The Relationship of Maternal and Environmental Characteristics to the Occurrence of Acute Respiratory Infections (ARIs) in Children Under Five Years of Age in Searema Hamlet, Babulo Village, Same Administrative Post, Manufahi Municipality, Year 2024

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Abstract:

➤ *Introduction*

Acute Respiratory Infections (ARIs) are a primary global health concern, particularly affecting children under five years of age. In Searema Hamlet, the interplay of maternal and environmental characteristics significantly influences ARI occurrences.

➤ *Objective*

This study aims to investigate the relationship between maternal factors—such as education and health practices—and environmental conditions—including housing quality and sanitation—on the incidence of ARIs in children under five in Searema Hamlet, Babulo Village, Manufahi Municipality, during 2024.

➤ *Research Method*

A cross-sectional quantitative research design was employed, surveying 42 heads of households. Data were collected through interviews and questionnaires, focusing on maternal education, household conditions, and the health history of children.

➤ *Results & Discussion*

The findings showed a high rate of ARIs, with 83.33% of surveyed children affected. Maternal education levels were particularly low, with only 2.38% attaining tertiary education, which was linked to higher ARI rates. Environmental factors, such as housing, ventilation, and air quality, also proved to be important influences. While maternal characteristics had a negative relationship with ARI occurrence, environmental conditions demonstrated a positive correlation.

➤ *Conclusion*

The study underscores the urgent need for targeted public health interventions that enhance maternal education and improve environmental conditions to reduce ARI incidences. A holistic approach integrating educational and environmental strategies is essential for improving health outcomes in vulnerable populations.

Keywords: *Acute Respiratory Infections, Maternal Characteristics, Environmental Factors, Children Under Five, Public Health Interventions.*

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I. INTRODUCTION

Acute Respiratory Infection (ARI) refers to a group of diseases that impact various parts of the respiratory system, including the nose, throat, lungs, and bronchi. According to the Centers for Disease Control and Prevention (CDC, 2020), ARIs are a leading cause of illness worldwide, particularly affecting vulnerable populations such as young children and the elderly (CDC, 2020).

In developed countries, acute respiratory infections rank among the most prevalent health issues, significantly contributing to morbidity and mortality rates in children (World Health Organization [WHO], 2021). These infections are characterized by acute inflammation in both the upper and lower respiratory tracts, typically resulting from a range of microorganisms, including bacteria and viruses such as influenza, respiratory syncytial virus (RSV), and rhinoviruses (Mackenzie, 2022).

Particularly concerning are the impacts of ARIs on children, who are at greater risk due to their developing immune systems and smaller airways (Fleming et al., 2019). Factors such as environmental pollutants, exposure to second-hand smoke, and socioeconomic conditions can further increase the frequency and severity of these infections (Hedman et al., 2020). Understanding the dynamics of ARIs and their effects on public health is vital for developing effective prevention and treatment strategies (Greenberg et al., 2021).

According to the World Health Organization (WHO) (2023), several factors significantly influence the occurrence of Acute Respiratory Infection (ARI) in children under five years old. Key contributors include various environmental aspects, such as air quality, exposure to pollutants, and living conditions, as well as maternal characteristics, including the mother's health status, nutrition, and access to prenatal care. ARI is recognized as a critical public health issue, being the leading cause of mortality among children under the age of five globally. Alarmingly, approximately 7 million children succumb to ARI-related complications each year, underscoring the urgency of addressing this health crisis (WHO, 2023).

The burden of ARI is particularly pronounced in certain regions, with countries exhibiting strikingly high incidence rates. For instance, the Bahamas leads with 33% of cases, followed closely by Romania (27%), Timor-Leste (21%), Afghanistan (20%), Laos (19%), Madagascar (18%), Indonesia (16%), and India (13%) (Global Health Observatory, 2022). These statistics highlight persistent vulnerabilities in healthcare systems and environmental conditions in these nations.

In a national context, the Statistics & Health Information System, Ministry of Health (2023) reported that the total number of registered cases of ARI within the national territory reached 17,962 in 2023. Among these cases, a concerning 2,156 involved children under one year of age, while 4,436 affected those aged 1-4 years. Additionally, 2,977 cases were recorded in children aged 5-14 years, while a significant number of 8,393 cases were observed in individuals aged 15 years and above. This data, sourced from the Tatoli National Agency of Timor-Leste in 2023, indicates a widespread prevalence of ARI across all age groups, necessitating comprehensive public health interventions and increased awareness to mitigate the impact of this disease (Tatoli National Agency, 2023).

According to secondary data reported by Statistics & Health Information System, Ministry of Health (2023), the Community Health Centre at the Same Administrative Post has experienced significant fluctuations in cases of ARI diseases over the past few years. In 2020, there were reported 576 cases (EIS, 2023). This number decreased considerably in 2021, with only 420 cases recorded (EIS, 2023). Notably, there has been a resurgence in 2024, with 4,565 cases reported from January to April alone, which included 135 cases in just a two-week period (Statistics & Health Information System, Ministry of Health, 2024).

In the Manufahi Municipality, there were instances of ARI disease reported in children under five years old in 2023. The total number of cases in this age group reached 13,336, with a gender breakdown showing 6,291 cases among females and 7,045 cases among males (Statistics & Health Information System, 2023).

➤ *General Objective*

To investigate the relationship between maternal characteristics—such as education level, sanitation practices, and healthcare access—and environmental factors—including residential conditions and sanitation infrastructure—on the incidence of Acute Respiratory Infections (ARIs) in children under five years of age in Searema Hamlet, Babulo Village, Same Administrative Post, Manufahi Municipality, during the year 2024.

➤ *Specific Objectives*
- To assess maternal and child characteristics, including age, health history, demographic factors, and socio-economic status, that contribute to the prevalence of ARIs in children under five in Searema Hamlet, Babulo Village, Same Administrative Post, Manufahi Municipality, in 2024.

- To evaluate environmental conditions that may predispose children under five to ARIs, focusing on factors such as air quality, housing stability, access to clean water, and sanitation facilities in Searema Hamlet, Babulo Village, Same Administrative Post, Manufahi Municipality, in 2024.

II. RESEARCH METHODS

➢ *Designing Research*

In this study, a quantitative research methodology was employed, utilizing a cross-sectional study design as outlined by Sugiyono (2013). The research was conducted in Searema Hamlet, within the Babulo Village of the Same Administrative Post in the Manufahi Municipality, in 2024. This approach enabled a comprehensive examination of the variables at a specific point in time, facilitating the collection of relevant data to draw meaningful conclusions.

➢ *Population and Sample*

- *Population*

According to Sugiyono (2020), a population is defined as a broad category that includes objects or subjects with specific attributes and characteristics, recognized by researchers for conducting studies and drawing conclusions. Based on this definition, the population for this research includes 634 household heads living in Searema Hamlet, Babulo Village, in 2024.

- *Sample*

A sample serves as a representation of the overall characteristics of a population. When researchers face a large population and cannot examine every individual—due to limited resources, time, and effort—it becomes necessary to use a sample drawn from that population (Sugiyono, 2020). If the population consists of fewer than 100 individuals, the researcher should consider including the entire population as the sample. In contrast, if the population exceeds 100, the researcher should select a sample that adequately represents the whole population.

To determine the appropriate sample size and ensure accuracy for this study, we applied Taro Yamane's formula along with Slovin's formula. Starting with a population of 634, we used Taro Yamane's formula with a precision level of 15%, which led to a final sample size of 42 respondents. These respondents will represent the heads of household in our study.

➢ *Data Collection Tool*

As noted by Sappaile (2007) and Sugiyono (2017), research tools are measurement devices that offer insight into the subject being studied. Consequently, the instrument employed for the research is detailed below.:

- An interview serves as a data collection method when researchers aim to identify issues that require investigation, as well as to gain deeper insights into respondents' perspectives.

- A questionnaire is a method of data collection that consists of a set of questions or written prompts provided to respondents for their responses.
- Observation is a data collection approach that involves systematically watching and recording problems or situations related to a subject at the research location.
- Documentation is a method employed to gather data and information from sources such as books, archives, records, written figures, and images in the form of reports, which can support research efforts.

➢ *Data Processing Techniques*

The data collected through questionnaires will be processed during the data processing stage, which includes editing, coding, data entry, and cleaning.

- Editing: The researcher will review the data obtained and examine it for errors (Hernandez, 2017).
- Coding: This process converts qualitative data into numerical formats, making it easier for researchers to tabulate and analyze the data (Burns & Grove, 2016). The data will be checked and corrected for completeness, and each item will be assigned a symbol or code according to its operational definition.
- Data Entry: Once the data has been coded, the researcher will enter the data for analysis. This involves reviewing the completed responses alongside their corresponding codes, which are then input into specialized computer software (Lemon & Wright, 2019). Special attention will be given to the coded values based on the outcomes outlined in the operational definition.
- Cleaning: The entered data will be reviewed to ensure its accuracy. A univariate frequency distribution list will be created for each variable to match the collected data with the recorded values. Researchers will confirm that the data aligns perfectly and is 100% accurate during this process. Additionally, efforts will be made to identify any missing data and ensure overall data consistency (Notoatmodjo, 2018; Creswell & Creswell, 2017).

➢ *Data Analysis Techniques*

This research employs quantitative descriptive analysis as its primary data analysis technique, utilizing both bivariate and multivariate analysis (Field, 2018). This approach allows for a comprehensive examination of relationships between maternal and environmental characteristics and the occurrence of Acute Respiratory Infections (ARIs) in children under five years of age (World Health Organization, 2020). By employing these statistical methods, the researchers can identify patterns and correlations within the collected data, which helps understand the factors influencing health outcomes in Searema Hamlet (Creswell & Creswell, 2018).

III. RESEARCH RESULTS AND DISCUSSION

➢ *Research Results*

Searema is a Hamlet located in Babulo Village, Same Administrative Post, Manufahi Municipality. The population in this village mostly lives with agricultural life, while others work as vendors, public servants and private employees. The

tables below will present the research findings related to maternal and environmental characteristics:

Table 1: Total Population by Gender in Searema Hamlet, Babulo Village, Same Administrative Post, Manufahi Municipality, Year 2024.

Gender	Frequency	(%)
Female	837	50.94
Male	806	49.06
Total	**1643**	**100**

Sources: Secondary data 2024

From the table above, it is evident that the gender distribution shows a slight predominance of females, numbering 837 and accounting for 50.94% of the population. In contrast, males total 806, making up 49.06% of the population.

This gender ratio indicates a relatively balanced demographic structure, albeit with a marginally higher number of females compared to males. The difference in numbers may reflect various socio-cultural factors that impact gender distribution in the area. Overall, the total population number suggests an active and potentially vibrant community, with the near-equal representation of both genders supporting a diverse social fabric in Searema Hamlet.

Given that the population numbers are closely aligned, this balance can positively contribute to the social dynamics and community engagement initiatives within the village, which may focus on inclusive development by considering both male and female perspectives.

Table 2: Frequency Distribution by the Education Level of Mothers (Respondents) in Searema Hamlet, Babulo Village, Same Administrative Post, Manufahi Municipality, 2024.

Education Level	Frequency	(%)
Did not complete Primary	3	7.14
Primary	3	7.14
Pre-Secondary	9	21.43
Secondary	26	61.90
Tertiary	1	2.38
Total	**42**	**100**

Sources: Primary Data 2024

The data presented in Table 2 illustrate the frequency distribution of mothers' education levels in Searema Hamlet, located in Babulo, Suco, within the Same Administrative Post of Manufahi Municipality, for the year 2024.

From the table, it is evident that a significant majority of mothers in the village have attained either secondary or pre-secondary education. Specifically, 61.90% (26 mothers) completed secondary education, making it the most common level of education among the respondents. In contrast, those who achieved pre-secondary education represent 21.43% (9 mothers), indicating a notable number who completed education before entering secondary school.

At the lower end of the educational spectrum, 14.28% of mothers, comprising six individuals, have not completed primary education. Of these, three mothers (7.14% of the total) have not completed primary education, while three others (7.14% of the total) have completed it. This reflects a small but significant portion of mothers who have not progressed far in their educational journey. Only one mother, representing approximately 2.38% of the total, has attained a tertiary education.

Overall, the data highlight a concerning trend in which a large proportion of mothers have low educational attainment, with only 2.38% achieving a tertiary education. This could have implications for the academic and developmental outcomes of the next generation in the hamlet, as maternal education is often linked to improved health, welfare, and educational opportunities for children. Given the focus on secondary and pre-secondary levels, it may be beneficial for local educational initiatives to support opportunities for mothers to further their education beyond secondary school.

Table 3: Frequency Distribution by Family Income (Respondents) in Searema Hamlet, Babulo Village, Same Administrative Post, Manufahi Municipality, 2024.

Family (US Dollar)	Frequency	(%)
>115	2	4.76
=<115	40	95.24
Total	**42**	**100**

Sources: Primary Data 2024

The frequency distribution data from Table 3 illustrates the family income levels in Searema Hamlet, located in the Babulo Village within the Same Administrative Post of Manufahi Municipality for the year 2024.

In total, 42 families were surveyed, with a clear distinction between the two income groups. Out of these families, only two families, which account for approximately 4.76% of the total surveyed population, reported a monthly income exceeding $115. This indicates a minimal number of families with higher incomes in this village.

Conversely, a significant majority of 40 families, constituting 95.24% of the total, reported incomes of $115 or less. This overwhelming percentage reflects the economic challenges faced by the majority of households in Searema Hamlet, suggesting a prevalent low-income status within the community.

This analysis highlights the need for targeted economic interventions or support programs designed to improve the financial situation of families in this village, ultimately aiming to reduce poverty and enhance the living conditions for the majority of its inhabitants.

Table 4: Frequency Distribution by Sex of Children in Searema Hamlet, Babulo Village, Same Administrative Post, Manufahi Municipality for the year 2024.

Gender of Children	Frequency	(%)
Female	17	40.48
Male	25	59.52
Total	**42**	**100**

Sources: Primary Data 2024

The frequency distribution of children by sex in Searema Hamlet, located in Babulo Village within the Same Administrative Post of Manufahi Municipality, reveals a noteworthy demographic insight. The total number of children surveyed is 42, comprising 17 females and 25 males.

This distribution indicates that females account for approximately 40.48% of the children, while males represent a higher proportion at about 59.52%. The data suggests a male-to-female ratio of approximately 1.47:1, indicating significantly more boys than girls in this hamlet's child population.

Table 5: Frequency Distribution of Child Immunization History in Searema Hamlet, Babulo Village, Same Administrative Post, Manufahi Municipality, 2024.

Immunization History	Frequency	(%)
Children receive immunisation	41	97.62
Children did not receive immunisation	1	2.38
Total	**42**	**100**

Sources: Primary Data 2024

The data presented in Table 5 provides a clear overview of the child immunization history in Searema Hamlet, within the Babulo Village of the Same Administrative Post in Manufahi Municipality for the year 2024.

From the frequency distribution, it is evident that a significant majority of children in this community have received their immunizations. Specifically, 41 out of 42 children, accounting for 97.62%, have been immunized. This high percentage indicates strong adherence to immunization programs, reflecting positively on public health initiatives in the area.

Conversely, only 1 child, which represents 2.38% of the total, did not receive immunization. While this figure is minimal, it highlights a small gap that may require attention from health officials and community leaders to ensure that all children benefit from crucial vaccinations.

Overall, the data suggests a robust commitment to child health in Searema Hamlet, with almost universal coverage in immunization. However, efforts may still be necessary to address the factors that contributed to the non-immunization of the remaining child, ensuring continued progress in public health outcomes within the community.

Table 6: Frequency Distribution by House Ventilation in Searema Hamlet, Babulo Village, Same Administrative Post, Manufahi Municipality in 2024.

Ventilation Status	Frequency	(%)
Good ventilation	36	85.71
Poor ventilation	6	14.29
Total	**42**	**100**

Sources: Primary Data 2024

In 2024, a study was conducted in Searema Hamlet, located in the Babulo Village of the Same Administrative Post within the Manufahi Municipality, focusing on the status of house ventilation. The findings reveal a significant prevalence of good ventilation among the residences surveyed.

Out of a total of 42 households, 36 (representing 86%) reported having good ventilation, indicating that the majority of homes provide an adequate airflow. This high percentage suggests that residents have generally implemented effective design and construction practices or have made modifications that enhance air circulation within their homes. Good ventilation is vital for maintaining indoor air quality, reducing humidity, and preventing issues such as mould and respiratory problems.

Conversely, only six households (which account for 14%) reported poor ventilation. This lower percentage highlights a notable minority of homes that may face potential health risks associated with inadequate airflow. These households may benefit from interventions aimed at improving ventilation, such as structural modifications or the incorporation of ventilation systems.

In summary, the data indicate that the majority of households in Searema Hamlet have successfully established good ventilation practices. However, addressing the needs of the smaller percentage of homes with inadequate ventilation could further enhance the overall living conditions in the community. This information highlights the importance of maintaining awareness and ongoing efforts to enhance home ventilation, thereby ensuring the health and well-being of residents.

Table 7: Frequency Distribution of House Window Presence in Searema Hamlet, Babulo Village, Same Administrative Post, Manufahi Municipality, 2024.

Presence of the house windows	Frequency	(%)
Presence of windows	36	85.71
Absence of windows	6	14.29
Total	**42**	**100**

Sources: Primary Data 2024

In Searema Hamlet, located within the Babulo Village of the Same Administrative Post in Manufahi Municipality, a recent survey conducted in 2024 assessed the presence or absence of house windows among the local population. The data reveals insightful trends regarding housing conditions in the area.

Out of a total of 42 houses surveyed, a significant majority —specifically, 36 houses —reported having windows. This accounts for an impressive 85.71% of the homes, indicating that windows are a common feature in the village. The benefits of having windows are noteworthy, as they contribute to improved ventilation, natural lighting, and overall quality of life.

On the other hand, only six houses, which represent 14.29% of the total, were found to lack windows. This absence could have various implications for the living conditions of those households, such as limited airflow, decreased sunlight, and potential challenges in maintaining a healthy indoor environment.

In summary, the data from Searema Hamlet highlights a predominantly positive housing feature: the presence of windows, which reflects a trend towards better living standards. However, the notable minority of homes without windows warrants attention, as it may suggest areas for improvement in housing infrastructure and community development efforts.

Table 8: Frequency Distribution by House Windows Functionality in Searema Hamlet, Babulo Village, Same Administrative Post, Manufahi Municipality in 2024.

House Window	Frequency	(%)
Works well	19	52.78
Did not work well	17	47.22
Total	**36**	**100**

Sources: Primary Data 2024

In the Searema Hamlet of Babulo Village, located within the Same Administrative Post of the Manufahi Municipality, a survey was conducted in 2024 to assess the functionality of house windows. Out of a total of 42 houses surveyed, 36 houses reported having windows, indicating a relatively high prevalence of window installations in the area.

The analysis of window functionality reveals that 19 houses, or 52.78%, reported that their windows work well. This suggests that just over half of the surveyed houses benefit from functional windows, which likely contribute positively to ventilation, light, and overall living conditions. In contrast, 17 houses, or 47.22%, indicated that their windows did not work well. This highlights a significant concern regarding home maintenance and functionality, as almost half of the households may face challenges related to inadequate window functionality, which could compromise their comfort and safety.

Overall, the data illustrate a split in window functionality within the community, with a slight majority experiencing satisfactory conditions in this regard. However, the nearly equal proportion of houses with non-functional windows highlights the need for increased home maintenance and improvement efforts in Searema Hamlet, as improving window functionality could lead to better living standards for many residents.

Table 9: Frequency Distribution by Water Absorption within homes in Searema Hamlet, Suco Babulo, Same Administrative Post, Manufahi Municipality, in 2024.

Soil Condition for Water Absorption within the Home	Frequency	(%)
Well Absorbed	17	40.48
Not Well Absorbed	25	59.52
Total	42	100

Sources: Primary Data 2024

The data presented in Table 9 provide insights into the soil conditions that affect water absorption within homes in Searema Hamlet, located in the Suco Babulo of the Same Administrative Post, Manufahi Municipality. The frequency distribution reveals two categories regarding soil absorption capabilities: "Well Absorbed" and "Not Well Absorbed."

Out of a total of 42 observations, 17 homes (40.48%) reported that the soil condition allowed for the well absorption of water, indicating a relatively moderate capacity of the soil to manage water effectively. Conversely, a larger portion, 25 homes (59.52%), indicated that the soil was poorly absorbent, suggesting significant challenges in managing water drainage and absorption.

This disparity highlights a prevalent issue with the soil conditions in the area, as more than half of the households experience problems with water absorption. These difficulties could lead to various implications for public health and sanitation. Poor water absorption can lead to waterlogging and increased susceptibility to flooding, resulting in damage to infrastructure and reduced agricultural productivity.

Overall, the findings underscore a pressing need for interventions that improve soil quality and water management practices within the community, thereby enhancing water absorption and ultimately improving living conditions for residents. Addressing these issues will be vital for sustainable development in Searema Hamlet.

Table 10: Frequency Distribution by Fireplace Working Properly in Searema Hamlet, Babulo Village, Same Administrative Post, Manufahi Municipality in 2024.

Fireplace	Frequency	(%)
Works Properly	41	97.62
Did not work properly	1	2.28
Total	42	100

Sources: Primary Data 2024

In Searema Hamlet, Babulo Village, the assessment of fireplace functionality reveals a remarkably high level of performance among the examined units. Out of 42 fireplaces surveyed, an impressive 41, accounting for 97.62% of the total, were reported to be working correctly. This suggests that the majority of households have efficient heating solutions that likely contribute to their comfort and safety.

Conversely, only one fireplace, representing 2.28% of the total, was found to be malfunctioning. This minor percentage indicates that issues related to fireplace operations are relatively rare within the community.

The data underscores the effectiveness of local resources and maintenance practices, as the overwhelming majority of fireplaces are operational. Such high functionality rates could be attributed to proper maintenance practices, effective installation, and possibly favourable environmental conditions that enhance their durability.

Overall, the analysis indicates a firm reliance on functional fireplaces in Searema Hamlet, an essential aspect of daily life for many residents. The minimal proportion of non-functioning fireplaces suggests a low likelihood of disruption in heating needs, which could positively impact the community's quality of life.

Table 11: Frequency Distribution according to the occurrence of ARI disease for Children Under Five Years in Searema Hamlet, Babulo Village, Same Administrative Post, Manufahi Municipality in 2024.

Occurrence of Diseases	Frequency	(%)
Occurrence of ARI Diseases	35	83.33
Does not occur ARI Diseases	7	16.67
Total	**42**	**100**

Sources: Primary Data 2024

In 2024, a study was conducted to analyse the occurrence of Acute Respiratory Infections (ARI) among children under five years in Searema Hamlet, located in the Babulo Village of the Same Administrative Post within the Manufahi Municipality. The results of the frequency distribution provide significant insights into the prevalence of ARIs in this population.

Out of a total of 42 children surveyed, a notable majority of 35 children, which constitutes 83.33%, reported experiencing ARIs. This high percentage indicates that ARIs are a prevalent health concern in this community, potentially highlighting environmental, social, or healthcare-related factors that contribute to the increased incidence of these infections.

Conversely, only seven children, amounting to 16.67% of the surveyed population, were reported to be free from ARIs. This figure further underscores the widespread nature of the disease among young children in Searema Hamlet, suggesting that protective health measures, awareness, and access to healthcare services may be limited for a substantial portion of the population.

Overall, the data reflect a concerning trend regarding the health of young children in the area, emphasising the need for public health interventions aimed at reducing the incidence of ARIs. These interventions could include educational programs for parents about prevention strategies, improved access to healthcare services, and initiatives to enhance overall living conditions in the village.

Table 12: Coefficient Test on the Relationship Between Maternal and Environmental Characteristics and the Occurrence of IRA Disease in Children Under Five Years in Searema Hamlet, Babulo Village, Same Administrative Post, Manufahi Municipality in 2024.

Coefficients							
	Unstandardized Coefficients		Standardized Coefficients	T	Sig.	95.0% Confidence Interval for B	
	B	Std. Error	Beta			Lower Bound	Upper Bound
(Constant)	1.185	.235		5.039	.00 0	.709	1.660
Characteristics of Mothers	-.236	.113	-.304	-2.096	.04 3	-.464	-.008
Environment Characteristics	.240	.123	.283	1.953	.05 8	-.009	.488

Sources: Primary Data 2024

The table presents a model evaluating two key independent variables: maternal characteristics and environmental factors. The results indicate that maternal characteristics have an unstandardized coefficient of -0.236, suggesting a negative relationship with the occurrence of ARI. However, with a significance value of 0.043, which is less than the 0.05 threshold, and a t-value of -2.096 that is lower than the critical t-value of 2.708, we conclude that there is no significant relationship between maternal characteristics (X1) and the occurrence of ARI in this sample. This implies that variations in maternal characteristics do not significantly predict the likelihood of ARI in children under five in this particular demographic context.

On the other hand, environmental characteristics showed a different trend. The unstandardized coefficient for environmental factors is 0.240, indicating a positive relationship with the occurrence of ARI. However, the significance value of 0.058, while close to the threshold, is still greater than 0.05, coupled with a t-value of 1.953 that does not exceed the critical t-value of 2.708. This reinforces the conclusion that there is no substantial relationship between environmental factors (X2) and the occurrence of ARI, although it suggests a potentially relevant association that may warrant further investigation.

In summary, while both maternal and environmental characteristics show some level of association with ARI, the statistical analysis indicates that neither variable significantly influences the occurrence of the disease among the children studied in Searema Hamlet. Future research could explore other factors or methodologies that may shed light on the dynamics affecting health outcomes in this population.

Table 13: Relationship of Maternal and Environmental Characteristics to the Occurrence of ARIs Diseases in Children Under Five Years in Searema Hamlet, Babulo Village, Same Administrative Post, Manufahi Municipality in 2024.

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	1.470	2	.735	6.571	.003[b]
Residual	4.363	39	.112		
Total	5.833	41			

Sources: Primary Data 2024

The data presented in Table 13 illustrate the relationship between maternal and environmental characteristics and the occurrence of Acute Respiratory Infections (ARIs) in children under five years of age in Searema Hamlet, located in the Babulo Village of the Same Administrative Post within Manufahi Municipality in 2024.

The regression analysis shows a sum of squares of 1.470 for the regression model, with 2 degrees of freedom (df), resulting in a mean square of 0.735. The F-statistic of 6.571 is significant, with a p-value (Sig.) of 0.003, which is notably less than the conventional alpha level of 0.05. This indicates a statistically significant relationship between the independent variables—maternal characteristics (X1) and environmental characteristics (X2)—and the dependent variable, the occurrence of ARIs (Y).

The residual sum of squares is reported as 4.363 with 39 degrees of freedom, yielding a mean square of 0.112. The total sum of squares amounts to 5.833 across the 41 observations. The low significance value suggests that the combined influence of maternal and environmental variables is likely to significantly affect the incidence of ARIs in this population.

Based on these findings, we can conclude that there is a noteworthy correlation between the characteristics of mothers and environmental conditions concerning the frequency of ARIs in young children. Consequently, the null hypothesis (Ho) can be rejected in favour of the alternative hypothesis (Ha), affirming that maternal and environmental factors do influence the occurrence of ARIs in children under five years of age in the specified region.

These results highlight the importance of considering maternal and environmental health attributes when addressing childhood illnesses, particularly ARIs. Targeted interventions focusing on improving these characteristics could potentially reduce the incidence of such diseases in vulnerable populations.

Table 14: Maternal and Environmental Characteristics Related to ARIs in Children Under Five Years in Searema Hamlet, Babulo Village, Same Administrative Post, Manufahi Municipality, 2024.

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.502a	.252	.214	.334	.252	6.571	2	39	.003

Sources: Primary Data 2024

The data presented in Table 14 provides an analysis of the relationship between maternal and environmental characteristics and the occurrence of ARIs (Acute Respiratory Infections) disease in children under five years in Searema Hamlet, Babulo Village, Same Administrative Post, Manufahi Municipality, during the year 2024.

The correlation value (R) is recorded at 0.502, indicating a moderate positive relationship between the independent variables (Maternal and Environmental Characteristics) and the dependent variable (Occurrence of ARIs), which refers to the occurrence of ARIs. This suggests that as maternal and environmental characteristics improve, there is a corresponding decrease in the incidence of ARs in this age group.

The coefficient of determination (R²) is 0.252, meaning that approximately 25.2% of the variance in ARIs' disease occurrence can be explained by the two variables under consideration. In practical terms, this implies that around a quarter of the factors contributing to ARIs' diseases in the studied population are influenced by maternal and environmental characteristics. Conversely, the remaining 74.8% of the variance remains unexplained by these variables, indicating that other factors may play significant roles. These could include genetic predispositions, access to healthcare, socio-economic conditions, or other environmental factors not accounted for in this study.

The standard error of the estimate is noted at 0.334, which provides insight into the accuracy of the predictions made from the regression model. A more standard minor mistake would suggest that the observed values closely align with the predicted values, thereby increasing the reliability of the results.

The change statistics further highlight the significance of the relationship, as evidenced by the F-change value of 6.571 with a significance level (Sig. F Change) of 0.003. This low p-value indicates strong evidence against the null

hypothesis, supporting the assertion that there is a statistically significant relationship between the studied variables.

In summary, while the data suggests a noteworthy relationship between maternal and environmental characteristics and the occurrence of ARI disease in children under five, it also points to the necessity of exploring other factors that may contribute to the disease, thereby providing a broader understanding of the issue at hand and informing strategies for intervention and prevention.

➢ *Discussion*

The relationship between maternal and environmental characteristics and the occurrence of Acute Respiratory Infections (ARIs) in children under five years of age is a critical area of public health research, particularly in regions like Searema Hamlet, where socioeconomic and environmental conditions can significantly impact health outcomes.

Maternal education and health knowledge are pivotal in preventing ARIs. As highlighted by Smith et al. (2020), mothers equipped with better health knowledge tend to implement healthier practices that can mitigate the incidence of ARIs in their children. In the present study, a significant portion of mothers in Searema Hamlet had low educational attainment, with only 2.38% having completed tertiary education. This aligns with findings from Hedman et al. (2020), which suggest that lower maternal education correlates with higher rates of respiratory illnesses in children. The lack of education can lead to inadequate health-seeking behaviours and poor hygiene practices, exacerbating ARI risks.

Environmental determinants, such as housing quality, ventilation, and air pollution, also play a crucial role in the health of young children. The study found that 85.71% of households reported good ventilation, which is essential for maintaining indoor air quality and reducing respiratory diseases (Miller, 2021). Conversely, poor housing conditions have been linked to a higher prevalence of ARIs (Johnson & Lee, 2019). In this context, Searema Hamlet's relatively good ventilation may contribute positively to health outcomes. However, the substantial number of households facing environmental challenges—like air pollution and inadequate sanitation—remains a concern.

The prevalence of ARIs in Searema Hamlet, with 83.33% of surveyed children affected, underscores the urgent need for targeted public health interventions. This statistic is alarming, especially considering the WHO's assertion that ARIs are a leading cause of mortality in children under five globally (WHO, 2023). The high incidence observed in this study resonates with the findings of the Global Health Observatory (2022), which reported striking ARI rates in various countries, emphasizing the global burden of these infections.

Comparing the findings from Searema Hamlet with similar studies in different contexts highlights the multifaceted nature of ARIs. For example, a study in Timor-Leste indicated that socioeconomic factors significantly affect health outcomes (Tatoli National Agency, 2023). In contrast, research by Chen et al. (2022) emphasized the impact of environmental pollution on respiratory health, particularly in urban settings. This suggests that while maternal education and knowledge are crucial, environmental conditions can have a disproportionate impact on ARI incidence, particularly in low-income areas.

The intersection of maternal and environmental factors presents a compelling case for integrated health initiatives. Public health strategies should focus on enhancing maternal education while simultaneously improving environmental conditions. Educational programs targeting maternal health knowledge, hygiene practices, and the importance of seeking medical care can play a transformative role in reducing ARI incidences (Greenberg et al., 2021).

Furthermore, addressing environmental issues through improved housing conditions and air quality regulations could yield significant health benefits for children. As evidenced by the findings in Searema Hamlet, a holistic approach that encompasses both maternal education and environmental improvements is essential for reducing the burden of ARIs.

In conclusion, the findings from Searema Hamlet highlight the critical interplay between maternal characteristics and environmental factors in determining the occurrence of ARIs in young children. Future research should continue to explore these relationships, considering other potential influences such as genetic predispositions and healthcare access. By adopting comprehensive public health interventions that address both educational and environmental challenges, we can significantly improve health outcomes for vulnerable populations.

IV. CONCLUSION

The study conducted in Searema Hamlet highlights the significant relationship between maternal and environmental characteristics and the occurrence of Acute Respiratory Infections (ARIs) in children under five years of age. The findings indicate that although maternal education and health knowledge are crucial, environmental factors such as housing quality, ventilation, and air pollution play a vital role in influencing health outcomes.

The data revealed a high prevalence of ARIs, with 83.33% of surveyed children affected, underscoring the urgent need for targeted public health interventions. These interventions should focus on enhancing maternal education and improving environmental conditions to mitigate the incidence of ARIs.

Despite the significant correlation identified between these factors, the study also noted that a substantial portion of ARI occurrences remains unexplained, suggesting that other variables—such as access to healthcare and socioeconomic conditions—may also contribute to the disease burden.

In conclusion, a holistic approach that combines educational initiatives with environmental improvements is essential for addressing the health challenges faced by young children in Searema Hamlet. Future research should continue to explore these dynamics to inform effective public health strategies and improve overall health outcomes for vulnerable populations.

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