

## ORIGINAL ARTICLE

# Caregivers' knowledge of pneumonia and uptake of vaccination in under-five children in Kaduna State, Nigeria

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Pneumonia, though very much a preventable disease, still remains a tangible threat to the lives of under-5 children. Caregivers' knowledge of pneumonia is important in effective management. The study determined the reported proportion of childhood pneumonia in Kaduna State and assessed caregivers' knowledge of pneumonia and uptake of pneumococcal vaccine among under-5 children. The mixed method research approach used 500 caregivers of under-five children in urban and rural communities in Kaduna state. Ethical approval and informed consent of participants was obtained before data collection using a pre-tested semi-structured questionnaire and a focus group discussion guide. Chi-square statistical test was used to test for association between variables, while data from the focus group discussion was analyzed using thematic coding process. Most respondents were aware of pneumonia, they had local names for it but majority 340 (68%) had poor knowledge of pneumonia. The overall occurrence of pneumonia as reported by respondents among under-five children was 33 (6.6%). The rate of child pneumococcal vaccine uptake as reported by respondents was 105 (21%), the uptake was significantly more among the urban dwellers ( $p < 0.01$ ). The knowledge of pneumonia and uptake of pneumococcal vaccination was poor. Routine and constant health education of the community members on pneumonia is very necessary to preserve lives of under-5 children in our communities.

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## INTRODUCTION

Pneumonia is a severe form of acute lower respiratory tract infection and is the leading cause of death in children under five years of age worldwide, causing more child deaths than any other disease (WHO, 2016). Despite substantial increase in the understanding of the clinical syndrome of pneumonia and its etiologies, its accurate diagnosis is challenging when clinical indicators are relied on, and improves only modestly with addition of laboratory, microbiological, or radiological tests (Stöppler, 2016).

Reliably identifying the causes of bacteria among children and differentiating between bacterial and non-bacterial causes still remain a challenge as the knowledge gap in this regard is a far-cry from

increasing (Grimwood *et al.*, 2016). Pneumonia still remains the single largest infectious cause of death in children worldwide, as it accounts for 16 percent of all deaths of children under five years old (WHO, 2016). Pneumonia is the most serious outcome of acute respiratory infection in young children in Nigeria (National Population Commission (NPC) (NPC, 2006). In fact, it was established that pneumonia claims the lives of about 195,000 Nigerian children annually, while about 124,000 others die of diarrhea (Madugba, 2015).

Children and infants are presumed to have pneumonia if they exhibit a cough and fast or difficult breathing. Caregivers therefore have an important role to play in recognizing the symptoms and danger signs of pneumonia in children and seeking appropriate medical care as necessary, thereby averting pneumonia deaths (Tuhebwe *et al.*, 2014). Attitude, practices and health seeking behavior of caregivers play a huge role on the health status of children, who are known to be dependents

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as they are incapable of taking care of themselves (Thandar *et al.*, 2015).

To reduce the morbidity and mortality associated with pneumonia infections, Nigeria introduced free pneumococcal vaccine for children under five years in 2014 with support from international funding agencies (Wiwa and Ojumu, 2016). Despite this efforts, pneumonia remains the most common cause of childhood mortality, especially in the northern part of Nigeria that has low uptake of vaccination in children (Gidado *et al.*, 2014).

It is therefore important to determine caregivers' knowledge of pneumonia, which is particularly necessary for early treatment seeking and appropriate use of health care options, as well as catering to the medical needs of the children. Promoting awareness and prevention through research and advocacy could go a long way in improving the access to healthcare and quality of life at the community level.

## MATERIALS AND METHODS

### Study design

The study was a community based descriptive cross-sectional study that determined the caregivers' knowledge and health seeking behavior on pneumonia in under-five children in selected Local Government Areas (LGAs) of Kaduna State, Nigeria, using both quantitative and qualitative methods of data collection. Kaduna state, is located in the north-western parts of Nigeria and being the third most populous state in the country (National Population Commission, 2006), has lots of communities that are densely populated, with its peculiar climatic conditions such as strong harmattan which increases the risk of infection, and numerous industries whose fumes contribute to air pollution known to be significantly responsible for several pulmonary diseases worldwide (Obinna, 2015).

### Sample size determination for respondents

The sample size of respondents used for this study was obtained using the Kish (1965) formula for cross-sectional studies given as: 
$$n = \frac{Z^2pq}{d^2}$$

Using a 23% prevalence of pneumonia from a previous study (Roca *et al.*, 2012), 4% precision at 95% confidence interval and considering 20% non-response rate gave a sample size of 531.

### Sampling procedure

A multistage sampling technique was used to select the respondents, who were caregivers of under-five children in this study, from the LGA level down to the household level. The 23 LGAs in Kaduna state were stratified based on urbanization (urban and rural) and simple random sampling by lottery method was used to select one LGA each from the two strata (urban and rural) that were used for the study.

A list of all the wards for each of the two selected LGAs was used to constitute a sampling frame. Three wards each from both the urban and rural LGAs were randomly selected, resulting in a total of six selected wards (3 urban and 3 rural), two communities and four streets were selected from each ward resulting 48 streets. Eleven households with under-five children were selected using systematic random sampling method from each of the 48 selected streets. Only households with under-five children were selected for the study. The caregiver of the under-five child, male or female was selected for the study. A pre-tested semi structured questionnaire was designed and used to elicit data from the respondents.

### Sampling procedure for focus group discussions (FGDs)

Focus group discussion participants were purposively sampled from a different but homogenous group of caregivers besides those who responded to the questionnaires. Eight participants constituted a group, making up two focus group discussions per LGA. A pre-tested FGD guide comprising of seven predetermined open-ended questions was used for the sessions.

### Method for data analysis

The quantitative data generated from this study was analysed using the Microsoft Excel 2016 and Statistical Package for Social Sciences (SPSS)

software version 20. Frequency distribution tables and figures were used to describe the data, while chi-square statistics was the test used for the comparison of proportions and testing of association. For the qualitative data analysis, tape-recorded data was transcribed and translated into English in the sessions where FGD is conducted in local language. The responses were manually analyzed using thematic coding method.

### Ethical consideration

An ethical clearance permission from the Kaduna State Ministry of Health's Research Ethics Committee, was obtained before commencement of the study. Informed verbal consent was sought from study participants before participation in the study. All information about the respondents were handled with utmost confidentiality and used only for intended purposes.

## RESULTS

### Socio-demographic profile of household respondents

A total of 500 fully completed questionnaires were recovered and analysed giving a response rate of 94.2%. Majority of caregivers in this study were females 338 (67.6%). For age, most of the caregivers 205 (42%) were between the ages of 26 – 35 years while the least age group was 56 years and above. More than three quarter of the respondents in this study were married 431 (86.2%), while 41 (8.2%) were single. Majority of respondents in this study had tertiary education 298 (59.6%). Majority of the children in this study were also females 259 (51.8%). Most of the children in this study were less than a year old 176 (35.2%) (Table1).

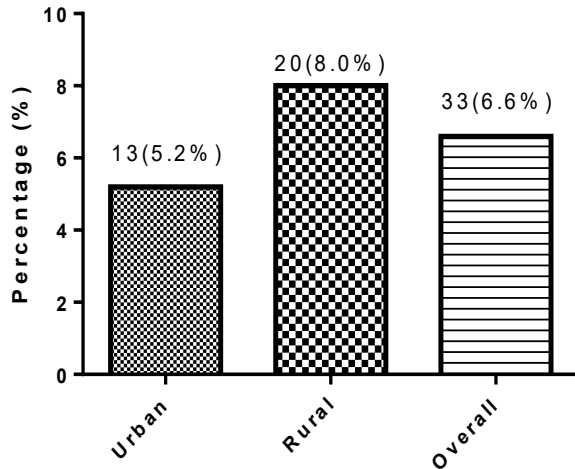
In this study, the overall occurrence of pneumonia as reported by respondents among under-five children was 33 (6.6%), 20(8%) occurred in the rural while 13 (5.2%) occurred in the urban LGAs (Figure 1). Majority of respondents in this study were aware of pneumonia as a disease condition 386 (77.2%). Most of the participants were of the opinion that pneumonia was caused by cold temperature/weather change 335 (67%), followed by bacteria 118 (23.6%), germs 109 (21.8%), viruses 43

**Table 1 Socio demographic characteristics of respondents**

Variables	Frequency (%)
<b>Gender of caregiver</b>	
Male	162 (32.4%)
Female	338(67.6%)
<b>Age of caregiver</b>	
Less than 25 years	141(28.2%)
26 – 35 years	217(43.4%)
36 – 45 years	108(21.6%)
46 – 55 years	31(6.2%)
56 years and older	3(0.6%)
<b>Marital status</b>	
Married	431(86.2%)
Single	41(8.2%)
Widowed	10(2.0%)
Separated	12(2.4%)
Divorced	6(1.2%)
<b>Educational status</b>	
No formal education	17(3.4%)
Primary	36(7.2%)
Secondary	149(29.8%)
Tertiary	298(59.6%)
<b>Occupation</b>	
Unemployed	74(14.8%)
Self employed	124(24.8%)
Formal employment	183(36.6%)
Casual labourer	24(4.8%)
Farmer	81(16.2%)
<b>Monthly income</b>	
Below N18,000	98(19.6%)
N18,000 – N50,000	161(32.2%)
N51,000 – N100,000	156(31.2%)
Above N100,000	81(16.2%)
<b>Religion</b>	
Christianity	279(55.8%)
Islam	221(44.2%)
<b>Children aged 5 and below in household</b>	
One	163(32.6%)
Two	174(34.8%)
Three	85(17.0%)
Four	78(15.6%)
<b>Age of child</b>	
Less than one year	176(35.2%)
1 – 2 years	126(25.2%)
2 – 3 years	90(18.0%)
3 – 4 years	55(11.0%)
4 – 5 years	53(10.6%)
<b>Gender of child</b>	
Male	241(48.2%)
Female	259(51.8%)

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**Figure 1: Occurrence of childhood pneumonia as reported by caregivers in the selected urban and rural communities in Kaduna state**

(8.6%), fungi 23 (2.3%). Some respondents were also of the opinion that pneumonia was caused by witchcraft 13 (2.6%).

The responses to the questions on knowledge of pneumonia in under-five children were scored individually to arrive at each respondent's score as shown in Table 2. The total scores range from zero to 40. Score range of 0 –10 represented poor knowledge of pneumonia in under-five children, score range 11 – 20 represented fair knowledge of pneumonia in under-five children, score range of 21 – 30 represented good knowledge of pneumonia in under-five children while score range of 31 – 40 represented excellent knowledge of pneumonia in under-five children. Majority of respondents 340 (68%) had poor knowledge of pneumonia in under-five children while 95 (19%) had fair knowledge of pneumonia in under-five children and the few remaining had good 30 (6%) and excellent 35 (7%) knowledge of pneumonia in under-five children (Figure 2).

Majority of the respondents 18 (54.5%) who reported that their child had pneumonia had poor knowledge level regarding the causes, sign and symptom and preventive measures to childhood

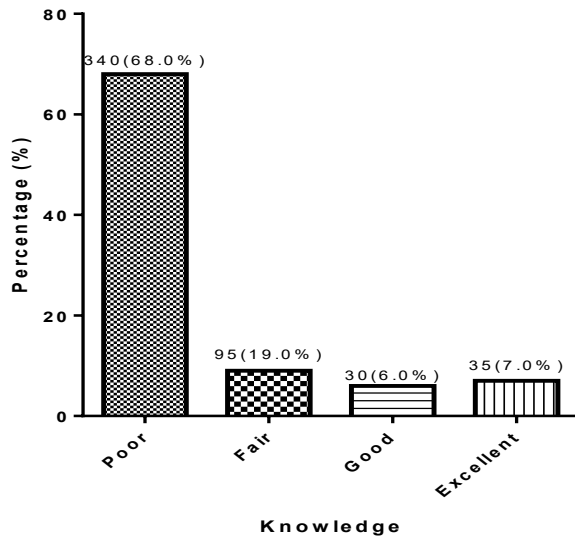
**Table 2 Caregivers' knowledge on childhood pneumonia**

Variables	Frequency (%)
<b>Awareness of pneumonia</b>	
Aware	386(77.2%)
Not aware	114(22.8%)
<b>Source of information on pneumonia</b>	
Health worker	157(31.4%)
TV/Radio	8(1.6%)
Older persons in the family, community	194(38.8%)
School	23(4.6%)
<b>Causes of pneumonia (multiple responses)</b>	
Cold temperature/weather	335(67.0%)
Germs/dust	109(21.8%)
Bacteria	118(23.6%)
Virus	43(8.6%)
Fungi	23(4.6%)
<b>Signs and symptoms of pneumonia (multiple responses)</b>	
Fever	137(27.4%)
Chills	64(12.8%)
Headache	218(43.6%)
Wheezing	61(12.2%)
Shortness of breath	97(19.4%)
Stabbing chest pain	270(54.0%)
Convulsions	81(16.2%)
Body weakness/fatigue	102(20.4%)
Chest in drawing	102(20.4%)
<b>Prevention of childhood pneumonia (multiple responses)</b>	
Vaccination/immunization	124(24.8%)
Improves child immune system	72(14.4%)
Proper nutrition/balanced diet	70(14.0%)
Exclusive breastfeeding	43(8.6%)
Proper warm clothing during dry season	339(67.8%)
Improve house ventilation	114(22.8%)
Practice hand washing	39(7.8%)
<b>Awareness of pneumonia vaccine</b>	
Aware	134(9.0%)
Not Aware	396(73.2%)

*Data presented as frequency (percentage)*

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**Figure 2: Caregivers' knowledge level on under-five pneumonia**

**Table 3: Relationship between caregivers' knowledge of pneumonia and occurrence of childhood (under-five) pneumonia**

Caregivers' knowledge of pneumonia	No	Yes	Do not know	Chi square	P - value
<b>Poor</b>					
Count	319	18	3		
% within Occurrence	70.0%	54.5%	27.3%		
<b>Fair</b>					
Count	76	11	8	30.333	<0.001*
% within Occurrence	16.7%	33.3%	72.7%		
<b>Good</b>					
Count	30	0	0		
% within Occurrence	6.6%	0.0%	0.0%		
<b>Excellent</b>					
Count	31	4	0		
% within Occurrence	6.8%	12.1%	0.0%		

*Categorical variable compared using chi-square and p-value <0.05 considered statistically significant*

**Table 4: Relationship between urbanization (region) and the burden (reported proportion) of under-five pneumonia**

Region	No	Yes	Do not know	Chi - square	P - value
<b>Urban</b>					
Count	226	13	11	12.52	0.002*
% within Urban	90.40%	5.20%	4.40%		
<b>Rural</b>					
Count	230	20	0		
% within Rural	92.00%	8.00%	0.00%		

*Categorical variable compared using chi-square and p-value <0.05 considered statistically significant*

pneumonia. This difference was statistically significant ( $p$ -value  $< 0.001$ ,  $df = 6$ , and  $\chi^2 = 30.333$ ). Majority of the respondents have heard of pneumonia (77%) and the main source of information was from older persons in the family or community followed by health workers (Table 3).

The burden of under-five pneumonia was more pronounced in the rural areas 20 (8.0%) when compared to the urban area 13 (5.2%). Analysis using chi square test shows that this difference was statistically significant ( $p = 0.002$ ,  $df = 2$ , and  $\chi^2 = 12.520$ ) (Table 4).

Focus group discussions revealed the terminologies and phrases used to describe pneumonia in this locality as shown in Table 5 below. From the focus group discussions, themes were identified as factors influencing knowledge of pneumonia in the

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**Table 5. Local illness terminologies used to describe childhood pneumonia**

English name	Local Terminologies	Literal Dictionary Translation
Pneumonia	Namoniya	Pneumonia in Hausa language
Pneumonia	Ukuluk	Pneumonia in Amawa language
Pneumonia	Oweruk	Pneumonia in Jere language
Pneumonia	Mokolo	Pneumonia in Dingi language
Chest pain	Ciwonkirji	Stabbing pain in the chest
Cough	Tari	To expel air from the lungs suddenly and noisily
Common cold	Mura	To get a cold or flu
Fever	Zazzabi	Increased body temperature
Difficult breathing	Kasawan lumfashi	To be out of breath
Convulsions	Farfadiya	Sudden involuntary contractions of body muscles

**Table 6. Codes and themes identified from focus group discussions as influencing the knowledge of caregivers towards under-five pneumonia**

Topic	Codes	Code definition	Theme(s)
Knowledge of pneumonia	Knowledge transmitted through generations	Past generations experienced the disease and told the younger generations of their experiences	Theoretical knowledge
	Had experienced the disease	Individuals in the household and or community had suffered from pneumonia	Vivid experience
	Dissemination by media and or health institutions	Campaign by governmental and non-governmental institutions to create awareness on pneumonia	

communities: Theoretical awareness and vivid experiences. Theoretical awareness relates to knowledge acquired through third parties, such as awareness programs by health officials both governmental and non-governmental, vaccination campaigns or knowledge passed through generations. It highlights that people are aware of the disease though they have not seen it or experienced it themselves which goes to show the importance of communication about diseases:

*“Over the years, pneumonia used to terrify a lot of children here because of the natural cold weather (barmattan), but our parents have had time to tell us about the dangers of the cold and how it relates to pneumonia” (32 years old female rural caregiver).*

*“We are aware of pneumonia because there are campaigns by health workers concerning how to protect ourselves from the disease by taking advantage of the health centers” (36 year old female urban caregiver).*

In contrast, vivid life experiences are the caregivers' direct experience of the disease either in their own children or through someone else's experience in the

community, where they see the disease first hand:

*“I have seen what pneumonia can do to a child. My neighbor lost her children to the disease because at first she did not even know it was pneumonia until it was too late...” (27 year old female urban caregiver).*

*“I battled with pneumonia as a child so I was very happy when I heard about the introduction of pneumonia vaccines. Now all my children have been vaccinated...” (34 year old male urban caregiver).*

## DISCUSSION

In this study, the occurrence of pneumonia as reported by respondents among under-five children was 33 (6.6%) with higher occurrence in the rural areas. This is in line with the report by the NDHS 2013 that childhood morbidity and mortality rates are higher in rural areas than in urban areas where adult education and literacy are relatively low, and with poor socioeconomic and socio-demographic characteristic, differences in access to health services and health information. The adverse effects of pneumonia cannot be over-emphasized given the grave outcomes that come with the condition

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because it claims the lives of about 195,000 Nigerian children annually (Madugba, 2015).

Result shows that most of respondents are aware of pneumonia but when pressed further with questions to determine their knowledge level based on causes, risk factors, signs and symptoms of pneumonia, most respondents could not give correct responses. Quite a few number of respondents had knowledge of the signs and symptoms of pneumonia such as fever, chills, wheezing, shortness of breath, stabbing chest pain, fatigue and chest in drawing. The most commonly reported symptom was stabbing chest pain 54%. This is in line with similar studies by Memon *et al.* (2013) and Ndu *et al.* (2015). Overall, majority of the respondents had poor knowledge of pneumonia. A similar study in India found 41% fair knowledge level among mothers of under 5 children (Pradhan *et al.*, 2016).

The uptake of vaccines was found to be low in this study, this is similar to other studies (Aigbokhaode *et al.*, 2015; Ndu *et al.*, 2015), however the study in Enugu by Ndu *et al.* (2015), found a higher uptake (39.7%) than that reported in this study (21%), the difference may be due the poor attitude to vaccination in general by caregivers who are from the northern part of the country. Ndu *et al.* (2015) however attributed the low uptake to cost of vaccination.

According to Gálvez *et al.* (2002), knowledge of pneumonia, the perceptions of its causes, the ability to recognize the signs of pneumonia coupled with the behavior of individuals if they were to have a child with the signs may help to build a better understanding of mothers' reaction to child pneumonia and uptake of vaccines.

Most of the respondents interestingly got information about pneumonia from older family or community member, which is an area to be explored in the plan to increase caregiver's knowledge of pneumonia and uptake of vaccines. However, we were not able to assess the association between source of information and uptake of vaccination and health seeking behavior. Ndu *et al.* (2015), established the

fact that source of information influenced uptake of vaccines, those who got their information from health facility were more likely to vaccinate their children than those who got their information about pneumonia from other sources.

Results from this study show that there was a positive association between knowledge of pneumonia and health seeking behavior of caregivers of under five children. This finding is supported by a study which was conducted in 6 sub Saharan African countries including Nigeria by Noordam *et al.* (2017).

Adequate health knowledge can equip an individual with the right tools and means to avoid a given health condition or at least minimize to a significant level, ones chances of contracting a health condition. Prior knowledge of causes and signs of pneumonia is imperative to the successful mitigation of the adverse health effect of the condition. In the study area, lots of the communities are densely populated, with peculiar climatic conditions such as strong harmattan and numerous industries whose fumes contribute to air pollution, may increase the risk of infection. The occurrence of pneumonia reported in this study was based on responses from the respondents and may not show true picture of the prevalence of pneumonia in the study area. There is the need for a population based study on the prevalence of pneumonia in the study area based on true diagnosis.

## CONCLUSION

The reported proportion of under-five pneumonia in the study was more among the rural dwellers than in the urban area. Though most of the respondents said they were aware of pneumonia, majority had poor knowledge level of the causes, signs and symptoms, prevention and treatment of the disease, which may have resulted in the poor uptake of pneumococcal vaccine. Improving caregivers' knowledge on pneumonia through effective and constant health education of the community members, especially those in the rural area is therefore strongly recommended.

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### COMPETING INTERESTS

The authors declare that they have no competing interests.

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