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**Family Smoking Behavior and Bronchopneumonia in Toddlers at Sari Asih Hospital**

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**ABSTRACT**

Bronchopneumonia remains a major cause of morbidity among children under five and is a significant public health concern. One key environmental risk factor is exposure to cigarette smoke within households, particularly from family members who smoke. Toddlers are especially vulnerable due to their immature immune systems and developing lung function. This study aimed to examine the relationship between family members' smoking behavior and the incidence of bronchopneumonia among children under five at Sari Asih Ciledug Hospital. A quantitative cross-sectional design was used, involving 83 respondents selected through total sampling. Smoking behavior data were collected using structured questionnaires, while bronchopneumonia incidence was obtained from hospital medical records. Data were analyzed using univariate methods to describe respondent characteristics and bivariate analysis with the Chi-Square test to determine associations. The results showed a statistically significant relationship between family members' smoking behavior and bronchopneumonia incidence in toddlers ( $p < 0.05$ ). The Prevalence Odds Ratio (POR) of 16.640 indicated that toddlers exposed to cigarette smoke had a much higher risk of developing bronchopneumonia compared to those not exposed. These findings emphasize the importance of maintaining smoke-free home environments to protect children's health.

Keyword : Smoking behavior; bronchopneumonia; toddlers

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**INTRODUCTION**

Bronchopneumonia is one of the lower respiratory tract infections that remains a major cause of morbidity and mortality among children under five years of age. Pneumonia, including bronchopneumonia, contributes significantly to child mortality worldwide and continues to be a major public health problem due to its high incidence and the potential to cause serious complications if not treated promptly. According to the World Health Organization, pneumonia remains one of the leading causes of death among children under five globally (1). Similarly, UNICEF reports that pneumonia continues to contribute substantially to the global burden of disease in children (2).

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In Indonesia, pneumonia among toddlers still shows a relatively high incidence. Based on medical record data from Sari Asih Ciledug Hospital, during the period of March to May 2025, a total of 211 cases of bronchopneumonia in toddlers were recorded. The high number of cases indicates the need for serious attention to the risk factors that contribute to the occurrence of bronchopneumonia among children under five.

One of the risk factors that may increase the incidence of bronchopneumonia is exposure to cigarette smoke in the household environment. Smoking behavior among family members causes toddlers to become passive smokers who are exposed to harmful substances such as nicotine, tar, and carbon monoxide. These substances can reduce immune function and damage the respiratory defense system of children, thereby increasing their susceptibility to respiratory infections (3,4).

Several studies have shown that toddlers living with family members who smoke have a higher risk of developing lower respiratory tract infections, including bronchopneumonia (5,6). However, studies examining the relationship between family members' smoking behavior and the incidence of bronchopneumonia among toddlers at Sari Asih Ciledug Hospital are still limited. Therefore, this study aims to analyze the relationship between family members' smoking behavior and the incidence of bronchopneumonia among toddlers at Sari Asih Ciledug Hospital.

### **METHODS**

This study employed a quantitative research method with an analytic correlational design using a cross-sectional approach to examine the relationship between family members' smoking behavior and the incidence of bronchopneumonia among toddlers at Sari Asih Ciledug Hospital. The study was conducted from September to October 2025 at the pediatric inpatient ward and pediatric clinic of Sari Asih Ciledug Hospital. The study population consisted of all toddlers who received treatment at the pediatric inpatient ward and pediatric clinic during the study period. The sample included 83 toddlers, selected using a total sampling technique, meaning all eligible respondents who met the inclusion criteria during the study period were included in the research.

The inclusion criteria were toddlers aged 12–59 months, having complete medical records, and whose parents or guardians were willing to participate in the study. The exclusion criteria were toddlers with incomplete medical records or those diagnosed with congenital respiratory abnormalities. The sample consisted of toddlers diagnosed with bronchopneumonia and those without bronchopneumonia, as recorded in the hospital medical records. The independent variable in this study was family members' smoking behavior, while the dependent variable was the incidence of bronchopneumonia in toddlers. Data on smoking behavior were collected using a 10-item questionnaire adopted from Suparlina (2023), which had previously been tested for validity and reliability. Data on the incidence of bronchopneumonia were obtained from hospital medical records. Data analysis was performed using univariate analysis to describe the characteristics of respondents and bivariate analysis using the Chi-

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Square test to examine the relationship between variables, with a significance level of  $p < 0.05$ . This study adhered to research ethics principles, including informed consent, anonymity, confidentiality, non-maleficence, and justice.

### RESULT

**Tabel 1. Respondent characteristics based on age**

Characteristic	Category	Frequency (n)	Percentage (%)
Age of Toddlers (months)	12–24 months	22	26,5
	25–36 months	18	21,7
	37–48 months	17	20,5
	49–59 months	26	31,3
<b>Total</b>		<b>83</b>	<b>100%</b>

Based on the table, data regarding the age characteristics of respondents showed that the highest proportion of toddlers suffering from bronchopneumonia were aged 49–59 months, totaling 26 children (31.3%). This was followed by 22 children (26.5%) in the age group of 12–24 months, 18 children (21.7%) in the age group of 25–36 months, and 17 children (20.5%) in the age group of 37–48 months. This distribution indicates that bronchopneumonia occurred across all age groups of toddlers, with the greatest prevalence observed among those approaching five years of age. The findings suggest that increased physical activity and social interaction at older toddler ages may contribute to higher exposure to infectious agents, while younger children remain vulnerable due to immature immune systems and narrower airways.

**Tabel 2. Respondent characteristics based on gender**

Characteristic	Category	Frequency (n)	Percentage (%)
Gender	Female	49	59,0
	Male	34	41,0
<b>Total</b>		<b>83</b>	<b>100%</b>

Based on the table, data regarding the gender characteristics of respondents showed that 34 children (41%) with bronchopneumonia were female, while 49 children (59%) were male. This finding indicates that male toddlers were more frequently affected by bronchopneumonia compared to females. The higher proportion among boys may be related to biological differences such as narrower airway diameter and variations in immune response, which can increase susceptibility to respiratory infections.

**Tabel 3. Respondent Characteristics Based on Nutritional Status**

Characteristic	Category	Frequency (n)	Percentage (%)
Nutritional Status	Normal	79	95,2
	Underweight	3	3,6
	Severely Underweight	1	1,2
<b>Total</b>		<b>83</b>	<b>100%</b>

Based on the table, data regarding the nutritional status of respondents showed that 79 children (95.2%) with bronchopneumonia had good nutritional status, while 3 children (3.6%) had poor nutritional status and 1 child (1.2%) was severely malnourished. This finding indicates that

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bronchopneumonia can occur even among toddlers with adequate nutrition, suggesting that environmental and behavioral factors, such as exposure to cigarette smoke, play a more dominant role in the incidence of the disease. Nevertheless, poor nutritional status remains an important risk factor that may further compromise immune function and increase susceptibility to respiratory infections.

**Tabel 4. Respondent Characteristics Based on Immunization History**

<b>Characteristic</b>	<b>Category</b>	<b>Frequency (n)</b>	<b>Percentage (%)</b>
<b>Immunization History</b>	Complete	71	85,5
	Incomplete	12	14,5
<b>Total</b>		<b>83</b>	<b>100%</b>

Based on the table, data regarding the immunization history of respondents showed that 71 children (85.5%) with bronchopneumonia had a complete immunization record, while 12 children (14.5%) had incomplete immunization. This finding suggests that although immunization provides protection against several infectious diseases, it does not fully prevent the occurrence of bronchopneumonia, as multiple pathogens and environmental factors may contribute to its development. The high proportion of cases among children with complete immunization highlights the multifactorial nature of bronchopneumonia and underscores the importance of considering additional risk factors such as cigarette smoke exposure, nutritional status, and household environment in efforts to reduce its incidence.

**Tabel 5. Respondent Characteristics Based on Cigarette Smoke Exposure History**

<b>Characteristic</b>	<b>Category</b>	<b>Frequency (n)</b>	<b>Percentage (%)</b>
<b>Cigarette Smoke Exposure History</b>	Exposed	58	69,9
	Not Exposed	25	30,1
<b>Total</b>		<b>83</b>	<b>100%</b>

Based on the table, data regarding the history of cigarette smoke exposure among respondents showed that 58 children (69.9%) with bronchopneumonia had a history of exposure to cigarette smoke, while 25 children (30.1%) had no such exposure. This finding indicates that the majority of toddlers affected by bronchopneumonia were those living in households where cigarette smoke was present, highlighting passive smoke exposure as a major environmental risk factor contributing to respiratory illness in young children.

**Tabel 6. Respondent Characteristics Based on Previous History of Bronchopneumonia**

<b>Characteristic</b>	<b>Category</b>	<b>Frequency (n)</b>	<b>Percentage (%)</b>
<b>Previous History of Bronchopneumonia</b>	Ever	36	43,4
	Never	47	56,6
<b>Total</b>		<b>83</b>	<b>100%</b>

Based on the table, data regarding the history of previous bronchopneumonia among respondents showed that 36 children (43.4%) had experienced bronchopneumonia before, while 47 children (56.6%) had no prior history of the disease. This distribution suggests that although more than

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half of the toddlers had not previously suffered from bronchopneumonia, a considerable proportion had experienced recurrent episodes. The presence of prior infection is an important factor, as it may increase susceptibility to subsequent respiratory illnesses due to compromised lung function and weakened immune defenses.

**Tabel 7. Respondent Characteristics Based on Parents' Occupation**

Characteristic	Category	Frequency (n)	Percentage (%)
<b>Parents' Occupation</b>	Private employee	70	84,3
	Self-employed	9	10,8
	Others	4	4,8
<b>Total</b>		<b>83</b>	<b>100%</b>

Based on the table, data regarding the occupational background of respondents' parents showed that 9 parents (10.8%) worked as entrepreneurs, 70 parents (84.3%) were private employees, and 4 parents (4.8%) had other types of occupations. This distribution indicates that the majority of parents were employed in the private sector, reflecting socioeconomic conditions that may influence the family's ability to maintain a healthy household environment. Employment status is closely related to socioeconomic factors, which have been shown in previous studies to affect the risk of infectious diseases in children, including bronchopneumonia.

**Table 8. Characteristics of Respondents Based on Parental Education**

Characteristic	Category	Frequency (n)	Percentage (%)
<b>Parental Education Level</b>	Elementary–Junior High School	4	4,8
	Senior High School / Vocational High School	39	47,0
	Higher Education	40	48,2
<b>Total</b>		<b>83</b>	<b>100,0 %</b>

Based on the table, data regarding the educational background of respondents' parents showed that 4 parents (4.8%) had completed elementary to junior high school education, 39 parents (47%) had completed senior high school or vocational school, and 40 parents (48.2%) had attained higher education. This distribution indicates that nearly half of the parents had a college-level education, which may influence family health knowledge and practices, although environmental risk factors such as cigarette smoke exposure and household conditions remain critical determinants of child health outcomes.

**Table 9. Frequency Distribution of Family Members' Smoking Behavior**

Smoking Habit	Frequency	Percentage (%)
Smoking	57	68,7 %
Not Smoking	26	31,3 %
<b>Total</b>		<b>83</b>
		<b>100,0 %</b>

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Based on the table, it was found that the majority of respondent families had members who smoked, totaling 57 families (68.7%), while 26 families (31.3%) reported no smoking behavior. This distribution illustrates that smoking habits remain prevalent within households, thereby increasing the likelihood of passive smoke exposure among toddlers. Such conditions highlight the importance of addressing family smoking behavior as a critical environmental factor contributing to the risk of bronchopneumonia in children under five.

**Table 10. Frequency Distribution of Bronchopneumonia Incidence in Toddlers**

Bronchopneumonia Incidence	Frequency	Percentage (%)
Yes	62	74,7%
NO	21	25,3%
<b>Total</b>	<b>83</b>	<b>100,0 %</b>

Based on the table, it can be seen that the majority of toddlers experienced bronchopneumonia, amounting to 62 children (74.7%), while 21 children (25.3%) did not suffer from bronchopneumonia. This distribution highlights the high prevalence of bronchopneumonia among children under five in the study population, reinforcing the importance of identifying and addressing risk factors that contribute to its occurrence.

**Table 11. Cross-Tabulation of Family Smoking Behavior and Bronchopneumonia Incidence in Toddlers**

Family Members' Smoking Behavior	Incidence Bronkopneumonia				Total		P Value	POR
	Bronkopneumonia		No Bronkopneumonia		n	%		
	n	%	n	%				
Smoking	52	91,2	5	8,8	57	100	0,000	16,640 (4,957-55,855)
No Smoking	10	38,5	16	61,5	26	100		
<b>Total</b>	<b>62</b>	<b>74,7</b>	<b>21</b>	<b>25,3</b>	<b>83</b>	<b>100</b>		

The cross-tabulation analysis revealed a clear association between family members' smoking behavior and the incidence of bronchopneumonia among toddlers. In households where family members smoked, the majority of children, 52 (91.2%), developed bronchopneumonia, while only 5 (8.8%) did not. Conversely, in households without smokers, most toddlers, 16 (61.5%), did not experience bronchopneumonia, and only 10 (38.5%) were affected. The Chi-Square statistical test yielded a p-value of 0.000, which is less than the significance threshold of 0.05, indicating that the alternative hypothesis (H1) was accepted. This confirms a significant relationship between family members' smoking behavior and the incidence of bronchopneumonia in toddlers. Furthermore, the Prevalence Odds Ratio (POR) was calculated at 16.640 (95% CI: 4.957–55.855), meaning that toddlers from smoking households were 16.64 times more likely to develop bronchopneumonia compared to those from non-smoking households. These findings strongly suggest that exposure to cigarette smoke within the household environment is a dominant risk factor for bronchopneumonia among children under five, reinforcing the importance of smoke-free homes in protecting child respiratory health.

### **DISCUSSION**

The characteristics of toddlers suffering from bronchopneumonia in this study varied across several factors, including age, gender, nutritional status, immunization history, exposure to cigarette smoke, and previous episodes of bronchopneumonia. Most children were aged 49–59 months, which is a developmental stage characterized by increased physical activity and social interaction. At this age, children are more exposed to environmental pathogens, which may increase the risk of respiratory infections. Previous studies have also reported that children under five years old are more susceptible to pneumonia due to their immature immune systems and higher exposure to infectious agents (7,8).

Male toddlers were more frequently affected than females. This finding may be related to biological differences in airway anatomy and immune responses between boys and girls. Studies have shown that male children tend to have narrower airways and different immune responses, which may increase their vulnerability to respiratory infections (9).

Although most toddlers in this study had good nutritional status, bronchopneumonia still occurred. This suggests that environmental factors may play a more dominant role in the occurrence of the disease. One of the most significant environmental factors identified in this study was exposure to cigarette smoke. A large proportion of toddlers (69.9%) were exposed to cigarette smoke at home. Exposure to secondhand smoke can impair mucociliary clearance, damage airway epithelium, and weaken pulmonary defense mechanisms, thereby increasing the risk of respiratory infections in children (3,4,10).

Socio-demographic factors also contributed to the findings. Most parents worked as private employees, reflecting socioeconomic conditions that may influence household health environments. Although nearly half of the parents had higher education levels, environmental risks such as poor ventilation and smoking behavior within the household may still negatively affect children's health. Previous research has shown that socioeconomic status and parental smoking behavior are important determinants of respiratory infections in children under five years of age (11,12).

Furthermore, this study revealed that 68.7% of families had at least one smoker, and the incidence of bronchopneumonia was high, affecting 74.7% of toddlers. Bivariate analysis showed that 91.2% of children from smoking households developed bronchopneumonia compared to 38.5% from non-smoking households. The Chi-Square test confirmed a statistically significant association ( $p < 0.05$ ). The Prevalence Odds Ratio of 16.640 indicates that toddlers living in smoking households were 16.6 times more likely to develop bronchopneumonia than those from non-smoking households. These findings are consistent with previous studies showing that exposure to cigarette smoke significantly increases the risk of pneumonia and other respiratory infections in young children (5,6,13).

Overall, these findings highlight the multifactorial nature of bronchopneumonia, which is influenced by biological, environmental, and behavioral factors. Cigarette smoke exposure emerged as a major risk factor in this study. Therefore, effective prevention strategies are necessary, including the

promotion of smoke-free homes, improved household ventilation, and increased parental awareness of the health risks associated with smoking near children. Strengthening child health programs and public health interventions aimed at reducing secondhand smoke exposure may help reduce the burden of bronchopneumonia among children under five years old (1,2)

### **CONCLUSION**

The characteristics of toddlers suffering from bronchopneumonia vary according to age, gender, nutritional status, immunization history, exposure to cigarette smoke, and previous episodes of bronchopneumonia. The findings also reveal that smoking habits among family members remain prevalent within the household environment, creating conditions that expose toddlers to passive smoke and its harmful effects. Bronchopneumonia cases were more frequently observed among children from families with smoking behavior compared to those from non-smoking households, underscoring the role of environmental risk factors in respiratory health. Furthermore, the statistical analysis confirmed a significant relationship between family members' smoking behavior and the incidence of bronchopneumonia in toddlers, thereby supporting the research hypothesis. These results emphasize the urgent need for smoke-free home environments and highlight the importance of family awareness in preventing respiratory diseases among children under five years of age.

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