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Community perspectives and caregivers' healthcare practices and responses to the four major childhood killer diseases in Nigeria

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Abstract

Two-thirds of Nigeria's childhood deaths is attributable to four preventable/curable diseases—diarrhoea, malaria, meningitis and pneumonia (DMMP). Community perspectives and caregivers' practices about these child-killer diseases are poorly documented. Drawing on individual and group interviews (n=259), we explored community members' perspectives, and caregivers' practices/responses regarding DMMP among children across Nigeria's three major ethnic groups**.** Using deductive reasoning and data analysis in Atlas.ti, results from the narratives formed four thematic issues—respondents' perception and knowledge about the causes of the diseases; perception and knowledge about prevention; perception and knowledge of symptoms and fatality of the diseases; and caregivers' practices regarding the prevention and management of the diseases. Results demonstrate significant misconception about the aetiology of pneumonia and meningitis. We found ostensible disconnection between knowledge and practice. Interventions including health education programmes/sensitizations on the causes, prevention/management of DMMP are necessary to achieve reduction in the burden of childhood mortality in Nigeria. *(Afr J Reprod Health 2021; 25[6]: 121-133).*

Keywords: Community perspectives; childhood killer diseases; caregivers' response; caregivers' healthcare practice; Nigeria

Résumé

Les deux tiers des décès d'enfants au Nigéria sont attribuables à quatre maladies évitables/curables: la diarrhée, le paludisme, la méningite et la pneumonie (DMMP). Les perspectives communautaires et les pratiques des soignants concernant ces maladies mortelles sont mal documentées. Sur la base d'entretiens individuels et de groupe (n = 259), nous avons exploré les points de vue des membres de la communauté et les pratiques/réponses des soignants concernant le DMMP chez les enfants des trois principaux groupes ethniques du Nigéria. À l'aide du raisonnement déductif et de l'analyse des données dans Atlas.ti, les résultats des récits ont formé quatre questions thématiques : la perception et les connaissances des répondants sur les causes des maladies ; perception et connaissance de la prévention, perception et connaissance des symptômes et de la mortalité des maladies ; et les pratiques des soignants en matière de prévention et de prise en charge des maladies. Les résultats démontrent une idée fausse importante sur l'étiologie de la pneumonie et de la méningite. Nous avons trouvé une déconnexion apparente entre les connaissances et la pratique. Des interventions comprenant des programmes d'éducation à la santé/des sensibilisations sur les causes, la prévention/la gestion du DMMP sont nécessaires pour parvenir à une réduction du fardeau de la mortalité infantile au Nigeria. *(Afr J Reprod Health 2021; 25[6]: 121-133).*

Mots-clés: Perspectives communautaires; maladies mortelles infantiles; réponse des soignants ; pratique de soins de santé des aidants; Nigeria

Introduction

The burden of childhood mortality and morbidity in Nigeria remains huge. With 13% of global share of under-five mortality, Nigeria is ranked the second largest contributor to global statistics on childhood mortality[1-4]. Available evidence confirmed that 1 in every 7 children in Nigeria dies before age five[5,6]. Similarly, there are substantial sub-national disparities in under-five mortality in the country[7-9]. Although under-five mortality rate at the national level stood at 132 deaths per 1000 live births, the rates are 134/1000 and 187/1000 in the North-east and North-west regions, respectively; compared to 62 deaths per 1000 live births in the South-west region of Nigeria[6].

To address this public health problem, many national and international efforts have been made. In particular, Nigerian government and different development partners have invested huge resources in maternal, new-born and child health care programmes since the turn of the new millennium. Examples of such programmes include Save One Million Lives Programme, Integrated Maternal, New-born and Child Health Programme, Midwives Service Scheme, National Malaria Control Programme and massive immunization campaigns, amongst others. Despite these interventions, commensurate decline in childhood mortality has not been achieved in Nigeria. While under-five mortality rate declined from 201 deaths per 1000 livebirths in 2003 to 157/1000 in 2008, 128/1000 in 2013, it increased to 132/1000 in 2018[5,6,10], hence the MDG4 target of reducing under-five mortality to 64 deaths per 1000 livebirths in 2015 was not achieved, despite the huge public health investments to reduce child mortality. This suggests there are factors sustaining high level of childhood mortality in the country. As the world begins to pursue a different set of international agenda—Sustainable Development Goals (SDG), it is important to generate context-specific evidence that would guide programmes and interventions aimed at achieving the SDG target of 25 under-five deaths per 1000 live births by year 2030.

To put the problem of high child mortality in Nigeria in a proper perspective, recent data has shown that most of the childhood deaths in the country are due to four major childhood killer diseases—pneumonia, diarrhoea, malaria, and meningitis, with these diseases accounting for more than three-fifths (61.3%) of the total childhood deaths in the country[4,11]. Evidence has also shown that these childhood conditions are preventable or curable through low-cost timely healthcare interventions and treatments uptake[12-14]. Unfortunately, the current level of under-five mortality due to these four killer diseases in Nigeria suggests poor level of knowledge and perception[15]. This raises concerns for empirical investigations.

Evidence suggests there are myths and misconceptions about the major causes of child death in Nigeria, and prior research has shown that such misconceptions and perceptions can have negative implication for health care-seeking behaviour and practices[15]. Given that the perceptions and opinions of community members and caregivers about certain illnesses have implication for demand-side barriers to healthcare use, this study therefore explored community members' perspectives, and caregivers' practices and responses to diarrhoea, malaria, meningitis and pneumonia among children in Nigeria.

Methods

Study setting and population

This study was conducted among respondents selected from among the three major ethnic groups in Nigeria—Hausa/Fulani, Igbo and Yoruba. The Hausa/Fulanis are predominant in the North, Igbos are in the South-east while South-west is home to the Yorubas. Kano state was selected from the North, while Ebonyi and Ondo states represented the South-east and South- west, respectively. These states were selected on the basis of their high level of under-five mortality[5] and because they represent the three major ethnic groups in Nigeria in terms of religious compositions, cultural practices, and linguistic as well as historical antecedents. Further, the study was conducted among the three major ethnic groups in Nigeria to obtain a diverse set of views from these groups which have different cultural practices with respect to child care and feeding practices. In each of the three states, we randomly selected one rural and one urban community. Purposive sampling technique was thereafter employed to select relevant participants for the study. The respondents included pregnant women/nursing mothers, older women, men, traditional birth attendants/traditional medicine practitioners, faith-based healers, skilled healthcare providers, as well as religious and community leaders.

Data collection

The interview guide (which contained questions on childhood diseases and their management, as well as child care practices) was designed and rigorously tested. Prior to the actual fieldwork, a pilot study was conducted (to test the interview guide) in Osun State, Nigeria; a location different from the three selected study sites. This was followed by a debriefing session which guided and assisted in the refinement of the study tools. The actual fieldwork took place between July and August 2017. The research assistants were

graduate students who were given rigorous training on the research protocol, the art of qualitative interviewing, research ethics and other pertinent research topics over a period of one week. The research assistants conducted the focus group discussions (FGDs) and in-depth interviews (IDIs) with the sampled respondents This was done to obtain a diverse set of views, perspectives, responses and practices regarding pneumonia, diarrhoea, malaria, and meningitis in Nigeria. Information was also collected on the socio-economic and demographic characteristics of study participants. Open ended study guides which were translated to major Nigerian languages (Hausa, Igbo and Yoruba) were used for data collection. English served as a language of interview for respondents who preferred it. We conducted a total of 84 interviews (60 IDIs and 24 FGDs) across the selected states in Nigeria. Each FGD session comprised 8-11 participants. Table 1 presents some of the selected background characteristics of the study participants.

Table 1: Distribution of FGDs and IDI participants by selected background characteristics

Characteristics	Percentage	Frequency
Sex		
Male	13.9	36
Female	86.1	223
Age		
18-34	39.0	101
35-49	47.5	123
50+	13.5	35
Level of Education		
None	12.0	31
Primary	22.4	58
Secondary	32.0	83
Tertiary	33.6	87
Occupation		
None	34.4	89
Formal employment	15.8	41
Informal employment	49.8	129
States		
Ebonyi	34.4	89
Kano	33.6	87
Ondo	32.0	83
Religion		
Christianity	64.5	167
Islam	35.5	92
Marital Status		
Single/never married	3.1	8
Currently married/cohabiting	88.8	230
Previously married	8.1	21
Place of residence		
Urban	56.0	145
Rural	44.0	114
Ethnic group		
Hausa/Fulani	35.1	91
Igbo	34.0	88
Yoruba	30.9	80
Parity		
0-3	48.2	79
4-5	23.8	39
>5	28.0	46

Data management and analysis

Research assistants always met at the end of each day of fieldwork to check for the main themes from the interview and also to share experiences and observations from the interviews (e.g. non- verbal clues, group dynamics). These were later included in the expanded field notes. Thereafter, experienced transcribers were engaged for the transcription of the audio files. Verbatim translation was done from local languages (Hausa, Igbo and Yoruba) to English. This was done by individuals who speak and understand the relevant local languages and English quite well. Data analysis was done with Atlas.ti software using the thematic approach. Narratives buttressing key findings were quoted verbatim and italicized and the source of the quotation was parenthesized. These quotations were then arranged according to the themes that arose from the data, and were interpreted accordingly.

Results

Findings from the narratives of the respondents from the three states formed five thematic areas. Using deductive reasoning, the narratives formed four main thematic issues—respondents' perception and knowledge about the causes of the diseases; their perception and knowledge about prevention, their perception and knowledge of the symptoms and fatality of the diseases; and caregivers' practices regarding the prevention and management of the diseases.

Respondents' perception and knowledge about the causes of pneumonia, diarrhoea, malaria and meningitis

We sought to find out the respondents' perception and knowledge about the causes of each of the diseases. It emerged from the discussion that though some respondents had better understanding of the causes of malaria and diarrhoea compared to pneumonia and meningitis, there were generally

some misconceptions about the causes of the four childhood killer diseases. On the causes of malaria, almost all the respondents were well aware of mosquito as the vector, as they mentioned mosquito bites as the cause of malaria. However, only a few respondents made reference to plasmodium as the causative agent and only one person (a traditional healer) said that it takes about three weeks of being infected with plasmodium before symptoms begin to manifest. Some of the misconceptions about the causes of malaria expressed by the respondents include forcing children to eat what they do not like. One respondent's view was:

"If the children are forced to eat food that they don't like, and from there, the body system will change and from there sickness like malaria will occur" (Ebonyi, FGD, urban less educated older women).

Another misconception about the cause of malaria was improper clothing of children in cold weather condition as can be deduced from the following quote from a respondent:

"*Some parents do not take care of their children properly. There are some parents, after waking up in the morning, instead of dressing for their children to protect them from cold weather, they would not and such children could be affected by diseases such as malaria." (*Ondo, FGD, rural educated older women).

Teething was also misconceived as a cause of malaria among under-five children as an urban traditional healer expressed thus:

If a child wants to grow teeth, his head will be hot and it may cause malaria" (Ondo, IDI, urban Traditional Healer).

Another traditional healer also said:

"*With regards to malaria, it is sometimes caused through breast feeding*" (Kano, IDI, urban Traditional Healer).

Other misconception about the causes of malaria is eating contaminated food or drinking contaminated water;

"Malaria fever is a consequence of unclean environment and places where food is prepared. Then government agencies that don't do their job in ensuring that the water we take is safe like this sachet water. Even if safe drinking water is available you will meet the unsafe on the street and buy, so you cannot escape" (Kano IDI, Urban Young Father)

With respect to diarrhoea, some respondents knew that diarrhoea is caused by eating contaminated food or drinking contaminated water, however, there were two notable misconceptions about the cause of childhood diarrhoea. First, almost all the respondents believed that diarrhoea is a normal occurrence during the teething period. One of the FGD participants was of the view that:

"It's very common because all children that want to grow their teeth will have diarrhoea and high temperature. When it's time for the child to grow teeth, there is no way he will stool and have high body temperature". (Ebonyi, FGD, rural less educated nursing mother).

Second, the other misconception was that diarrhoea is as a result of eating sweetened food or a reaction to food that a child cannot tolerate. A nursing mother expressed her opinion that:

"*Some parents buy biscuits and "viju milk" for their children, which cause diarrhea*" (Ondo, FGD, urban less educated nursing mothers).

There are several misconceptions about the causes of childhood pneumonia. Majority of the respondents perceived that pneumonia is caused through exposure to cold weather. Some had the misconceptions that pneumonia is caused by eating cold food, drinking cold water and soft drinks, sleeping on the floor and staying in an air conditioning room or staying under a fan. Other misconceptions include bathing children with cold water, exposing children to cold weather and allowing them to play under the rain and allowing them to sleep in a poor ventilated or congested room. Some respondents also said that children are at the risk of coming down with pneumonia if their mothers drink excess alcohol during pregnancy, or if they are exposed to cold weather, drink cold water or cold soft drinks during pregnancy. The two narratives below buttress the respondents' misconceptions about the causes of childhood pneumonia:

"Pneumonia has a link with the kind of weather we are in. Some get it through fans and air conditioner, while others get pneumonia through sleeping on the floor without mat or bed and without covering their bodies." (Kano, KII, urban adult father).

" *Most of the children running around without cloth will definitely have pneumonia, and those who wake up in the morning and eat cold food, especially poor homes where the parents do not take proper care of their children*" (Ebonyi, FGD, urban educated currently nursing/pregnant mothers).

Only one of the respondents said that pneumonia is caused by infective agent as could be deduced from the following narrative:

"Well, to me, pneumonia is caused by the infection of the upper respiratory tract, and weather conditions account for that. (Kano, IDI, urban young father).

Generally, knowledge of the causes of meningitis among respondents is very poor. Only one of the respondents, - a health worker mentioned infectious agent – bacteria as a cause of meningitis:

"The major cause of pneumonia is bacterial infection – when the bacteria gets to the meninges" (Ondo, KII, urban health care worker (HCW)).

There was an evidence of a form of sensitization on how to avoid meningitis in some communities, however, people's perception about the causes of meningitis has not really changed. This is reflected in a narration of one of the respondents:

"*Sir, actually some people recently said that pneumonia is caused by an infectious organism but what we know is that it is the result of overcrowding and excessive heat, especially here in the metropolis where many people sleep in an overcrowded space."* (Kano, FGD, urban less educated older women).

Further, majority of the respondents in selected rural communities of northern Nigeria believed that meningitis is caused by an act of God as expressed in the views below:

"Our belief is that pneumonia is from God, He causes it and takes it away when he wishes. He kills whom he wills with it and leaves those he wishes (Kano, FGD, rural educated currently nursing mothers*).*

Respondents' perception and Knowledge about prevention of PDMM

Most of the respondents indicated vaccination as the best means of preventing childhood illness, and some wished that there is malaria vaccine as expressed in the views below:

"*Methods that could have been the best so far in this our community here is if we could get vaccines for malaria as well .I think they've started working on vaccination against malaria*." (Ondo, IDI, urban young father).

Asides vaccination, sanitation and good hygiene practices, good or adequate nutrition and exclusive breastfeeding for the first six (6) months of life were also mentioned by the participants as effective strategies to prevent childhood illnesses. The importance of good hygiene and exclusive breastfeeding was driven home as follows:

Preventive methods include keeping your environment clean, keeping the feeding items of children clean and ensure children don't play around dirty places. There are some homes where faeces are left for flies to perch. This should be avoided (Ebonyi, KII, rural female community leader).

"It depends on the people. Some people are aware of exclusive breastfeeding for four to six months which prepare and strengthen the immunity of the child, also good hygiene must be ensured" (Kano, FGD, urban educated women aged 35+).

Majority of the respondents reported that malaria can be prevented among under-five children by protecting them against mosquitoes' bites using insecticide treated nets (ITNs). The level of awareness of importance of ITNs for preventing mosquitoes' bites was equally high across the three selected states. However, a number of misconceptions were reported on the prevention of malaria. These include that malaria is not preventable during raining season while many respondents expressed that malaria is preventable through drinking clean water.

Vaccination was considerably mentioned by many people as the best means of protecting children against pneumonia. An adult father from Kano state stated thus:

"The *best measure against pneumonia is the vaccine method. We hear the town criers, publicising that we should take our children to the health facility for immunization against meningitis." (*Kano, IDI, rural adult father).

One of the major misconceptions about pneumonia prevention among under-five is the restriction of pregnant women with regards to drinking cold water or soft drinks or staying in the cold weather. Some respondents from the north also believed that pneumonia can be prevented among children by wearing a garlic necklace round a child's neck:

"*In the olden days we used to make a chain of garlic and put it around our children's neck. This prevents them from pneumonia, even though some people consider that as witchcraft.* (Kano FGD, Urban less educated currently nursing mothers)"

Though narratives from majority of respondents revealed their knowledge about the availability of vaccines against meningitis, albeit a few of the re spondents still believed that nothing could be done

to prevent meningitis. Further, majority believed that meningitis outbreak can be prevented by sleeping in a well aerated environment, by decongesting the sleeping rooms and by taking cold baths before going to bed at night.

The level of awareness of rotavirus vaccine for the prevention of diarrhoea is still low among caregivers;

"Yes, food hygiene and environmental hygiene are the orthodox preventive measures but I'm not aware of any vaccine against diarrhea" (Kano, IDI, rural young father).

Though majority of the respondents were aware that diarrhea can be prevented through good hygiene and sanitation practices, a lot of them believed that childhood diarrhea is unavoidable during teething period, thus the use of some medications called teething powder and some herbs were advocated for. These are expressed in the extended narratives below:

"*There is a practice during teething period. "Ararrabi" is added to the liquid food or drink of children with diarrhea. The mothers also drink it so that the stool of their children will be solid*" (Kano, FGD, rural educated currently nursing mothers).

"*I remember one home grown prevention of diarrhea. The mother will plant beans anywhere in the house, then you collect the first leaves from the beans, grind the leaves using your two (2) fingers and apply in the mouth of the child. That child will never face diarrhea during teething period"* (Kano, Urban, KII, Traditional healer).

Also, few respondents believed that quarantine is an effective means of preventing childhood diarrhea as expressed in the quote below:

"Yes, children should avoid contacts with others so as not to contract diarrhea. Because if a person vomits, another child may inhale it because it's airborne. Same with when that person stools. So the person should will be quarantined" (Ebonyi, IDI, urban adult Father)

Respondents' perception and knowledge of symptoms and fatality of PDMM

The two notable symptoms of diarrhoea according to the respondents were watery and frequent stooling and vomiting as expressed in the quote below:

"*The symptom is that, the child would stool for long. He may stool for like four to five times within one hour"* (Ondo, IDI, urban young father).

For pneumonia, fast breathing, coughing with blood and increased body temperature were the symptoms highlighted by the respondents

Seizure, stiff neck and fever were the two major meningitis symptoms identified by the respondents while fever was the major symptom mentioned for malaria. Similar views were expressed on these symptoms by the IDI and FGD participants as shown below:

"For malaria, firstly, the person will be complaining of headache, body weakness, and loss of appetite, and very high fever. From my little knowledge of pneumonia, it is a disease caused by a prolong cold and catarrh. Pneumonia also has a symptom of difficulty in breathing in children. Pneumonia is more rampant during the rainy season in our community. It is more frequent to children especially infants. Moreover children that do not ware socks and caps are seriously at the risk of pneumonia diseases. Many caregivers also do not prevent their children from playing after a rainfall. Coughing, and sneezing for a long time without taking the child to the hospital can result in pneumonia" (Kano, KII, rural healthcare provider).

"You will see that the child finds it difficult to turn his head because the neck becomes stiff" (Kano, FGD, urban educated currently nursing mothers).

On respondents' perception about the fatality of the four killer diseases, the popular opinion expressed was that pneumonia, diarrhoea, malaria and meningitis cause childhood death, particularly if children are not taken promptly for proper medical care. One of the respondents reported that she had lost a child due to diarrhoea:

"My daughter died as a result of diarrhea and vomiting" (Kano, FGD, urban poor women).

On the contrary, a respondents was of the opinion that:

"*Diarrhea cannot kill a child, it just makes the child weak"* (Ondo, FGD, urban less educated nursing mothers).

Meningitis was said to have resorted into hearing loss by another respondent:

"*On my side, my younger sister has even lost hearing as a result of meningitis."* (Kano, FGD, rural less educated currently nursing mothers)

Another respondent was of the view that:
Meningitis mainly affects children during the hot season. They wake up in the morning with rigid neck and they will not be able to talk. From there you will hear that someone has died because meningitis also causes death (Kano, urban, IDI).

Caregivers' preventive practices and managements of childhood pneumonia, diarrhoea, malaria and meningitis

Even though there was evidence of ITN campaign and distribution, narratives from the respondents revealed that, in most households, under-five children were not usually sleeping under the net. Some people reported that the ITNs were fixed on their windows. This practice was reported as shown below:
"N*o, we don't use the net, but we fixed it on the window to prevent mosquito, because the children do not like to sleep under the net"* (Ondo, FGD, urban less educated nursing mothers).
Interestingly, it was reported that others were using the distributed ITNs for other purposes such as for farming, for nursing seedlings and for fishing. In a similar vein, community members were not properly guided on the use of ITNs, as some of the respondents complained of adverse reactions at their first attempt of sleeping under the net as shown in the narratives below:
"The reason for some people to have put the mosquito net in water to wash is because, like me now, for example, when I was given for the first time, I did what I was told to do. That I should put in sun, but when we used it and woke up the following morning, I did not know immediately that it was the net, all our faces, my own, that of my husband and my children's faces, became swollen and paining us. It was somebody that told us to wash it, thereafter we discovered a positive change" (Ondo, FGD, urban educated currently nursing older women).
Caregivers' preventive measures and practices against pneumonia included keeping children warm by clothing them properly, bathing them with warm water, preventing them from playing in the rain or sand, rubbing their body especially their chest with mentholated balm or shea butter and feeding them with warm food. These measures are expressed in the quotes below:
"How we prevent pneumonia is as my sister just mentioned. What we do is to always feed the child with warm food, bath the child with warm water and clothe the child properly from being exposed to cold.…and applying balm that will keep the child warm" (Ebonyi, FGD, urban poor currently nursing mothers).
Another respondent from Kano State also mentioned this practice as follows:
"*Early in the morning, I put warm/thick cloths on my children, I ensure that they put on stockings and head warmer. I don't allow them to come out of the room until the sun has started coming out. I don't go out of the room until the sun is fully out because whenever I come out, my son will insist on following me so because of him I have to delay the time I come out to reduce exposing him to cold weather"*(Kano, FGD, urban educated currently nursing mothers).
A health worker also confirmed that this pneumonia preventive measure is a usual practice across their communities. This is buttressed by the quotes below:
"*With regards to pneumonia, they do tell us health workers that they have been doing their best possible to prevent it by wearing more than two clothes for their children while they are going to bed but that wearing of many clothes seems not to be working because after a while, they still get effected with pneumonia."*(Ebonyi, Urban, KII, HCW).
Apart from keeping the children warm, some home-grown herbs are also given to children to prevent them from having pneumonia. A respondent stated that:
*"We give the children garlic along with honey as well as kajiji (local herb) and man shanu local butter). These are boiled together and given to children to drink to prevent them from pneumonia. Raid ore (local leaves) is also squeezed and the water is used to bath the children … the raid ore is also boiled and the child is made to inhale the steam to prevent him from pneumonia by the grace of God (*Kano, FGD, urban poor currently nursing mothers).

Majority of the respondents across the three states reported vaccination as their major practice in preventing meningitis among their children, however, some of the respondents in the selected states reported avoiding congested and stuffy rooms at night as parts of the measures taken in preventing outbreak of meningitis in their communities.
The responses to meningitis disease among children are more of reactive than proactive measures, as

mass immunization campaign was reported as the usual response to meningitis outbreak. .

Some proactive national efforts towards preventing diarrhoea outbreak were cited by the respondents. These include the roles being played by the National Agency for Food and Drug Administration and Control (NAFDAC) and Environmental Health Officers Association of Nigeria (EHOAN); In addition to the roles played by these government agencies, a mass rotavirus vaccination campaign was also cited as part of government efforts to prevent outbreak of diarrhea among children. According to a health care workers in Ondo State, several efforts such as hand-washing campaign, health talk and household visit have been put in place at the health facilities level to prevent diarrhoea among children Caregivers and other community members across the selected states also mentioned that they practised good sanitation and hygiene as preventive measures against childhood diarrhea.

Narratives from respondents whose children had suffered from meningitis and those whose relatives and/or neighbours' children had experienced meningitis before reflected health facility as the place where most caregivers seek health care for their children. However, results showed that majority do not usually present in the facility at the early stage, as self-medication was reported as the major initial response to the manifestation of symptoms. A respondent's response below confirmed this practice:

"But I know that at early stage when it starts with signs of fever, they used to give fever drugs like paracetamol. When they notice that the thing is so much that they can't handle they will then proceed to the hospital" (Kano, IDI, urban women leader).

It was also reported that, due to the perception that diseases are usually caused by spiritual influence, many people resort to spiritual means to combat meningitis at the initial stage:

"The only thing is that initially they will start praying, using anointing oil and all those things with the impression that it is a spiritual attack. So it is after they have exhausted those different options that someone will suggest they should go to the hospital and while they come to the hospital, they will still continue with the prayer"(Kano, KII, urban HCW).

Our findings showed that meningitis was most commonly reported in Kano state compared to the other two selected states. Though, some of the respondents reported orthodox medicine as the best means and most effective treatment for meningitis, following are some of the narratives from respondents with varying characteristics describing the home grown care for meningitis in Kano as in other parts of northern Nigeria:

"Yes, we used to find "raidore" (local Hausa plant) and mix it with red potassium and rob all the body of an infected person." (Kano, FGD, urban less educated currently nursing mothers).

"There is one local drug that was used to cure my son of meningitis. It is called man aledi (local ointment). It was dropped in his mouth and also rubbed over his knees and he was cured of the meningitis" ... (Kano, FGD, rural older women).

"There is a local drug called garap (local herb) that is grinded and rubbed on the neck of the child. The child will get better from this by the grace of god even without going to the hospital" (Kano, Urban, FGD, educated currently nursing mothers).

"And whenever a symptom of meningitis appears you can use a dry leaf of grass and potassium, you apply the mixture of the grass and potassium on the neck. By God's will the meningitis patient will recover. You can also apply garlic on the neck. All these are home grown treatments of meningitis." (Kano, KII, Urban traditional healer).

The conventional Oral Rehydration Solution (ORS) and the home made Salt Sugar Solution (SSS) were mentioned as the first line of response to diarrhoea among under-five children. However, if the symptoms persist after some days, caregivers reported that the child will then be taken to the health facility for further management. Narratives from nursing mothers in Ondo affirmed there were health campaigns and talks on the management of diarrhea:

"We have been thought on how to treat diarrhea at home with Oral solution, and when it persists then the child will be taken to the hospital for the doctors to run a test on them and the child will be cured." (Ondo, FGD, urban nursing mothers in Ondo).

Apart from the use of ORS and SSS, respondents also mentioned that some local herbs are used in managing childhood diarrhoea:

"*There is a local leave we use because not all of us have the money to go to the hospital. Early in the morning, we boil the leave and use it as a tea herb for the children. That is the first thing he or she will take in the morning and through that God does see*

us through" (Ebonyi, FGD, urban less educated older women),

"*There is a local medicine called ararabi, it is just like Ampiclox antibiotics. You just dissolve it in water and give the children to drink" ....."the ararabi is also used along with dan tam barawa (a local herb) and sabara (bark of a specific tree), It also serves as a treatment for diarrhea*" (Kano, FGD, urban, less educated currently nursing mothers).

Notable among the first aid practices in managing malaria among under-five children in Nigeria is cold sponging as expressed in the narratives below:

"*Something else I want to add to the issue of Malaria is that at midnight the child may develop fever, and you may not take the child to the hospital at that time of the day. First of all we massage the child's body with cold water to reduce their body temperature so as not to cause what the English people call "convulsion". Then the child may be taken to the hospital in the morning*" (Ebonyi, FGD, urban educated nursing mothers).

Further, respondents reported that palm kernel oil, gin based concoction and other types of herbs are also used in managing childhood malaria:

"*But in Igbo culture when a child is having fever you may massage the child's body with cold water and Palm kernel oil. It is believed that when a child is having fever and cry persistently the palm kernel oil is used to drive away negative bad spirits*." (Ebonyi, FGD, urban educated nursing mothers),

"You can mix bitter leave and dry gin, and apply the concoction on the child's body" (Ebonyi, FGD rural less educated currently nursing mothers).

"Some areas in this community, they give their children herbs and even prepare some herbal soup for them. If the child cannot eat, immediately the child tastes the herbal soup, the body will begin to become better. Sometimes the parents might not have money, and instead of spending money in the hospital, the parents will spend the money to prepare the herbal soup" (Ondo, FGD, urban less educated nursing mothers).

Apart from using the home-grown herbs, self-medication and patent medicine consultation were cited as parts of the first line of treatment of malaria among under-five children. It is only after 2 to 3 days of no improvement that the child will be presented at the health facility.

"When it comes to children, you know most of the time, caregivers go and buy malaria drugs, but adults mostly take the traditional herbs. But for children, most of the times, they go and get anti-malaria drug over the counter" (Kano IDI, urban HCW*)*.

"When we discover that the child is warm, the child will be given drug and warm food… drugs like paracetamol, malaria drugs… drugs like chloroquine. When my first born was sick, I took him to general hospital, chloroquine and piriton were part of the drugs I was given and since then I have been using similar medications to treat malaria for my children". (Ondo, FGD, urban less educated nursing mothers).

Like the other childhood killer diseases, caregivers' responses to childhood pneumonia include using home-grown herbal concoctions, self-medication and consultation of patent medicine sellers. The quotes below buttress these findings.

"Some parents used to give the children honey and garlic at home in order to cure pneumonia". *Others use cow oil which helps to dislodge all the mucus on the airway. Garlic oil is also used with honey and bitter lemon placed on the nose and mouth. Also palm kernel oil and mentholated oil is applied to the child. Powdered ash can also be applied on the nostrils and the child will be releasing mucus from the chest. Usually when all the local measures fail, the hospital is approached. They usually request for a chest x-ray and then prescribe medications for them".* (Kano, FGD, urban educated older women)

"We can do the treatment of pneumonia in our house; we could make the bathing water of the child hot, and wear a very good cloth for him then apply rob ointment all over his body". (Ondo, FGD, rural educated older women)

Moreover, hospital was mentioned as the major place of call for treating childhood pneumonia particularly for parents who have the financial means to do so. The responses to pneumonia

"Most of the times, the ones that can afford it to take their children to the hospital will do so, then the ones that cannot afford it will go to patent medicine store and tell them what the problem looks like, and they will prescribe pneumonia drugs for their children. ...But, those who come to the hospital, we normally place them on antibiotics. So

the antibiotics they start with at times is Zenat suspension, depending on the age of the child. At times we use Cefuroxime, at times we use seflaxil syrup. Then depending on how severe the condition is, we can equally give them ceftriaxone maybe 250 to 500mg depending on the severity and age of the child" (Kano, KII, urban HCW).

Discussion

This study explored community perspectives and caregivers' healthcare practices and responses to the four major childhood killer diseases (diarrhoea, malaria, meningitis and pneumonia) in Nigeria. Despite the available proven low-cost healthcare interventions, the four childhood conditions remain deadly and account for about two-third of childhood deaths in the country[4,11]. Prior research has established that disease-specific beliefs have implications for healthcare seeking behaviour[16-18]. Our findings from this study have important policy implications and utility for prioritising and guiding future actions aimed at improving child healthcare practices in Nigeria.

Our data established considerable myths and misconceptions regarding the causes of pneumonia, diarrhea, malaria and meningitis among children in Nigeria. Similar findings about myths and misconceptions regarding the aetiology of childhood diseases have been previously reported[15]. Although, community perception and knowledge about causes of childhood diarrhoea and malaria seemed more fairly adequate compared to the other two conditions, significant misconceptions also exist regarding these diseases. For instance, it was a common belief among caregivers that teething is a cause of malaria and diarrhoea, and that children must certainly have these two illnesses during the teething period. Also, most respondents held the misconception that once a child can avoid contaminated foods or unclean water, malaria can be prevented. As Nigeria ranks first among the top countries with malaria cases global, the common misconception about causes of malaria is perhaps a major contributor to the over 300,000 annual malaria deaths in the country, and which mostly occur among under-five children[18,19].

Malaria is recognized as one of the major killers of children globally and it hampers children's social development and schooling. Whereas child death due to malaria can be drastically reduced through prompt access to effective antimalarial treatment[20], our data showed that many caregivers largely delay seeking appropriate care. Rather than accessing prompt diagnosis and effective treatment of malaria, we found that it was a common situation that caregivers erroneously regard malaria infection in children as common fever for which they often resort to self-medication by purchasing over-the-counter medicine from patent medicine vendors. Prior research has established the devastating effects of self-medication[21,22]. Although knowledge has increased considerably that mosquitoes are the major cause of malaria[23], our findings established that many caregivers still do not attribute malaria to mosquitoes. This result perhaps partly account for the poor preventive measures against mosquito bites among some caregivers. Previous study found that less than 5 per cent of African children sleep under ITNs, despite its potential to reduce malaria episodes by more than half in the high-transmission areas[20]. In some areas, we found that local government authorities had previously distributed ITNs and also undertaken sensitization programmes on the benefits of ITN as a preventive measure against malaria, nevertheless a huge gap still exists between knowledge and practice. Our data showed that many community people have turned ITNs to fishing or farming device.

With respect to diarrhoea, we found that the level of knowledge was high among respondents that diarrhoea can be prevented through good hygiene and sanitation, nonetheless many held the notion that diarrhea is an inevitable teething problem among young children. They explained that good sanitation and hygienic practices are good but cannot prevent childhood diarrhea during teething period. This belief has a serious implication and may cause caregivers' delay in seeking appropriate care. In particular, malnourished children who do not have the resilience to fight diarrhea are the major victims of diarrhea. Nigeria's burden of severe acute malnutrition is high, with almost 3 million children severely acutely malnourished in the country[19]. Childhood disease such as diarrhoea in combination with underlying malnutrition is a major cause of childhood death in Nigeria. In regards to diarrhoea prevention and management, although respondents described good knowledge of measures such as oral rehydration solution (ORS) and the home-made salt sugar solution (SSS), use of home-grown herbal measures against childhood diarrhoea was prominent among the study population.

Further, despite that childhood pneumonia is the largest infectious cause of child death globally[24] and a major cause of childhood death in Nigeria[4], we found that level of knowledge about causes and prevention of pneumonia was generally low across the study setting. Nigeria has the highest burden of pneumonia in Africa and also ranks among the five countries that account for more than half of the global annual incident cases of pneumonia[4,11]. Poor knowledge about causes and prevention of childhood pneumonia as well as its poor management are possibly major factors contributing to its high fatality among children in Nigeria.

While childhood pneumonia, diarrhoea and malaria were reported across the three selected states, our data showed that childhood meningitis was mainly found in Northern Nigeria. As has been previously reported, reasons for this are due to climatic condition and social habits[25-26]. Besides, northern Nigeria is close to the meningitis belt[28]. Unfortunately, we found that efforts and approaches of national and regional governments to pneumonia and meningitis are reactive rather than proactive. Respondents noted that government often embarks on immunization mainly when there is outbreak of these diseases. Such approaches are certainly not in line with the international best practice.

Conclusion

Most of the caregivers' responses and healthcare practices regarding the four childhood killer diseases largely emphasise preventive rather than curative measures, albeit, many of these preventive practices are home-grown and are based on misconceptions about the causes of the childhood conditions. Besides, there are ostensible disconnections between knowledge and practices. Therefore, interventions such as sensitizations and health education programmes on the true causes, right strategies on prevention and management of diarrhoea, malaria, meningitis and pneumonia are necessary to ensure significant reduction in the burden of childhood mortality in Nigeria.

Limitations and strengths

This study has some limitations. These include a reliance on self-reporting which may be subject to recall bias. To minimize this problem, intensive training was given to the data collectors on how to avoid or reduce recall bias through clear explanation of questions and appropriate probing during data collection. Also, the study was mainly women-focused as most information was solicited from female participants. Reason for this is that issues of fertility and child death are better linked to women. However, our findings may offer exclusively women perspectives about the issues under study. Lastly, there is likelihood of social desirability bias, but adequate trainings were conducted and steps were taken to minimize such biases by ensuring respondents' privacy during fieldwork. Despite these limitations, this study has offered important insights regarding the community perspectives and caregivers' healthcare practices and responses to the four major childhood killer diseases in Nigeria.

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Conflict of interest

The authors declare that there were no conflicts of interest in the conduct of this study.

Ethical approval

Ethical approval to undertake the study was obtained from the National Health Research Ethics Committee (NHREC), Abuja, Nigeria. The NHREC approval, with number

NHREC/01/01/2007-20/06/2017 was obtained in June 2017. All institutional guidelines and principles (beneficence, non-maleficence, autonomy and justice) as stipulated in the National Code for Health Research Ethics were complied with. Appropriate informed consent was obtained from study participants before the commencement of each interview. Similarly, the research team obtained approvals from the relevant authorities in the study locations (including State Ministries of Health and Hospitals Management Boards). Research findings were anonymised and information obtained from respondents was treated with strict confidentiality.

Contribution of authors

SAA: study conceptualization, study design and data collection, data analysis, manuscript preparation, revising manuscript critically for important intellectual content, and final approval of the version to be submitted. OAA: data analysis, manuscript preparation, and final approval of the version to be submitted; CAA; drafting the manuscript and revising it for important intellectual content; and final approval of the version to be submitted.

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