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Determinants of time to seeking treatment among under-five children suffering from Pneumonia in Uganda

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Abstract

The major goal of this study was to determine the factors influencing the time to seeking treatment among under-five children suffering from pneumonia in Uganda. The Makerere University School of Public Health dataset, which included 791 caregivers that were subjected to a prospective cohort study. A multi-stage sample approach was used. Descriptive statistics and Kaplan-Meier were adopted in the study. The length of time that caregivers waited before search of treatment was different among areas of Uganda. Caretakers with high wealth scores, those who frequently visited public health facilities, and those with higher monthly incomes were more likely to search for medication for their children early on. The results showed that parents of male children were more inclined to put off obtaining medical attention. The type of facility, the child's gender, the asset score, and the monthly income of the homestead were among the variables associated with time to seeking treatment among children of under-five. There is need to increase awareness of pneumonia symptoms in children. There should be increased health literacy among caretakers in the country, particularly those with lower wealth scores and monthly incomes.

Keywords: Pneumonia, Under-Five Children, Uganda, Weibull, Statistics

1.0 Introduction:

Pneumonia is described as a severe inflammatory condition of the parenchymal lining of the lungs (WHO 2022). about 1.2 million children under the age of five worldwide die each year from pneumonia, Which continues to be the main cause of infant mortality (UNICEF, 2019). Disproportionately, 95% of these deaths occur in low- and middle-income countries. In 2019, pneumonia claimed the lives of more than 80,000 children under the age of five, or one toddler every 39 seconds (UNICEF, 2019). The global burden of pediatric pneumonia mortality has

continuously been advised to be reduced through prompt care-seeking and adequate management (Chen et al., 2022). To increase the chance of a kid surviving, timely medical attention and access to high-quality care are essential (Shimelis et al., 2022). However, for this to happen, parents or caregivers must be able to recognize pneumonia warning symptoms and signs (Pajuelo et al., 2018). In East Africa, the prevalence of pneumonia in children under-five is estimated at 34% (Beletew et al., 2020). In Uganda, 80% of adolescents under the age of five who seek treatment from a health professional have symptoms of an acute respiratory illness. Pneumonia incidence among children under-five has been estimated by studies to range between 16% and 33% in a unique African international setting (Kiconco et al., 2021).

The main risk factors for pneumonia include nursing, inadequate nutrition, indoor air pollution, low birth weight, overcrowding, a lack of immunization, and coexisting illnesses (Sutriana et al., 2021). Children with weakened immune systems, such as those who are malnourished, especially newborns who are not exclusively breastfed, are more likely to contract pneumonia (Kiconco et al., 2021). Pneumonia is more common among children under-five, and in developing nations, it continues to be the predominant cause of morbidity and mortality in this age group (Beletew et al., 2020). According to estimates from Abate et al. (2020), there were 102 million instances of pneumonia in children under the age of five, with 0.7 million of those cases leading to fatalities. The prevalence of pneumonia has been revealed by numerous primary research in Uganda (Ekirapa -Kiracho et al., 2021). However, discrepancies between those studies have been noted, and no study has been done to document the treatment-seeking behaviors over time. Therefore, the goal of this study was to determine the variables that influenced how long it took Ugandan children under the age of five who had pneumonia to seek care.

In every country on the globe, getting treatment as soon as possible may help reduce the high rate of pneumonia mortality among children under-five (Ukwaja et al., 2012). The government of Uganda has put into practice several strategies that were adapted from the Global Action Plan for Prevention and Control of Pneumonia (GAPP). These strategies include a combination of interventions to protect, prevent, and treat pneumonia in young children, such as vaccination, encouraging exclusive breastfeeding for six months, and access to appropriate pneumonia treatment (Nabunya et al., 2020; Uganda Bureau of Statistics (UBOS), 2016). Many Ugandan children under the age of five have died from pneumonia despite the government's measures. Pneumonia causes 10% of mortality in children under-five in Uganda, according to the ministry of health. Every day, at least 25 children in Uganda pass away from the same illness known as pneumonia. Pneumonia deaths could be prevented if caregivers were able to recognize the symptoms and signs in kids with the condition and promptly seek treatment. Numerous research on the factors influencing the length of time it takes to seek medical attention for pneumonia treatment have been carried out in developing nations including Ethiopia, India, and Uganda. Some of these employed a multivariate logistic regression model, which causes information loss and makes it difficult to decide which group end points to utilize (Degefa et al., 2018; Malhotra & Upadhyay, 2019). Studies on diseases like Anemia, HIV and Pneumonia in the continent of Africa is of great benefit for proper understanding of the patterns of such diseases. (Ogunsakin et al., 2020; Olubiyi et al., 202

2. Review of Literature:

In Uganda, studies on the factors associated with time to seeking treatment among pneumonia children have been carried out but never employed the Weibull proportional hazards model (Ekyaruhanga, 2022; Källander et al., 2008). The study's main goal was to identify the factors influencing the time to seeking treatment among under-five children suffering from pneumonia in Uganda. The study's findings shed light on the variables that influence how long it takes for children in Uganda's under-five age group who have pneumonia to seek treatment. The results are especially useful for policy preparation on the behavior of seeking treatment. The outcomes have a significant impact on how program strategies and interventions are developed by many stakeholders with the goal of lowering pediatric pneumonia-related morbidity and mortality in relation to treatment uptake.

3. Research Methodology:

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This study adopts Anderson's Health Behavior Model as a foundation, conceptual framework was created (Khanam et al., 2016). The independent variables, such as socio-demographic factors, economic factors, and structural issues, directly affect how long it takes to seek treatment for diarrhea. Based on information provided by the Makerere University School of Public Health which illustrates the potential relationships between socio-demographic factors, economic factors, structural factors, and the length of time before seeking treatment for pneumonia. This study concentrated on children under the age of five who had pneumonia, as reported by their caregivers. The empirical research on the social, demographic, economic, and structural variables that affect how long it takes before a patient seeks therapy is presented.

3.1 Data Source

This analysis made use of secondary data from the Decade of Vaccine Economics (DOVE) study, which was carried out by the Makerere University School of Public Health in collaboration with the Johns Hopkins School of Public Health. A prospective cohort study was used in the DOVE study (2017–2018). 48 health centers were chosen using a straightforward random selection technique after a multi-stage sampling design was utilized to reach out to health facilities. From four regions (Northern, Eastern, Western & Central), four districts were chosen. Twelve health facilities were then chosen from each district, bringing the total number of health facilities to 48. The total number of caregivers interviewed during both the patient caretaker exit survey and the patient caretaker follow-up survey was 720 after a sample of 15 caregivers was chosen from each healthcare facility.

Kampala district from the Central region, Gulu district from the Northern region, Mbarara district from the Western region, and Jinja district from the Eastern region were chosen to guarantee that the data obtained was logically and geographically possible for the entire nation. To assure representation of hospitals at all levels—HCIV, HCIII, and HCII—facilities in each chosen district were chosen across all levels. To accurately reflect rural and urban areas, health facilities from various levels were chosen. The representativeness of the several types of facility ownership, such as private for profit, private not for profit, and public facility, was also taken into consideration.

3.2 Methods of Data Analysis

A survival data analysis approach was adopted in the investigation. Prior to the analysis, a survival variable was generated. A survival variable represented those who sought treatment and all observations were coded 1 since there were no censoring problems. The analysis was carried out at three stages: First, descriptive statistics and Kaplan-Meier were adopted in the study. Secondly, differentials in time to treatment seeking by socio-demographic factors, economic factors and structural factors were assessed using the Log-rank Chi-square test. Association was established at 5% level of significance using the general format for the Log-rank (χ^2) Chi-Square test statistics for categorical variables while for continuous and count variables, univariate cox proportional hazards was used.

$$x^2 = \frac{(O_A - E_A)^2}{E_A} + \frac{(O_B - E_B)^2}{E_B} \quad (1)$$

Where; O_A and O_B are the observed pneumonia cases in groups; E_A and E_B the expected pneumonia cases in groups.

$$h(t/x) = h_o(t)\exp(bx) \quad (2)$$

Where, $h(t|x)$, is the survival time, $h_o(t)$is the baseline hazard and x is the covariate. Multicollinearity was also accounted for at bivariate and the variables that are highly correlated were excluded in the model.

Third, a multilevel proportional hazards model was used to evaluate the influence of economic considerations, structural problems, and socio-demographic forces on the length of time before seeking treatment. The frailty model was inspired by time-to-event clustered data with regions acting as clusters.

$$h_{ij}(t/X) = h_o(t)\exp\ (X_{ij}{}^T\beta + Z_{ij}{}^T b_i) (3)$$

Where $h_o(t)$ is the baseline hazard function of either a basic parametric technique, such as utilizing restricted cubic splines on the log hazard scale model, or a more general spline-based approach, such as the Exponential, Weibull, or Gompertz

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distributions, model, $i = 1 \dots N$ Clusters, which are the regions with each cluster having $j = 1 \dots n_i$patients, $h_{ij}(t|X)$ is the survival time of the j^{th} patient in the i^{th} cluster. $X_{ij}^T\beta$ Are the fixed effects and $Z_{ij}^T b_i$ are random effects. The distribution of random effects is multivariate normal, with $b_j \sim N(0, \sum)$.

AIC (Akaike Information Criterion) is a widely used model selection criterion that measures the quality of a statistical model while penalizing for the number of parameters used in the model. The Exponential, Weibull and Comparts distributions are three commonly used parametric models for modeling survival data. When comparing the Exponential, Weibull, and comparts models for survival data, AIC is used to select the best-fitting model.

4. Results and Discussion:

This section presents findings of the univariate, bivariate, and multivariate analysis of socio-demographic factors, economic factors, and structural factors in relation to time to seeking treatment. In the above IV study, 791 caretakers were interviewed approximately 54% opting for public facilities and approximately 46% opting for private facilities. Findings reveal that the majority of sick children were between 12-23 (37.8%) months, followed by those between 0-24 (35.78%) and 6-11 (26.42%) months. As for the caretakers, slightly over half of them were between 25-34 (52.59%) years of age while the least were those 45+ (2.28%) from the derived sample.

With regards to sex of the child, findings reveal that the majority of the sick children were males 413 (52.95%), with females making up 47.05% of the sample. The largest proportion of caretakers were female 736 (93.05%) and 55 (6.95%) were male. Furthermore, caretakers who had attained O' level were the majority 238 (30.09%), followed by those of complete primary 173(21.87%) and those with no education were the least 38(4.8%). More than three quarters of the caretakers were married 674 (85.21%), 66 (8.34%) unmarried and 4 (0.51%) divorced respectively.

4.1 Results: The results show that a considerate proportion of the caretakers were from urban settings 335 (42.35%), 237 (29.96%) from rural settings and 219 (27.69%) from semi-urban settings. Banyankole was a dominant ethnicity (26.08%), followed by Acholi (20.25%) and the least group was that of Bagisu (1.14%). Across four regions of Uganda, 22.88% of the caretakers were from Northern region, 24.27% from Eastern, 26.17% Western and 26.68% from Central region of Uganda.

The study findings revealed that household head occupation comprised 37.9% in business, 22.77% in formal employment, and 11.13% under agriculture while 28.2% in other occupation. Further, more than three quarters of the caretakers not on insurance (97.71%). Finally, the wealth index income quintiles comprised of the poorest (20.05%), poor (20.05%), middle (20.05%), rich (19.92%) and richest (19.92%).

Table 1: Summary of Continuous Variables

Adaptable	Average	Median	Std.Dev	Min	Max	Skewness	Kurtosis
HH-monthly income (UGX)	1,016,830	600,000	186,6643	0	27,000,000	6.95	71.44
HH-monthly expenditure (UGX)	269,703.3	153,666.7	396,560.1	5000	3,563,967	4.65	29.45

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Direct-medical costs(UGX)	19,837.76	4,000	35,757.76	0	391,000	3.40	22.36
Non-medical costs(UGX)	21,709.61	8,500	33,309.52	0	280,000	3.30	17.90
Distance to the facility (KM)	17.75	6	36.10	0	400	5.00	39.34
Family size	4	4	2.03	2	14	1.36	5.34
HH children	3	3	1.58	1	11	0.95	4.15

The median rather than the mean was applied to skewed variables because mean was not representative of the sample.

Results in Table 1 above show that the poorest households earn close to zero income monthly and high-end earners earned income of 27 million UGX with an average income of 600,000 UGX per month. However, these households spend income ranging between 5,000 UGX and 3,563,967 UGX a month and 153,666.7 UGX on average. Caretakers spent on average 35,757.8 UGX and income ranging between 0 and 391,000 UGX on direct medical costs and on average 8,500 UGX and income with in a range of 0 and 280,000 UGX on non-medical costs for their children suffering from Pneumonia.

With regards to the distance from home to the facility, on average caretakers spent 6km and distance ranging between 0 and 400km. Household family size was ranging between 2 to 14 individuals with an average of 3 children per household. The result shows that the median number of days spent by the caretaker without seeking treatment was 2 days. The time for seeking treatment ranged within an interval of [1, 30] days. The pattern of survival times is represented in the figure below

4.2 Differentials in time to seeking treatment

Differentials were assessed by economic factors, socio-demographic factors and structural factors using log-rank chi-square for categorical variables. The assessment was performed to determine which variables were considered for multivariate analysis. The criterion for inclusion of the variable was that the test should have a probability value of 0.2 or less (Bursac et al., 2008) as shown in the below.

Table 2: Differentials in time to seeking treatment by Economic, Socio-demographic and Structural categorical factors

Independent variables	**Events observed**		**Events expected**
Economic factors			
Wealth quintile			
Poorest	153		147.72
Poor	143		146.48
Median	149		168.61
Rich	146		153.34
Richest	151		125.85
		$\chi^2=12.79$, $p=0.0124$	
Socio demographic factors			
Gender of the child			
Female	344		323.11
Male	391		411.89

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Independent variables	Events observed		Events expected
		χ^2=3.89, p= 0.0486	
Gender of the caretaker			
Female	694		700.70
Male	51		44.30
		χ^2=1.69, p= 0.1939	
Education level of caretaker			
A' level	72		72.12
Complete primary level	168		166.07
Incomplete primary level	134		150.66
No education	36		38.10
O' level	217		221.22
Tertiary level	118		96.84
		χ^2=10.69, p=0.0579	
Marital status			
Divorced	4		4.63
Married	633		624.91
Separated	36		34.91
Unmarried	64		70.24
Widow	8		10.31
		χ^2= 2.16, p= 0.0057	
Residence			
Rural	218		234.87
Semi-urban	214		198.98
Urban	313		311.15
		χ^2= 3.8, p= 0.1493	
Ethnicity			
Acholi	159		106.42
Bagisu	7		5.41
Iteso	22		21.57
Langi	18		15.96
Lugbara	11		9.92
Muganda	132		167.63
Mukiga	13		15.01
Munyankole	202		245.64
usoga	109		78.18
Other	72		79.26
		χ^2= 91.66, p=0.0000	
Region			
Northern	181		125.71
Eastern	159		130.55
Western	205		253.79
Central	200		234.95
		χ^2=74.31, p= 0.0000	
Occupation			
Agriculture	86		89.99
Business	273		273.83
Formal employment	167		149.26
Others	203		215.92
		χ^2=4.91, p= 0.1782	
Structural factors			
Type of facility			
Private	335		348.97
Public	410		396.03
		χ^2=1.70, p= 0.1924	

The findings in Table 2 reveal that the variables which were selected for multivariate analysis based on the inclusion criterion of (p-value<0.2) include; wealth quintile (p-value =0.0124), gender of a child (p-value=0.0486), ethnicity (p-value =0.0000), region (p-value =0.0000), gender of the caretaker (p-value=0.1939), education (p-value=0.0579), residence (p-value= 0.1493), occupation (p-value = 0.1782), and type of the facility (p-value=0.1924).

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Differentials in in time to seeking treatment for continuous and count Economic factors, Social-demographic factors and Structural factors

Differentials for continuous and count variables were assessed by economic factors, socio-demographic factors and structural factors using univariate cox proportional hazards. The assessment was performed to determine which variables to be considered for multivariate analysis.

Table 3: Differentials in time to seeking treatment for continuous and count Economic factors, Socio-demographic factors and Structural factors

Variables	HR	Std. Err.	P>z
Economic Factors			
Monthly income	1	1.98e-08	0.196
Monthly expenditure	0.999	9.40e-08	0.503
Socio-Demographic Factors			
Number of children	0.984	0.0224162	0.502
Family size	0.998	0. 0179983	0.420
Age of child	1.001	0.000712	0.123
Age of the caretaker	0.996	0.006094	0.546
Structural factors			
Distance	0.999	0.0011021	0.174

Findings in Table 3 reveal that only the age of the child (p-value=0.123) was selected under socio-demographic factors, monthly income (p-value= 0.196) under economic factors, and distance (p-value=0.174) under structural factors since their p-values were below the recommended cut-off of 0.2 while other variables with a p-value above 0.2 were excluded at multivariate analysis.

Factors influencing the time to seeking treatment among under-five children suffering from pneumonia in Uganda

Time to seeking treatment was evaluated using multilevel proportional hazards model. Table 4 presents the regression estimates of the issues influencing the length of time it takes for Ugandan children in the under-five years that have pneumonia to go look for treatment.

Table 4: Factors influencing the time to seeking treatment among under-five children suffering from pneumonia in Uganda (using Weibull Proportional Hazards Model)

Variable		HR	Std.Err	P>|z|
Economic Factors				
Wealth Score		1.185	.0783	0.010
HH-monthly expenditure		1.00	1.22e-02	0.780
HH-monthly income		1.01	2.45e-02	0.046
Social Demographic Factors				
Family size		1.0271	.0238	0.249
Gender of child	Female +	1	0.000	0.000
	Male	.8404	.0714	0.041
Gender of caretaker	Female +	1	0.000	0.000
	Male	1.207	.2166	0.293
Marital status	Divorced+	1	0.000	0.000
	Married	.7227	.4298	0.585
	Separated	.6400	.3974	0.472
	Unmarried	.5483	.3369	0.328
	Widow	.3369	.2520	0.146
Residence	Rural+	1	0.000	0.000
	Semi-urban	1.0613	.1331	0.635
	Urban	.8851	.1114	0.332
Occupation	Agriculture+	1	0.000	0.000
	Business	.9430	.1562	0.723
	Formal employment	.9970	.1802	0.987
	Others	.9949	.1645	0.976
Age of child		1.001 1.007	.001 .0082	0.282 0.347

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Variable		HR	Std.Err	P>|z|
Age of caretaker				
Structural Factors				
Facility Type	Private+	1	0.000	0.000
	Public	1.241	.1238	0.031
Distance		.9994	.0013	0.693
Constant		.2226	.1527	0.029
	/ln_p	.30231	.0282	0.000
Region	var(_cons)	.1486	.11377	

Log likelihood = -1261.0191 Prob > chi² = 0.0121 Wald chi² (19) = 35.52

Findings in Table 4 present a Weibull proportional hazards model findings examining the economic, socio-demographic, and structural factors influencing the time to seeking treatment among under-five children suffering from pneumonia in Uganda with reference to the probability value and their respective Hazards ratios. The log likelihood of the model produced a chi^2 p-value (0.0121) which is below the 5% significance level which indicates that the covariates significantly influenced the time to seeking treatment. The Akaike Information Criteria was one diagnostic test that was taken into consideration. It was used to rank the models, with the top models having the lowest value.

Table 5: AIC test for Goodness of Fit of the three Models

Distribution	AIC
Exponential	2659.017
Weibull	2566.038
Gompertz	2671.105

Table 5 above indicates that the Weibull proportional hazards model had the lowest Akaike Information Criteria (2566.038) compared to Exponential and Gompertz. Thus, this model was selected to estimate the economic, socio-demographic, and structural factors influencing the time to seeking treatment among under-five children suffering from pneumonia in Uganda. The Weibull Proportional Hazards Model findings in Table 4 reveal that the economic factors influencing the time to seeking treatment among under-five children suffering from pneumonia in Uganda include: wealth score and HH monthly income. Caretakers with high wealth score were more likely to seek treatment early (HR=1.185, p-value=0.010) for their children suffering from pneumonia in Uganda than those with low wealth score. Concerning monthly income, parents who earned more money each month were more likely to take their sick children to the doctor sooner (HR=1.01, p-value=0.046) than those of low monthly earning.

In light of socio-demographic factors, gender of the child was the significant factor influencing time to seeking treatment among under-five children suffering from pneumonia in Uganda. Caretakers with male children were more likely to delay in seeking treatment (HR=.8404, p-value=0.041) for their children suffering from pneumonia in Uganda than those with female children. Concerning the structural factors, the findings in Table 4 reveal that the type of facility was the significant factor influencing time to seeking treatment among under-five children suffering from pneumonia in Uganda Caretakers who visited public health facilities had a higher propensity to look for medical care quickly (HR=1.241, p-value=0.031) for their children suffering from pneumonia in Uganda than those in private health facilities.

The estimated frailty variance is 0.1486, indicating heterogeneity across regions, that is various regions of Uganda had different waiting times for caregivers to receive medical attention.

4.3 Discussion:

The model findings in Table 4 revealed that type of facility, gender of the child, asset score and household monthly income were the variables that influenced the length of time it took for Ugandan children under-five with pneumonia to look for medical attention.

Caretakers who visited public health facilities were more likely than those who went to private clinics to look for healthcare quickly for their children who had pneumonia in Uganda. The findings are in contrast to

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those of (Degefa et al., 2018), which showed that mothers who favored government health facilities for the treatment of children were three times more likely to put off seeking treatment than mothers who opted for private health units. The possible reason for visiting public health facilities early could be due to lower costs in government health facilities than private health facilities as well as self-medication of those who visit private facilities. It could also indicate that public health facilities in Uganda are more accessible than private clinics, which may be located in more remote or affluent areas. This means that families who live closer to public facilities have better access to healthcare for their children.

According to the study, parents of male children in Uganda were more inclined to put off getting their kids treated for pneumonia. This contrast with of (Sarker et al., 2016) whose results showed that male children had a 2.09 times higher chance of receiving care than their female counterpart. The findings were also in contrast with the findings of (Malhotra & Upadhyay, 2013) which showed that a young girl who sought therapy was discriminated against simply because she was a girl. The fact that male children can adhere better under any circumstances than female children is a known clear cause, as revealed by this study, for the delays in seeking therapy for these youngsters.

The study further revealed that caretakers in Uganda with high wealth score had higher chances to look for care quickly for their children who had pneumonia. This is in line with the study of Malhotra and Upadhyay (2013) that revealed that children belonging to middle, richer and richest wealth index groups were more likely to be brought to a medical facility than the underprivileged. The reason for these findings could be that caretakers with a higher wealth score in Uganda have better access to healthcare than those with a lower wealth score. Wealthier caretakers may have more resources to travel to healthcare facilities, pay for healthcare services, or access private healthcare providers. In addition, wealthier caretakers in Uganda may be more health literate than those with a lower wealth score, which could help them recognize the signs of pneumonia and the importance of seeking care quickly.

The study also showed that parents in Uganda who had high monthly incomes had more chances than those who had low incomes to send their children to the doctor for medical attention in relation to pneumonia at an early stage. This conforms to findings by (Romay-Barja et al., 2016) which showed that children associated to families with the greatest socio-economic position possessed low chances unlike their counterparts from families that had a lower socio-economic position in the society, to delay looking for healthcare. The reason for these findings could be that caretakers with a higher monthly income in Uganda have better access to healthcare than those with a lower monthly income. High monthly income earners may have more resources to travel to healthcare facilities, pay for healthcare services, or access private healthcare providers.

Finally, the study revealed that in different parts of Uganda, the amount of time required to look for healthcare varied depending on their respective region. This could imply that some regions of Uganda have better access to healthcare than others. A region like Central may have shorter time to seeking treatment because it has more healthcare facilities or providers, or located closer to urban centers with better healthcare infrastructure compared to other regions like north.

The time for Ugandan children with pneumonia to seek medical treatment varied significantly with some economic factors, socio-demographic factors and structural factors. Particularly among economic factors, caretakers with high wealth score and high monthly income had a high likelihood of looking for medical attention early for their children. In light of socio-demographic factors, the study revealed that caretakers with male children possessed more chances of delaying in looking for medical care for their children that had suspected signs of pneumonia in Uganda.

Concerning structural factors, this study revealed that caretakers who opted for public health unites to provide care had a higher probability of looking for Medicare on time as opposed to their counterparts that took private health services provision units as their first choice. Conclusively, the amount of time it took caretakers before moving from their comfort zones to

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look for medical attention was greatly distinguishable in accordance with their respective regions of stay.

5 Conclusion and Recommendation:

In conclusion, the economic, socio-demographic, and structural factors are instrumental in influencing the time to seeking treatment among under-five children suffering from pneumonia in Uganda. Concerning economic factors, wealth quintile and monthly income have a significant influence on the time to seeking treatment among under-five children suffering from pneumonia in Uganda. In light of socio-demographic factors, gender of the child has a significant influence on the time to seeking treatment among under-five children suffering from pneumonia in Uganda. Lastly, concerning the structural factors, type of facility has a significant influence on the time to seeking treatment among under-five children suffering from pneumonia in Uganda.

5.1 Recommendation:

It is highly recommended that deliberate efforts towards establishing specific programs, projects and or interventions should be greatly thought of by the all the concerned stakeholders. Specifically, care takers should be health educated and counseled so as to equip them with relevant knowledge on detection and management of suspected pneumonia among the male children who are mostly taken for care later than their female counterparts. Priority should be given to the people that possess low monthly income as well as the ones that have, in their possession, low wealth score on either offering and delivering to them totally free of charge or relatively low and affordable cost health services for pneumonia disease and the like, since caretakers delay in seeking treatment due to financial incapability. There is need to improve access to healthcare facilities and providers in regions with lower utilization rates. There should be increased health literacy among caretakers in the country, particularly those with lower wealth scores and monthly incomes. High healthcare costs can be a barrier to accessing care, particularly for caretakers with lower wealth scores and incomes. In light of reducing on the median time taken before looking for medical attention and care services for Ugandan children below five years of age with pneumonia, there is need for continuous community engagement by way of health education targeting caregivers, on most appropriate and convenient mode of establishing whether or not the Children below the five year mark have pneumonia. Caretakers may not be aware of the signs and symptoms of pneumonia in male children, which could contribute to delays in seeking care. Increasing awareness of the symptoms of pneumonia in male children through community-based interventions and health education campaigns could help to address this issue.

Gender norms and stereotypes may play a role in caretakers' decision-making around seeking care for their children. Caretakers may perceive male children as being more resilient or less likely to be seriously ill, which could contribute to delays in seeking care. Addressing gender norms and stereotypes through targeted interventions could help to overcome these barriers. High healthcare costs can be a barrier to accessing care, particularly for caretakers with lower incomes. Addressing healthcare costs by providing subsidies or other financial incentives to make healthcare more affordable for caretakers who opt for private health services provision units could help to reduce the disparities in healthcare-seeking behavior.

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