

KNOWLEDGE, ATTITUDE AND PRACTICES OF MOTHERS' ON PNEUMONIA PREVENTION IN CHILDREN UNDER FIVE YEARS ATTENDING NYAGATARE DISTRICT HOSPITAL, RWANDA

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Abstract: In Rwanda, pneumonia is still public health concern among under five children with a prevalence of 23% as well attributes to 9% mortality. The main objective of this study was to assess Knowledge, attitude and practices of mothers on pneumonia prevention in children under five years attending Nyagatare district hospital. This was a cross-sectional study conducted at Nyagatare district hospital inpatient and outpatient maternal and child clinic from March to May 2024. A total of 423 mothers' of under five children were assessed for socio-demographic factors, knowledge, attitude and practices using a various indicators in management of pneumonia. We examined any correlations between the variables affecting knowledge, attitude, and practices in respect to the treatment of pneumonia. To determine the factors influencing a mother's knowledge, attitudes, and practices, logistic regression was employed. Data analysis was conducted where by IBM SPSS package version 23 was used and all of questions about knowledge of mothers on childhood pneumonia were scored on 16, mothers who had 0-6 score had poor knowledge, mothers who had 7-12 score moderate knowledge and those with 13-16 score had good knowledge. For question related to attitude of mothers about childhood pneumonia was scored on 5, those with 0-1 score had poor attitude, from 2-3 score had moderate attitude and those with 4-5 score had good attitude. About practices of mothers toward childhood pneumonia, mothers were scored on 5, those with 0-1score had poor practices, those with 1-2 score had moderate practices and 4-5score had good practices. In 423 mothers, we found that 82.7% had moderate knowledge, 17.3% had good knowledge. About attitude, majority of mothers (78.1%) had good attitude while 20.9% of mothers had moderate attitude and 1% had poor attitude. On practices of mothers, about 73% had good practices, 26.5% had poor practices and 5% had good practices. Majority of mothers (84.2%) choose cold temperature or change of weather as cause of pneumonia, about the signs and symptoms of pneumonia, majority of mothers (23.4%) chose difficulty in breathing. Mothers who previously had a child suffering from pneumonia were approximately 6 times more likely to have knowledge of pneumonia than those who did not (Adjusted Odds Ratio (AOR) 6.3 [95% CI 1.4-27.9]). Subsequently, mothers with more than three children were more likely to have knowledge of pneumonia compared to mothers with three or less children (AOR13.0 [95% CI 2.7-62.9]) and also those with higher levels of education compared to those with reduced levels of education (AOR 14.3 [95% CI 1.3-161.3]). In relation to health care seeking when a child is suspected of pneumonia, the majority of mothers (71.9%) visit nearly health center or health post. Majority of mothers (91.8%) seek care before 24 hours when suspect that the child ill pneumonia while few of mothers (8.2%) do it after 24 hours. Our research shows that mothers have gap about knowledge as we found that 82.7% had moderate knowledge. Thus, need to reinforce on health promotion activities to improve health seeking behaviors for sick children.

Keywords: public health, mother's knowledge, childhood pneumonia, treatment of pneumonia.

I. INTRODUCTION

1.1. Back ground of the study

Pneumonia is acute infectious disease that affects lungs. Worldwide, every 20 seconds a single child dies due to pneumonia (Johnson, 2023). It is claimed to be the most infectious killer of under five years old children, claiming more than 900,000 lost lives of under five years old every year globally (Solomon et al., 2022). Achieving Sustainable Development Goal target 3.2, to end preventable under-five deaths by 2030, will be difficult if the underlying issue of poor care seeking practice for childhood pneumonia among caregivers is not given due consideration (Bakare et al., 2023). WHO reports pneumonia is the primary infectious factor of fatalities within children; it has been described as having 0.37 episodes of new cases for a single child every year (Gothankar et al., 2018). However, it is vital that Mothers know and recognize the danger signs of pneumonia in children and that children with signs of pneumonia are properly diagnosed and treated with appropriate antibiotics by trained health personnel (Jroundi et al., 2015). Global burden of disease reported that more than 2.5 million lives among of them 672,000 children under five years old passed away due to pneumonia equal to one child of under five years old passing a way every 47 seconds (Langefeld, 2022).

In developed nations, the leading cause of illness within infants is community-acquired pneumonia and it has got an incidence of 1 per 66 children (Lange et al., 2023). Community prevention of pneumonia and improvement in care-seeking practices were highlighted as key strategic priorities in this strategy and implementation plan in different countries (Bakare et al., 2023). A WHO publication reported the incidences of community acquired pneumonia (CAP) in children estimated to 0.026 incidents annually per child. For instance, in European countries, 51.96 millions of children between 0-4 years becomes infected by pneumonia per year and between 68 and 7000 per 100,000 cases of CAP were reported (Torres, et al., 2018). In America, the 15.7 per 10,000 under five years old children cases of pneumonia were reported (CDC Newsroom, 2016).

In developing countries according to estimates 101.8 million episodes of under five years old pneumonia were reported in 2015 (Marangu and Zar, 2019). Mother's practices are known to influence children's progression to illness or health, Therefore to promote the full participation of families in pneumonia management, there is need to understand caregiver's home-based care practices (Opuba et al., 2021). In, Bangladesh, one of the five countries that have half of the world's under five years old children pneumonia cases, 1.87 million cases were identified in 2016, when investigating the causes of pneumonia in children survey started in 2012, 21,000 under five years old children passed away due to pneumonia (Brooks et al., 2021). In Sub Saharan African countries, more than 172 fatalities per 1000 live births of under five years old happened due to pneumonia (Solomon et al., 2022). In Uganda, childhood pneumonia was the main public health concern as it was the fourth most common reason for young children's deaths of under five years old in 2017, 2018 respectively (Ekirapa-Kiracho, et al., 2021).

In Rwanda, the picture of childhood pneumonia was reported in RDHS 2014-2015 where 23 % was the prevalence in under five years old children with 9% as mortality due to pneumonia (National Institute of Statistics of Rwanda et al., 2016). Previous studies on care seeking for pneumonia are either non-empirical or hospital based studies with a few focusing on caregiver's knowledge (Bakare et al., 2023). On world pneumonia day 12th, November, 2022, Rwanda, MOH identified pneumonia as the third infectious disease in under five years old children, after Diarrhea and Malaria. The integrated Community Case Management (iCCM) guideline recommends that all children 2–59 months of age are first assessed for general danger signs, then for cough or difficult breathing, diarrhoea, fever, ear problem, acute malnutrition and anaemia (Daka et al., 2023). According to RBC report, there were 52,124 cases among children younger than five who have illness only in July 2021 up June 2022 and 69% were treated by CHWs where as 18.2 % diagnosed by HCs (Nzabonimpa, 2022) and the knowledge, attitude, and practice scale (KAP) is a structural tool for researchers in the field of public health to explore people's healthy behaviors that usually provides quantitative and qualitative information for a specific research target by predefining some questions in standardized questionnaires, which usually includes misconceptions or misunderstandings that may bring barriers to the concerning behavior change (Hao et al., 2023).

Rwanda has been helped with different prevention measures for reduction some risk factors highlighted by WHO such as vaccination, early health seeking behaviors with those with signs and symptoms of pneumonia to HCs or CHWs and living in environment with good air (Nzabonimpa, 2022). Even if there is much done in Rwanda to prevent and treat pneumonia disease in under-five years old children, pneumonia is still a public health concern. The Eastern province became the first in all provinces with highest deaths of under five years old children with 86 fatalities per 1000 live births and study done on under five years old children deaths in Eastern province revealed 618 deaths where pneumonia was 13.5% of all

deaths(Gupta et al., 2018).Nyagatare district hospital is one of the district hospital in Eastern province that has admitted the highest number of pneumonia cases from July 2021 to June 2023,1010 cases from OPD and 1077 cases from hospitalized wards making the first health facility reported under five years old pneumonia in whole district.. However, mother's knowledge, altitude and practices on pneumonia is crucial to increase the early identification, referral and management for prevention of Pneumonia related complications (Amuka et al., 2020).

1.2 Problem statement.

Pneumonia is acute infectious disease that affects lungs. According to WHO, Pneumonia cases have exceeded 150 million worldwide with 95% of them being new cases reported globally resulting into two million deaths among under five years old children (Rahman & Khairul Azam, 2019). In Rwanda, the research done in 2014-2015 to update information related to child hood diseases found out that pneumonia prevalence were 23% with Among infants and young children under five (Uwamahoro, 2019). Knowledge, attitude and practices of mothers of young children with pediatric pneumonia is critical for preventing and caring for pediatric pneumonia (Hao et al., 2023).However, the overwhelming majority of mothers of under five years children continue to have inadequate knowledge, attitude and practices regarding pneumonia and other childhood illnesses, their signs and symptoms, as well as danger signs, the modes of transmission, risk factors, and prevention/treatment measures (Kajungu et al., 2023). Regretfully, in nations with high death rates, timely and early care-seeking is still difficult (Kajungu et al., 2023) Moreover, lack of knowledge about the danger signs and symptoms of pneumonia among the primary caregivers is another cause of delayed seeking care for childhood pneumonia, which could even be life threatening (Ferdous et al., 2020).

However Studies exploring mothers' attitudes to pediatric pneumonia are limited (Hao et al., 2023). And knowledge level, attitude and preventive practices on pneumonia among mothers is known to be important in improvement and early recognition of pediatric pneumonia in order to avoid putting off obtaining medical attention which prevent escalation to fatal signs(Amuka et al., 2020). Furthermore, there may be significant discrepancies between what is stated and what is done, so mothers with more knowledge may not always model better behavior (Hao et al., 2023). There are studies available regarding on understanding, disposition, and behaviors connected with acute respiratory infections in East Africa while the number of studies is somewhat small in Rwanda. Therefore, we will assess the mothers' knowledge, attitudes, and practices on prevention of pneumonia among under five children admitted in Nyagatare district hospital.

1.3. Study Objectives

The main objective of the study was to assess Knowledge, attitude and practices of mothers on pneumonia prevention in children under five years attending Nyagatare district hospital with the following specific objectives:

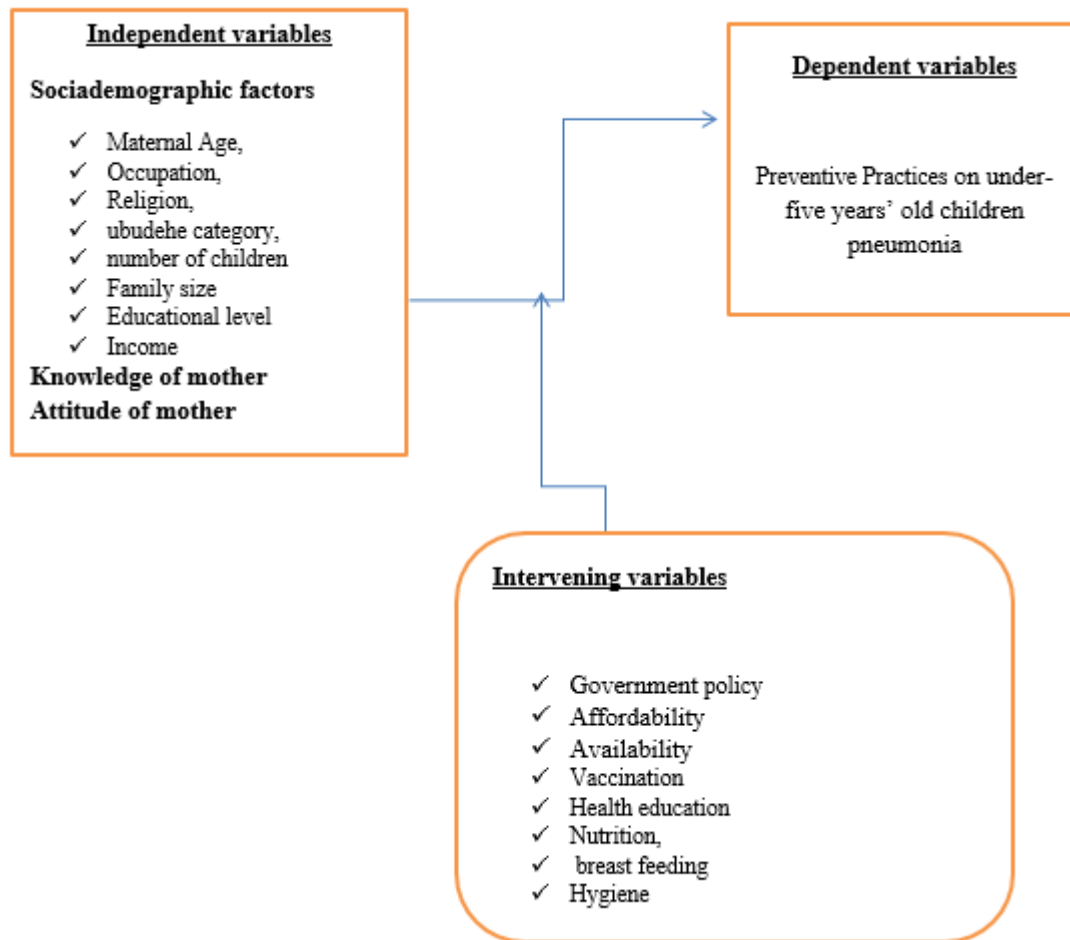
- i. To assess the level of knowledge of mothers on pneumonia prevention in children under five years attending Nyagatare district hospital.
- ii. To determine the attitude of mother on pneumonia prevention of under five years old children among mothers at Nyagatare district hospital.
- iii. To identify the level of practices among mothers on pneumonia prevention in children under five years attending Nyagatare district hospital.

1.4. Research Questions

- i. What is the the level of knowledge of mothers on pneumonia prevention in children under five years attending Nyagatare district hospital?
- ii. What is the attitude of mother on pneumonia prevention of under five years old children among mothers at Nyagatare district hospital?
- iii. What is the level of practices among mothers on pneumonia prevention in children under five years attending Nyagatare district hospital?

1.5 Conceptual Framework

The conceptual framework looks at the visual depiction of the relationship between independent variables and the dependent variable, which is clearly shown in the figure below. Independent variables are those that impact or determine changes in another variable, and the dependent variable is the factor measured to evaluate the impact of the independent variables.



II. METHODOLOGY

2.1 Research Design

This was a cross-sectional study conducted at Nyagatare hospital inpatient and outpatient among mothers of children under five years diagnosed with pneumonia during study period.

2.2 Research setting

Nyagatare district hospital is one of the two district hospitals of Nyagatare district in eastern province of Rwanda. It has started in 1983 and serves 458,272 populations by 2022. Administratively, the district is constituted of 14 sectors, 106 cells and 630 villages covering a total surface area of 1,919 km². Nyagatare district has also 12 health centers, 52 health posts, 1 prison clinic, 2 private clinics and some private dispensaries. According to HMIS report July 2021-June 2023, revealed that Nyagatare hospital had the highest number of children admitted with pneumonia than any other health facility with 1,010 and 1077 cases diagnosed among under twelve months children and between 1 to 5 years old children, respectively.

2.3 Target Population

The intended audience in this study was mothers' of children under five years attending Nyagatare hospital inpatient and outpatient clinic during the study period. We chose this population for our study because mothers are the ones who stay with them always as well last decision makers in case of any disease complication. Mothers aged between 18-45 years with under-five year's old children who have attended at maternal and child health clinics when data was gathered were participant of the study. Mothers who were younger than 18 or older than 45, as well as mothers who declined to sign a consent form, was not be included in the study.

2.4 Sample Size

We used Cochran formula to get our study sample size. In our formula there were two steps in determining sample size were the calculated sample size was then increased by 10% to account for non-response or attrition. ,Hence the sample size

was 423. In our formula there were two steps in determining sample size: Step one, was to calculate for an unlimited population, the sample size whereas, $S = Z^2 \cdot P \cdot (1-P) / M^2$ where S was sample size for, for an endless population, the sample size was, Z is z-score, P is percentage of the population (we assume to be 50%=0.5) and M, was margin of error. Because our confidence level was 95% our z-score is 1.96, our margin of error was 5%=0.05, Then $S = (1.96)^2 \cdot 0.5(0.5) / (0.05)^2 =$

$$S = 3.8416 \cdot 0.25 / 0.0025$$

$$S = 0.9604 / 0.0025$$

$S = 384.16$. The sample size was then increased by 10% to account for non-response or attrition. , Hence the sample size was 423

2.5 Data analysis.

After collection of data we used IBM SPSS package version 23 for analyses it. A descriptive analysis was conducted to present frequency tables, percentages, for social-demographic characteristics and also the knowledge, attitudes, and practices of mothers regarding pneumonia prevention was presented in the form of percentages and frequency tables. Later, we showed association between different independent variables and dependent variables. According to our analysis, knowledge was assessed out of 16 marks. Mothers overall knowledge was scored based on Bloom's cutoff point, as good if the score was between 80 and 100% which was from 13 -16 ,moderate if the score was between 60 and 79% which was from 8 -12 marks and poor if the score was less than 60% which was below 7 marks. Therefore, knowledge was scored poor, moderate or good knowledge. For question related to attitude of mothers about childhood pneumonia, it was scored based on Bloom's cut-of point, as good if the score was between 80 and 100% especially those with 4-5 marks, moderate if the score was between 60 and 79% which was from 2-3 marks and poor if the score was less than 60% those with 0-1 mark . About practices of mothers towards childhood pneumonia, the Bloom's cut-of point was also used where by those with 0-1score had poor practices, those with 1-2 score had moderate practices and 4-5score had good practices.

III. RESEARCH FINDINGS AND DISCUSSIONS

3.1 Introduction

This research investigated Knowledge, attitude and practices of mothers on pneumonia prevention in children under five years attending Nyagatare district hospital in Rwanda. The findings were analyzed and the findings were in harmony with study objectives. The first part provides the demographic characteristics of respondents, and the second part presents findings in accordance of specific objectives. Both descriptive and inferential statistics were presented in data analysis

3.1.1 Demographic Characteristics of Respondents

The highest proportions of mothers 177(41.8%) were aged 26-33 years, 149(35.2%) were between 18-25 years; 67(15.8%) were between 34-40 years and finally 30(7.1%) were aged 41-45 years. The majority of respondents 326 (77%) were married; while 4 (1%) were widower, 32 (9.2%) were Divorced or separated. The respondents had education level of primary 182(42.9%), secondary 175(41.3%), universities 47(11.2%), and those with no formal education were 20(4.6%). About occupation, most participants 173(40.8%) are self-employed, 40(9.2%) were farmers while 157(37.2%) were government employees .Most respondents had one child 186(43.9%), 119 (28.1%) of the respondents had two children and more than two children respectively. And for the case of Ubudehe category, Category1 were 17(4.1%), category 2 was 212 (50%), category3 were 192(45.4%) and category 4 was 2 (0.5%)

Table 3.2: Demographic Characteristics of Respondents

Variables		Freq(n=423)	%
Marital status	Married	326	77.0%
	Single	54	12.8%
	Divorced/separated	39	9.2%
	Widower	4	1.0%
Education level	Not educated	20	4.7%
	Primary	182	42.9%
	Secondary	175	41.3%
	University	47	11.2%
Occupation	House wife	54	12.8%
	Farmer	40	9.2%

	Self-employed	173	40.8%
	Government- employee	157	37.2%
	One child	186	43.9%
Number Of Children	Two child	119	28.1%
	More than two child	119	28.1%
	Category 1	17	4.1%
Ubudehe category	Category 2	212	50.0%
	Category 3	192	45.4%
	Category 4	2	0.5%
	18-25	149	35.2%
Maternal Age	26-33	177	41.8%
	34-40	67	15.8%
	41-45	30	7.1%
TOTAL		423	100%

Source: (Primary data, 2024)

3.1.3 Presentation of Findings

I. The first objective of this study was to assess the level of knowledge of mothers on pneumonia prevention in children under five years attending Nyagatare district hospital

Table 3.I. Respondents level of knowledge on the Under Five Years Pneumonia Prevention.

Variables		Freq(n=423)	%
Sources of information	Health workers	153	36.20%
	TV or radio	69	16.30%
	Internet	9	2%
	Family or Relatives	82	19.40%
	Child recover from pneumonia	33	7.70%
	Other	37	8.70%
Different causes of pneumonia.	Do not know	40	9.70%
	Cold temperature/weather change	356	84.20%
	Bacteria and fungi/germs	43	10.20%
	witchcraft	9	2.10%
	do not know	15	3.50%
	Fever	13	3%
	Cough	51	12%
	rapid breathing	92	21.7%
	Loss of Appetite or not breastfeed	9	2.1%
	Chest pain / Cost pain	63	14.8%
	Headache	30	7.1%
	Weakness	16	3.8%
	Do not know	17	4.3%
	Wheezing	29	6.9%
	Difficulty in breathing	99	23.4%
	Other (specify)		0.9%
	4		
Preventive measure	Vaccination / immunization	10	2.4%
	Balanced diet	27	6.4%
	clothing warmly during cold season	48	11.3%
	Washing hand	88	20.8%
	Improves child immunity	90	21.3%
	Exclusive breast feeding	101	23.9%
	Proper house ventilation	41	9.7%
	Do not know	13	3.1%
	Others (specify)	5	1.2%
Total		423	100%

Source: Primary data, 2024

Table above shows that, in all 423 mothers asked, 288(68%) knew what is pneumonia while 135(32%) did not know what it is. Mothers have got information on what is pneumonia in different sources, where 153(36.2%) got it from CHWs, 69(16.3%) from television and radio, 9(2%) from internet, 82(19.4%) from family members or relatives, 33(7.7%) from had child suffered from, 41(9.7%) of mothers choose I don't know while 37(8.7%) choose other sources. About different causes of pneumonia given to mothers to choose, about 356(84.2%) choose cold temperature or change of weather as cause of pneumonia, 43(10.2%) choose bacteria and fungi as cause of pneumonia, 8.8(2.1%) choose witchcraft, while 15(3.5%) were not know what cause of pneumonia. On knowledge about the signs and symptoms of pneumonia, 13(3.1%) mothers chose fever as sign of pneumonia, 51(12.1%) chose cough, 92(21.7%) chose rapid breathing, 99(23.4%) chose difficulty in breathing, 63(14.9%) chose chest pain, 30(7.1%) chose headache, 29(6.9%) chose wheezing, 16(3.8%) chose weakness, 9(2.1%) chose loss of Appetite, 17(4.0%) chose I don't know and 3.8(0.9%) choose others. On Knowledge about the measures should be taken to prevent childhood pneumonia, majority 101(23.9%) chose breastfeeding exclusively, 48(11.3%) chose clothing warmly during cold season, 10(2.4%) chose pneumonia vaccine, 27(6.4%) chose proper nutrition, 88(20.8%) chose hand washing, 90(21.3%) chose improves child immunity, 41(9.7%) chose proper house ventilation, 5(1.2%) chose others and 13(3.1%) chose did not know any measure to prevent pneumonia in children.

Table: 3.II. Respondents general level of Knowledge

		Frequency	Percent
Knowledge score	Moderate knowledge	350	82.70%
	Good knowledge	73	17.30%
	Total	423	100%

Source: Primary data, 2024

Table above shows that generally, we found that 350(82.7%) of respondents had moderate knowledge, 73(17.3%) had good knowledge

3.2 Respondents attitude on under five years children pneumonia prevention

The second objective of this study was to assess the attitude of mother on pneumonia prevention of under five year's old children among mothers at Nyagatare district hospital

Table: 3.2. Respondents attitude on under five years children pneumonia prevention

	Variable	Frequency	Percentages
Seeking care for childhood pneumonia	CHWs	104	24.40%
	Nearly health center/health post	304	71.90%
	Pharmacy	9	2%
	Traditional practitioner	6	1.5%
Health center/doctor attendance when a child is suspected of pneumonia i	immediately/24hrs	388	91.8%
	after 24hrs	35	8.2%
	Total	423	100%
	Pharmacy	9	2%
	Traditional practitioner	6	1.50%
Improving child's immunity and reducing indoor smoke and dust.	Mother's care about improving child's immunity	371	87.80%
	Mother's care about reducing indoor smoke and dust	52	12.30%
	Total	423	100%

Source: Primary data, 2024

The findings above indicate that in relation to health care seeking when a child is suspected of pneumonia, the majority 304(71.9%) would visit nearly health center or health post, 104(24.4%) visit CHWs, 9(2%) visit pharmacy, while 6(1.5%) visit traditional practitioner. Within all of that about 388(91.8%) seek care before 24 hours when suspect that the child ill pneumonia and 35(8.2%) do it after 24 hours. About 371(87.8%) of respondents choose improving child's immunity while 52(12.3%) of mothers' care about reducing indoor smoke and dust.

3.2.1. Attitude scores of mothers**Table 3.2.1: General Attitude Scores**

Attitude scores	Freq	%
Poor attitude	4	1.0%
Moderate attitude	88	20.9%
Good attitude	331	78.1%
Total	423	100%

Source: Primary data, 2024

Table 4.5. Shows that majority of the mothers 331(78.1%) had good attitude, 88(20.9%) has moderate attitude and 4(1%) has poor attitude.

3.3. Respondents level of practice on under five years old children pneumonia prevention

The third objective of this study was to assess the level of practices among mothers on pneumonia prevention in children under five years attending Nyagatare district hospital

Table 3.3: Respondents level of practice on under five years old children pneumonia prevention

Variables		Freq	%
Home practice of mothers before go to health facilities	Medication to reduce fever	310	73.30%
	Breastfeeding	60	14.20%
	Nothing	32	7.60%
	feed child with liquid food /fluid	21	4.70%
	Gone a child for vaccination	150	35.50%
Mothers' action to prevent childhood pneumonia.	Balanced diet	204	48.20%
	Clothing child warmly and prevent him or her to go outside in rain	63	14.90%
	Nothing	6	1.40%
Total		423	100%

Source: Primary data, 2024

In this findings about home practice of mothers before go to health facilities, about 310(73.3%) said that when a child has a fever or suspect pneumonia, they gave him/her medication to reduce fever, 60(14.2%) breastfeeding the child, 33(7.8%) they did nothing to child before reach to health facility and 20(4.7%), gave a child a liquid food or fruit. About mother's action to prevent childhood pneumonia, 204(48.2%) give their child balanced diet to prevent pneumonia and 63(14.9%), clothing warmly and prevent child to go outside in rain. While 63(1.4%) did nothing to protect the children for pneumonia and 150(35.5%) take a child for vaccination against pneumonia.

3.3.1 Practices score of mothers**Table 3.3.1: General score on level of practices**

Practices scores	Frequency	Percent
Poor practices	112	26.5%
fair practices	309	73.0%
Good practices	2	0.5%
Total	423	100%

Source: Primary data, 2024

In these findings, about 309(73%) of mothers had moderate practices, 112(26.5%) of mothers had poor practices and 2(0.5%) of mothers had good practices.

3.4. Univariate and multivariate analysis of factors associated with mother's knowledge, attitude and Practices of pneumonia.**Table 3.4.1: Association of factors with knowledge of pneumonia among mothers**

Variables	Knowledge about pneumonia						Univariate OR (95% C.I)	P Value
	Yes		No		Total			
	N	%*	N	%*	N	%†		
Maternal age								
41-45	153	97.2	3	2.8	106	36.2	6.1 (1.4-25.6)	0.006
34-40	108	95.9	4	4.1	97	25.5	4.1 (1.1-15.4)	
26-33	97	87.3	13	12.7	102	22.9	1.2 (0.4-3.4)	
18≤ 25	65	85.0	6	15.0	41	15.4	Reference	
Level of education								
University	47	95.5	1	4.5	22	5.2	8.1 (0.9-77.1)	0.004
Secondary	175	94.7	7	5.3	133	31.5	6.9 (1.9-25.0)	
Primary	182	93.6	16	6.4	249	59.0	5.6 (1.8-17.7)	
None	20	72.2	5	27.8	18	4.3	Reference	
Occurrence of pneumonia								
Yes	121	98.4	2	1.6	123	29.1	6.0 (1.4-25.7)	0.006
No	272	91.0	27	9.0	299	70.9	Reference	
Number of children								
> 3 children	150	98.7	2	1.3	152	36.0	8.3 (2.0-35.6)	0.001
≤ 3 children	243	90.0	27	10.0	270	64.0	Reference	

Source: Primary data, 2024

Univariate analysis was performed on factors associated with mothers' knowledge of pneumonia as shown in bellow. There was a significant association between occurrence of childhood pneumonia and knowledge of pneumonia (OR 6.0, 95% CI 1.4-25.7, $p=0.006$). Mothers who reported to have had a child suffering from pneumonia previously were more likely to have knowledge of pneumonia than those who did not

Table 3.4.2: Logistic regression model for variables predicting knowledge, attitude and practices of pneumonia among mothers.

Variables	Knowledge about pneumonia						Multivariate AOR (95%C.I)
	Yes		No		Total		
	N	%*	N	%*	N	%†	
Level of education							
Tertiary	47	95.5	1	4.5	22	5.2	14.3 (1.3-161.3)
Secondary	175	94.7	7	5.3	133	31.5	14.6 (3.2-66.4)
Primary	182	93.6	16	6.4	249	59.0	10.6 (2.6-42.8)
None	20	72.2	5	27.8	18	4.3	Reference
Occurrence of pneumonia							
Yes	121	98.4	2	1.6	123	29.1	6.3 (1.4-27.9)
No	272	91.0	27	9.0	299	70.9	Reference
Number of children							
> 3 children	150	98.7	2	1.3	152	36.0	13.0 (2.7-62.9)
≤ 3 children	243	90.0	27	10.0	270	64.0	Reference

Source: Primary data, 2024

There was a significant association between mothers' level of education and knowledge of pneumonia (OR 8.1, 95% CI 0.9-77.1, $p=0.004$). Mothers with higher level of education were more likely to have knowledge of pneumonia compared to those with reduced level of education. There was a significant association between mothers' age and knowledge of pneumonia (OR 6.1, 95% CI 1.4-25.6, $p=0.006$). This showed that older mothers were more likely to have knowledge of pneumonia compared to the younger mothers. Also, there was a significant association between the total number of children in a lifetime and knowledge of pneumonia (OR 8.3, 95% CI 2.0-35.6, $p=0.001$). Mothers with more than three children were more likely to have knowledge of pneumonia compared to those with less than three children. Binary logistic regression using the backward conditional method was then done to eliminate confounding factors and examine the effect of the four predictive factors which significantly associated (independently) with knowledge of pneumonia at univariate analysis. Mothers who reported to have had a child suffering from pneumonia previously were approximately six times more likely to have knowledge of pneumonia than those who did not (AOR 6.3 [95% CI 1.4-27.9]). Mothers' with higher level of education were approximately fourteen times more likely to have knowledge of pneumonia compared to those with reduced level of education (AOR 14.3 [95% CI 1.3-161.3]). Mothers with more than three children were thirteen times more likely to have knowledge of pneumonia compared to those with less than three children (AOR 13.0 [95% CI 2.7- 62.9]) and there were Correlation was significant at the p -value of 0.01 (2-tailed) level with the Pearson correlation test. There was a significant relationship between knowledge, attitudes, and practices ($p < 0.05$, Pearson correlation test) as indicated in table 4.4.5

Table 3.4.3: Correlation among knowledge, attitudes, and practices of mothers about childhood pneumonia.

	Knowledge	Attitudes	Practices	
Knowledge	R	1	0.518 ^a	0.527 ^a
	P		0.000	0.000
Attitudes	R	0.518 ^a	1	0.516 ^a
	P	0.000		0.000
Practices	R	0.527 ^a	0.516 ^a	1
	P	0.000	0.000	

Source: Primary data, 2024

3.5. Discussion of the findings

The first objective of this study was to assess the level of knowledge of mothers on pneumonia prevention in children under five years attending Nyagatare district hospital. The findings revealed that among 423 mothers, 292 (68.9%) of them, knew what is pneumonia. This is close with the finding of results in a study conducted by (Saeed & Awadalla, 2020) in the Sudanese Capital Area of Khartoum revealed that 88.7% of mothers were knowledgeable about what pneumonia is. Mothers has got information on what is pneumonia in different sources but their main source were Community Health Workers (CHWs), where 36.2% mothers got information from them. Whereas, least source is internet account for 2%. This is true source for Rwandan to get health information as government of Rwanda put much effort on using CHWs and this result is closer to one from the result of research carried by (Aguti et al., 2018) in Butaleja district, eastern Uganda, showed that the source of information was largely from health workers (43.4%). Government has to encourage other health workers like nurses at health centers not only Community Health Workers (CHWs) to teach people about pneumonia. Different causes of pneumonia given to mothers to choose, most of them (84.2%) chose cold temperature or change of weather as cause of pneumonia, this is close to the findings in research carried out in Enugu state in Eastern south of Nigeria where majority respondents (88.7%) believe that pneumonia is caused by exposure to cold environment and/or ingestion of cold fluid or food (Ndu et al., 2015). Even if great percentage chose this, but cause of pneumonia is bacteria, virus and fungus so much effort is required to explain the true cause of pneumonia to mothers. And this can be achieved through teaching about pneumonia on radio and television as most Rwandan use it. On knowledge about the signs and symptoms of pneumonia, among the lists of the signs and symptoms of pneumonia given to mothers to choose, 13(3.1%) mothers chose fever as sign of pneumonia, 51(12.1%) chose cough, 92(21.7%) chose rapid breathing, 99(23.4%) chose difficulty in breathing, 63(14.9%) chose chest pain, 30(7.1%) chose headache, 29(6.9%) chose wheezing, 16(3.8%) chose weakness, 9(2.1%) chose loss of Appetite 17(4.0%) chose I don't know and 4(0.9%) chose others. This differ from results in research carried out on Butaleja district, Eastern Uganda mothers in 2018 showed that only 6.3% of the respondents reported fever as sign of pneumonia (Aguti et al., 2018). On Knowledge about the measures should be taken to prevent childhood

pneumonia among mothers within the possible measures given to mothers, majority 101(23.9%) chose breastfeeding exclusively, followed by 90(21.3%) of mothers who chose improves child immunity 88(20.8%) of mothers chose hand washing, 48(11.3%) choose clothing warmly during cold season , 41(9.7%) choose proper house ventilation,27(6.4%) chose proper nutrition, and 13(3.1%) choose did not know any measure to prevent pneumonia in children, 10(2.4%)chose pneumonia vaccine and 5(1.2%) choose others .This is different to research done by (Keter, 2015) where by majority of mothers choose clothing warmly during cold season (93.4%) followed by vaccination/immunization (80.9%), exclusive breastfeeding (43.8%), proper nutrition (39.7%), improving child's immune system (34.6%), proper house ventilation (26.0%), washing hands (19.3%) and a paltry (0.8%) indicated the use of herbs. The first purpose of this study was to assess the level of knowledge of mothers on pneumonia prevention in children under five years attending Nyagatare district hospital. Generally, we found that 350(82.7%) had moderate knowledge, 73(17.3%) had good knowledge . This result was nearly similar to that found in research carried out by (Rao et al., 2016) in Udupi taluk, Karnataka in India, revealed that (88.4%) of parents had moderate knowledge .

The second objective of this study was to assess the attitude of mother on pneumonia prevention of under five year's old children among mothers at Nyagatare district hospital. In relation to health care seeking when a child is suspected of pneumonia, the majority 304(71.9%) would visit nearly health center or health post, while least number 6(1.5%) visit traditional practitioner, within all of that about 388(91.8%) seek care before 24 hours when suspect that the child ill pneumonia. This result is close to that found in research carried out on Peruvian mother in 2002 showed that 94.6% they were ready to take their child to nearly health center when suspect pneumonia (Gálvez et al., 2002). Majority of mothers (78.1%) has good attitude, 20.9% had moderate attitude and 1% had poor attitude. This differs from what found in research carried out by (Rahman & Khairul Azam, 2019) in Tangail, Bangladesh revealed that that, about (58%) parents had good attitude and similar to cross sectional study done by(Khan, 2022) in Pakistan where by 26.7% of mothers had good attitudes to words childhood pneumonia prevention.The third objective of this study was to assess the level of practices among mothers on pneumonia prevention in children under five years attending Nyagatare district hospital. The results revealed that about 309(73%) of mothers reported that when a child has a fever or suspect pneumonia, they gave him/her medication to reduce fever, and less number 20(4.6%) they did nothing to child before reach to health facility. This contrast from research carried out by (Keter, 2015) in Kenya revealed that for a child with fever and/or suspected of pneumonia, the majority (77.3%) indicated they would feed a child with liquid food/fluids (like milk and porridge). On preventive action mothers taken to prevent pneumonia for their children, majority 335(79.1%) give their child balanced diet to prevent pneumonia and less mothers 123(29.1%) clothing warmly and prevent child to go outside in rain. This differs from the result found in research carried out by (Aguti et al., 2018)in Butaleja district, Eastern Uganda which showed that (64.6%) did nothing.Our mothers, about 309(73%) had moderate practices, 112(26.5%) had poor practices and 21(5%) had good practices. This is closer to a study done by (Kajungu et al., 2023) in Uganda where by Majority of the mothers reported good practice (74.1%),19.1% had moderate practices towards the management of pneumonia. Even if the percentage of mothers on practice seen to be high but mothers have to be explained that pneumonia is not prevented by only feeding a child with balanced died but also by taking a child to health center for vaccination. This information can reach to mothers through CHWs, radio and television.

IV. CONCLUSION AND RECOMMENDATIONS

4.1 Conclusion

The aim of this study was to determine the Knowledge, attitude and practices of mothers on pneumonia prevention in children under five years attending Nyagatare district hospital in Eastern Province of Rwanda. The study concluded that mothers have gap about knowledge as we found that 350(82.7%) has moderate knowledge. Thus, need to reinforce on health promotion activities to improve health seeking behaviors for sick children. The discrepancy between knowledge and practice suggests that behavioral change interventions are needed, which take into account practical barriers such as distance to healthcare facilities, financial constraints, or limited access to healthcare resources. Efforts to increase vaccine availability and ensure that preventive measures are easy to adopt are critical. The study revealed that healthcare access plays a crucial role in the prevention of pneumonia in children. Mothers who had regular access to health facilities were more likely to report adherence to vaccination schedules and other preventive practices. Improving healthcare access is essential for enhancing pneumonia prevention efforts. This could involve expanding outreach services, increasing the availability of mobile health clinics, and providing transportation assistance to help families reach healthcare facilities, particularly in rural or remote areas.

4.2 Recommendations

Ministry of health should encourage the health workers at health facilities to educate mothers about childhood pneumonia during vaccination session, and prepare continuous education session on radio and television about childhood pneumonia. Local readers together with CHWs should prepare education part about childhood pneumonia during Umuganda, Ibimina and Akagoroba k'ababyeyi. Mothers who have under-five years old child must attend all vaccination date as planned, cloth warmly child during cold weather, feed a child a balanced diet and should ask question those health workers about childhood pneumonia.

We would like to recommend Nyagatare district hospital to strengthen the community outreach for the purpose of health education and updating community about pneumonia in under-five years' old children. Health center also should carry routinely health education about childhood pneumonia for people visit it especially mothers at morning before start other daily activities. As more population (mothers) in Nyagatare district get information about pneumonia from Community Health Workers (CHWs) we recommend school of health sciences to prepare community outreach where students will work together will Community Health Workers (CHWs) in Nyagatare district and teach community about causes and prevention of childhood pneumonia.

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