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# impediment and resolution in fighting pneumonia among children under five years of age in Nigeria

Master's thesis in GLOBAL HEALTH

Supervisor: PROF ELISABETH DARJ

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## **Abstract**

**Background:** Pneumonia is an acute infection with less than twenty one days duration and is characterized by inflammation of bacteria, viruses or fungi in the lungs parenchyma leading to cough or difficult breathing. These may be enhanced by malnutrition, indoor and outdoor air pollution and leaves the children fighting for breath. Their lungs become inflamed and the tiny air sacs, or alveoli inside the lungs becomes filled up with fluid and air. These are usually serious situations that can lead to death if not properly handled. As of 1902, one of the founders of Johns Hopkins Hospital and a pioneer medical teacher called William Osler gave pneumonia a name (Captain of the Men of Death). According to the publish report, Africa has the highest burden of global child mortality. According to the publish report by WHO 2016, 16% of the 5.9 million deaths recorded pneumonia deaths in 2015 were among children under five years of age.

**Design and method:** A qualitative study design with in-depth interviews and focus group discussions were used to explore nurses and pediatricians perception on impediments and resolution in fighting pneumonia among children under five years of age in Nigeria.

**Findings:** Our analyses yielded eleven subcategories which were merged into four main categories. All categories influence in various ways, prevention and the combat against fatal pneumonia among children less than five years old in Nigeria

**Conclusion:** The result from this study highlights a number of contextual issues playing a major role in pneumonia among children under five years of age death rate in Nigeria, which will also need a contextual approach in order to address them.

## **Dedication**

This thesis is dedicated to you, my parents, for always loving, supporting and encouraging me. Words cannot express how I feel, but I give all thanks to God on how you both raised me.

There is no way I can pay you back and I will never fully understand, but I want you to know you raised a God fearing man and I am quite positive you will be proud of the progress I have made in life.

I love you, mum and dad, you are appreciated.

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## **Abbreviation**

ARI ACUTE RESPIRATORY INFECTION

AIDS ACQUIRED IMMUNODEFICIENCY SYNDROME

CXR CHEST X-RAY

CRP C- REACTIVE PROTEIN

CAP COMMUNITY ACQUIRED PNEUMONIA

DPT DIPHTHERIA, PERTUSSIS AND TETANUS IMMUNIZATION

FGD FOCUS GROUP DISCUSSION NURSES

GAPD GLOBAL ACTION PLAN FOR PNEUMONIA AND DIARRHOEA

GTH GOVERNMENT TEACHING HOSPITAL

PED PEDIATRICIAN

PH PRIVATE HOSPITAL

PHC PRIMARY HEALTH CARE CENTRE

WHO WORLD HEALTH ORGANISATION

IMI INTEGRATED MANAGEMENT OF CHILDHOOD ILLNESS

ICU INTENSIVE CARE UNIT

VAP VENTILATOR ASSOCIATED PNEUMONIA

UNICEF UNITED NATION INTERNATIONAL CHILDREN EMERGENCY FUND

NPHC NATIONAL PRIMARY HEALTHCARE DEVELOPMENT AGENCY

EPI EXPANDED PROGRAMME ON IMMUNIZATION

NPI NATIONAL PROVIDER IDENTIFIER

SES SOCIO ECONOMIC STATUS

NHP NATIONAL HEALTH POLICY

TB TRADITIONAL BIRTH ATTENDANT

## 1. Introduction

Pneumonia is an acute infection of less than twenty one days duration characterized by the inflammation of the lungs, which may be enhanced by malnutrition, indoor and outdoor air pollution, bacteria, viruses or fungi, and leaves children fighting for breath as their lungs becomes inflamed and the tiny air sacs, or alveoli inside the lungs becomes filled up with fluid and air. These are usually a serious situation that can lead to death if not properly handled(1).

As of 1902, one of the founders of Johns Hopkins Hospital and a pioneer medical teacher called William Osler gave pneumonia a name (Captain of the Men of Death). In the early 20<sup>th</sup> century there were few treatments for this disease. In the 1940s medical textbooks would still recommend bloodletting as one of them(2).

Our world at present, pneumonia is no longer a captain of Men's Death because we now know the cause, the risk factors, possible way to prevent and to treat the disease. Because of this knowledge, the number of children dying from pneumonia has decreased substantially over the past decades. As of 1990, over two million children died from this deadly disease. This figure reduced drastically by two third by 2017, this was possible to achieve because of the increased availability of interventions and treatment such as pneumonia vaccines and antibiotics, improvements in the major risk factors such as childhood wasting, high air pollution, and poor sanitation. Maintaining these factors will continue to sustain or rather reduce child mortality from pneumonia(3).

According to Dr Stefan Peterson, the leading expert on child pneumonia for UNICEF, solution to reduce death rate on this disease includes increased investment in prevention, diagnostics and treatment for pneumonia, but more than this an integrated approach to the major infectious diseases is needed. He argues that if newly developed, cheaper vaccines could be scaled up, the overall deaths could be further reduced every year. This will require a surge of investment into research and roll-out program(4,5).

The zeal from the international community to initiate this seems to be lacking it's the worst effects are limited to the poorest, because unlike other diseases such as malaria, for which donor government provides money to buy mosquito nets(4,5). Fighting pneumonia among children

U5(under five years of age) is complex, the lack of investment and the absence of global initiatives, such as those seen for malaria or HIV means that thousands of pneumonia cases are misdiagnosed and mistreated each year. In many of these cases the sufferer is usually a child, who does not survive(6).

A study by the University of Southampton recently found that between 2000 and 2015 pneumonia got only 3 per cent of the research funding dedicated to infectious diseases – which is not proportional to its role as a cause of deaths(4,5).

Surprisingly, despite the tools at our disposal, like health care and antibiotic treatment, pneumonia still claimed the lives of more than 800,000 children U5 the last three year globally. One child dies every 39 seconds, according to a new analysis. Out of this figure above, just five countries were responsible for more than half of child pneumonia deaths: Nigeria (162,000), India (127,000), Pakistan (58,000), the Democratic Republic of Congo (40,000) and Ethiopia 32,000(7,8).

Nigerian children U5 made up the highest number of those who died of this disease in 2018 since we know how to treat and prevent these deaths, this should never be the case.

The biggest risk factors for child pneumonia deaths in Nigeria are malnutrition, indoor air pollution from use of solid fuels, and outdoor air pollution. Globally, child pneumonia deaths occurred among children under the age of two, and almost 153,000 within the first thirty days of their life(1).

## **BACKGROUND**

According to WHO report, Africa has the highest burden of global child mortality. In 2016, 16% of the registered 5.9 million deaths in pneumonia were among children U5. In 2016, it was recorded that more than 90,000 U5 died by pneumonia in sub-Saharan Africa(10). These deaths can be prevented or treated through simple and cost-effective interventions. Despite the sustained effort to reduce the death rate in Nigeria, the improvement is still very slow compared to other African countries that are even poorer and economical worse than Nigeria.

In 2003, it was estimated that 11 million children died. Majority of these children were from developing countries (98 %) (11). The rate of U5 mortality rate varies across the countries

ranging from 3 to even 280 deaths per 1000 live births(9). The biggest cause of death in children U5 is pneumonia, followed by diarrhea and neonatal severe conditions(10). Global distribution in 2004 showed that pneumonia accounted for 19% of all U5deaths(11).Others were diarrhea 17%, malaria 8%, measles 4%, injuries 3%, Aids 3%, and other severe neonatal infections 8%(11).

Although there has been reduced number of deaths lately compare to 1980s and 1990s, the task of preventing child deaths and addressing inequalities remain unfinished. For example, a child born in the poorest home in Nigeria are four time more likely to die before the age of five compare to the one born into a wealthy family(12).

Currently an organization called Integrated management of childhood illness(IMCI) coordinated by WHO & UNICEF aims at addressing the challenges of the five major preventable killers of children U5 in developing countries(13).Their duties as an organization includes promoting accurate identification of childhood illness in out-patient settings, assisting in administering appropriate treatments in home settings, encouraging and educating on the importance of improved nutrition and preventive care. The IMCI in Nigeria has been training health workers to learn the importance of determining the severity of the disease by observing the child for two key signs of pneumonia (chest indrawing and fast breathing) (13).

In their effort to reduce childhood mortality in Nigeria(14) the National Health Policy (NHP) was officially launched and became active in October 1988. The aim of NHP was to enable all Nigerian to achieve socially and economically productive lives. Recently, government has established an agency called the National Primary Health Care Development Agency (NPHCDA) responsible for developing and maintaining health care facilities across all the local government area in the country. The agency has since then been conducting trainings, upgrading the skills of the PHC personnel in the local government areas, recruiting more village health workers, and traditional birth attendants (TBAs) with a goal of reducing child mortality in the country(14).

Additionally, awareness campaigns were launched on common childhood diseases, the government provide vaccination at no cost for the children in the country, allocated someday when routine immunization are carried out on children from house to house. In the government's

effort to reduce child mortality, the Expanded Programs on Immunization was renamed to NPI (National Program on Immunization).

Thus, the government is addressing the issue of child pneumonia and puts efforts and resources to minimize the fatal disease in the country(14).

The year Nigeria and other countries are expected to reach the 2025 GAPPD target at current rate of progress by WHO 2018(7).

Country	Number of under five death from pneumonia	Rate of under five pneumonia deaths per 1000 births	Share of death from pneumonia in under five mortality	Average annual rate of reduction in pneumonia mortality from year 2000 to 2015	Year country is expected to reach the 2025 GAPPD target at current rate of progress
Nigeria	132,556	19.0	17.8%	-2.73%	2075
India	178,717	7.1	14.9%	-5.76%	2030
Pakistan	63,844	11.9	14.8%	-3.72%	2052
Republic of Congo	45,812	14.8	15.2%	-1.75%	2075
Ethiopia	31,456	10.0	17.4%	-2.79%	2032
Niger	18,247	19.2	20.8%	-5.53%	2048

Despite the announcement by Nigerian government since year 2000 of the world ever pneumonia control strategy-couple with the focus globally on combating pneumonia with the help of UNICEF in Nigeria, after 8 years of the implementing the strategies, GAPPD target will be attained by 2075 instead of 2025 as projected. This above data can only mean that more effort is



needed to reduce the mortality rate without ruling out the fact that more children will continue to die until the impediments and resolution are uncovered. There is therefore an urgent need to provide concrete strategies to reduce child pneumonia death in Nigeria(7).

## **DEFINITION OF PNEUMONIA**

Pneumonia is defined as an acute infection (of less than 21 days duration) characterized by inflammation of the lung parenchyma leading to cough or difficult breathing, tachypnoea, or chest-wall indrawing(15). It can also be known as the inflammation of the lung tissue primarily of the respiratory bronchioles and alveoli, caused by micro-organisms. Pneumonitis and alveolitis are terms used when the inflammation is associated with chemical or physical injuries. However, pneumonia can be primary when it occurs in previously healthy children who does not have any underlying lung disease and also termed secondary when there is an underlying cause either within the chest/outside, when it results from a depression in defense mechanism as in children with malignancies, AIDS, malnutrition and those on immunosuppressive drug therapy(16). Primary pneumonia is also termed community acquired pneumonia (CAP) and it refers to pneumonia in a previously healthy person who got the infection outside of the hospital(17).

Radio graphically; pneumonia has been divided traditionally into two manifestations, interstitial and alveolar. Diffuse interstitial infiltrates tend to be seen in viral infections while lobar consolidation suggests a bacterial etiology. Alveolar infiltrates are seen in both bacterial and viral pneumonia(17). On chest radiograph, the size and shape of the infiltration changes during the course of infection and influence the radiographic signs. The value of chest radiographs in differentiating bacterial from viral lower respiratory infections in children was recently reviewed and no clinically relevant accuracy was demonstrated(18).

## **EPIDEMIOLOGY**

Research has shown that in developed countries, the annual incidence of pneumonia in children U5 is 2-4 per every 100 children compared to 10-20 per 100 children in non-developing countries. Incidence exceeding 50 per 100 children have been reached in settings with high prevalence of malnutrition and HIV infection in sub - Saharan Africa(19).In the USA, children U5 pneumonia mortality was 30/1000/year, while in whole finish population, the total incidence

of community acquired pneumonia was 37/1000/year. Infants and toddlers are more frequently affected than older children and the mortality is higher in younger children(20).In Saudi Arabia more cases of childhood pneumonia are reported in January when it's cold and also raining(21). In Nigeria, pneumonia occurs without any exemption to a specific season, even though there may be variations. High number of cases are reported during raining seasons, but also occasionally during the harmattan seasons when dry and dusty wind that blows southwards from the Sahara across the country. It usually occurs between the end of November to March each year. In Oyo State Nigeria, more cases are reported between Novembers through January(22). In Sokoto State, North-West region of Nigeria, more cases are reported between Junes through September corresponding with the raining season of the country at large(23).

Factors enhancing the development of childhood pneumonia could be medical, social and environmental. The social and environmental factor could be overcrowding, inadequate housing, indoor fuel exposure, tobacco smoke exposure and raining/harmattan seasons. Medical risk factors include children less than 1 years old (prematurity), malnutrition and immune-suppression of pneumonia(16).

### **Treatment protocol**

Case management system is the most recommended way of treating pneumonia in children U5. This is the use of minimal necessary criteria to decide treatment and minimum treatment to reduce mortality in regions of high mortality(21).Under this system, children with chest indrawing(inward movement of the lower chest wall when the child breathes in)should be referred to a hospital from a primary health care. They should be given ambulatory antibiotic at home if there is fast breathing(taking more breaths than normal, in a given minute) or even if neither chest indrawing and fast breathing is present, but the child has elevated temperature(25).

### **Use of Antibiotic**

The choice of using antibiotics is determined by the epidemiology of the infecting organisms present in the area, prevalence of drug resistance, HIV prevalence and available resources. Since it is difficult to differentiate between bacterial and viral pneumonia, children with pneumonia requires an antibiotic(26). WHO recommended the use of intravenous crystalline penicillin, chloramphenicol, cloxacillin, or gentamicin to be followed by oral amoxicillin for 5 or 10 days in

children admitted with pneumonia(27). In India, combination of sequential injection of crystalline penicillin and gentamicin followed by oral amoxicillin was found to be as effective as sequential injection and oral amoxiclav for the treatment of very severe hypoxemic childhood pneumonia(28).

## **PATHOGENS ASSOCIATED WITH PNEUMONIA**

There are different ranges of pathogens associated with respiratory tract in children. The spectrum of etiological agents in developed countries resembles that in developing countries. However, the complexity of childhood etiology makes it difficult to resolve many cases. Some series from developing countries have reported up to 15-45% of blood cultures as positive compared to 0.5% reported in developed countries(24-27)).In most cases, different organisms can be detected simultaneously from blood and lungs(28).

## **ETIOLOGICAL DIAGNOSES**

Clinic and radiographic features of pneumonia cannot determine the etiology of pneumonia(15). A causative agent should be sought in hospitalized children. Identification of a pathogen may allow for more focused effective therapy. Provide important epidemiological data can allow for the implementation of infection control measures to reduce the risk of nosocomial infection of special pathogens(15).

## **HISTORY OF PREVIOUS ACUTE RESPIRATORY INFECTIONS**

Previous Acute Respiratory Infections (ARI) increase the risk of severe illness and poor prognosis(29). Recurrence may be because of unpreventable reasons such as inherent immune deficiency, congenital defect or residual damages due to previous illness. More importantly may be persistence of the risk factors like nutritional deficiency (30).

## **CAUSATIVE ORGANISMS**

In a general term, virus pneumonia runs a less fatal course than bacterial pneumonia(16). Among the bacterial pneumonias, prognosis is worse with staphylococcus and klebsiella pneumonias because of their possibility of producing lung abscess and septic lesions outside the

respiratory tract resulting in meningitis, osteomyelitis(16).Children diagnosed with bacteraemia in Nigeria records higher mortality compared of children with no bacteraemic(31).

### **CLINICAL TYPE OF PNEUMONIA**

Lobar pneumonia was found to have a better prognosis than bronchopneumonia. The later was a leading finding in children who died from pneumonia in some parts of Nigeria(32).

In a study carried out in Greece, left sided pneumonias were found to run a more severe cause than the right sided ones(33). The development of pleurisy commonly observed in left sided pneumonias was put forward as possible explanation for this finding.

### **TACHYPNOEA**

Tachypnoea is the best single predictor of pneumonia in children of all ages(34). In a situation where there is no cough or breathlessness, it could mean other conditions such as dehydration acidosis or anaemia(35). A child with tachypnoea and lower chest wall indrawing is at higher risk of death from pneumonia than a child with fast breathing without lower chest wall in drawing(34).

In a study carried out in Nigeria, tachypnoea was found to be an important prognostic factor in children admitted with pneumonia. Children with respiratory rate between 60 to 80 breaths in a minute had a mortality rate of 20.3%. This was because tachypnoea is a sign of hypoxia which can lead to heart failure and complication in children with severe pneumonia(36).

### **HYPOXEMIA**

Hypoxemia is the oxygen saturation 90% less at sea level and 88% less at higher altitude(37). A study at Colombia discovered that hypoxemia measured through pulse oximetry was the only single most useful predictor of radiographic pneumonia(38).pulseoximetry appeared more sensitive than radiography for pneumonia, as hypoxaemia was frequently present without radiographic changes in clinically ill children with ARI(38).

Studies carried out in Kenya, Zambia and Zimbabwe showed that the risk of death in hypoxemic children with pneumonia ranges from 1.4 to 4.3 times higher than non-hypoxemic children. WHO clinical predictors for hyoxemia in areas where oxygen tension cannot be measured

objectively includes unconsciousness, head nodding or convulsion(39). Lately, grunting respiration and nasal flaring were added on the list(40).

### **ASSOCIATED COMPLICATION**

The cardiovascular and respiratory systems functions as a single unit and cannot be thought of independently Alterations in cardio-respiratory interaction can cause significant changes in cardiac functions(41).

### **PATHOPHYSIOLOGY OF PNEUMONIA**

Pneumonia can be referred as an infectious development resulting from the invasion and overgrowth of microorganisms in lung parenchyma, reducing defenses and activating intra-alveolar exudates. It can also be referred as community pneumonia if the infection is generated from non-hospitalized population or as hospital/non nosocomial pneumonia if there is no evidence to show that the origination of the infection is from the period of admission at the hospital. In most cases, this type of pneumonia is found in mechanically ventilated patient which is presently refers to as ventilator-associated pneumonia (VAP). With the growth of non-invasive ventilation, a new term must be used when pneumonia occurs in monomial patient in the intensive care unit (ICU). VAP must be related to incubation associated pneumonia(42).

In the pathogenesis of nosocomial pneumonia, accessing the lung parenchyma can be described in several ways. The growth of pneumonia requires that the pathogen reaches the alveoli and that the host defense is overshadowed by microorganism virulence or by the inoculum's size. The entrance of bacteria into the lower respiratory tract usually is as the result of the aspiration of organisms from the upper respiratory tract(43).

Occasionally, different organisms have been detected simultaneously from blood and lungs(28) In fact, bacteraemia has been suggested to be secondary to initially non-bacteraemic pneumonia(44).Underlying disease, loss of mechanical respiratory defenses with the use of sedatives, tracheal intubation and antibiotic treatment are determinant factors for change in the normal flora of the upper respiratory tract.

Biofilm, nasa, oropharynx and respiratory tract colonization has been attributed to the risk of pneumonia. Aspiration of normal oropharynx flora in comatose patients and during intubation

seems to be the pathogens of early-onset pneumonia. Less frequently, bacteremia, contaminated aerosols, tracheal aspiration maneuvers or fiber scopes can be used to introduce micro-organisms directly into the lung parenchyma. The relationship of the gastric chamber is the only source of colonization in VAP. Postmortem studies revealed the reified the complexity of histologic findings and suggest that quantitative cultures of lung samples cannot easily determine the presence and absence of histologic pneumonia(44).

## **DIAGNOSES OF PNEUMONIA**

### **Clinical Evaluation**

In developed countries, radiologic confirmation of pneumonia is considered the best form of diagnosing pneumonia(17). In low and middle income countries like Nigeria, radiographic facilities are rarely available. In early 80s, observation methods were used to diagnose children. This was done by checking out for key signs like cough or difficulty in breathing(35). Determining the path gnomonic value of the clinical protocol for detecting pneumonia in children was during the period 1988-1990, one of the major priorities for scientists committed to assisting ARI Control programs. The primary clinical concern was that the protocol should be highly sensitive for each age group in order to ensure that anti – microbial treatment are given to most children in the initial stages of pneumonia(38). According to WHO, tachypnoea is define according to the patient as

- (i) Greater than 60 breaths in a minute for infants less than 2 months old
- (ii) Greater than 50 breaths in a minute for infants from 2 months old to a year old
- (iii) Greater than 40 breaths in a minute for children above 1 year old.

However, it was alleged that the uses of breathing as directed or encourage by WHO is not accurate based in a study from Gambia, that showed that breathing is not sufficiently reliable as a predictor for malnourished children(39). This could be as a result of the debilitation preventing them from responding adequately to the stress of pneumonia. When children are malnourished, the respiratory rate require to achieve adequate sensitivity and specificity to predict pneumonia was approximately five breaths per minute less, compare to well-nourished children(39). Comparing this to another study carried out in India, the differences in the mean respiratory rate

between well nourished and malnourished children with radiological pneumonia were not statistically significant. Based on these findings, there were no changes introduced in the WHO guidelines for the recognition of pneumonia in malnourished children(39).

WHO guidelines indicated that the in-drawing of chest in a child with cough was a sign of severe pneumonia which needed referral to hospital(35). Analyzed result from Bangladesh revealed that the specificity of lower chest wall in-drawing is increased without losing sensitivity when combined with the presence of intercostals retractions. These signs enable patients with lower chest wall in-drawing and pneumonia who were mostly severely ill(45).

A study conducted on signs and symptoms indicative of pneumonia on children less than six months found prostration, cough and fever in 72.5%, 66.6% and 53.2% respectively. Hypo activity was found in 68.4%, tachypnoea in 76%, altered respiratory auscultation in 91.3% and chest in drawing in 46.7% of cases(46).

In a study carried out in Brazil, 96% of the children had cough(47). In Nigeria 92.5% of the children had fever, 77.8% had cough, 70.1% had difficulties in breathing, 62.4% were vomiting while 8.0% of them had convulsion. Symptoms and sign of the above listed factors help in diagnosing the severity of the illness. WHO classified pneumonia into three different part namely:- non-severe, severe and very severe. Each of the three categories comes with a specific type of treatment. The stages require administering antibiotics while severe and very-severe will require the use of artificial oxygen mostly recommended in the hospital(34).

## **RADIOLOGICAL DIAGNOSES**

A chest x-ray (CXRS) is usually recommended for diagnosing pneumonia and detecting complications such as lung abscess or empyema, however not available in all health facilities. It cannot be used to determine pathogens responsible for the diseases none differentiate between the virus and bacterial pneumonia(45). In addition, there is a wide inter-observer variation in interpreting CXRS(45). Because of its inability to give improved outcome/change of treatment in an ambulatory setting; it's therefore restricted to indication such as(44).

i. Clinical pneumonia unresponsive to standard ambulatory management.

ii. Suspected T.B

iii. Suspected foreign body aspiration

iv. Hospitalized children to detect complications

v. Children with high fever and no obvious focus of infection since approximately 29% at such children may have radiographic evidence of pneumonia(44).

### **IMPLICATION OF WRONG DIAGNOSE**

In a study carried out in western Uganda 2004, the increase in pneumonia mortality in U5 children was attributed to the inability of the community health care worker to diagnose severe pneumonia. The study shows that the ability of the health care worker to diagnose pneumonia was at sensitivity of 75% and specificity of 83%. The severities of the pneumonia were related to high fever and were mistreated as malaria instead of pneumonia(24).

In some secondary and tertiary hospitals in developing countries, many clinicians do not recognize hypoxia easily in these children due to poor clinical judgment and lack of pulse oximeters in their hospitals. Even after hypoxia is diagnosed there is no regular supply of oxygen, as most of these hospitals depend on oxygen concentrators machines that depend solely on electric power which is not regular in such areas in most case(25).

### **PROGNOSTIC FACTOR IN CHILDHOOD PNEUMONIA**

There are different social and environmental factors associated with ARI morbidity in children U5, i.e. HIV, malnutrition, prematurity, overcrowding, poor standard of living, lack of preventive (immunization) and elective health services(16).

### **HOUSEHOLD FACTORS**

Healthcare seeking behavior: The prognosis of pneumonia in children U5 can be affected by different factors. Family's healthcare seeking attitude can be the major determinant within this age group. A study by Adegboyega showed that low compliance to healthcare seeking among care givers in Nigeria is the major cause of high mortality of childhood pneumonia in



Nigeria(46).However, it was discovered that high care seeking of mothers/caretakers behavior in Sri-Lanka, for similar illness as a plausible explanation for low level childhood mortality in that part of the world(47).

## **SOCIO- ECOMICS STATUS**

Poverty and low social economics status (SES) are associated with so many other independent risk factors for ARI, such as crowding, poor sanitation, poor access to medical care, malnutrition and poor immunization coverage(24).Paternal and maternal education at least up to middle school was found to be protective against development of severe pneumonia and mortality in a study in India(48).The protective effect of parental education against severe pneumonia may be due to better health awareness and healthcare practice in the literate group.

Von Ginneeken, et al, found a strong link between ARI mortality and maternal education consistent across a number of studies. The author explained how this effect of educating mothers is associated to the economic advantages. These could be maximized by woman encouraging in business or at least working and not been full time housewife(49). Interestingly, O Dempacy et al., in the Gambia found children of mothers with a source of livelihood to be at a lower risk of ARI(49). This highlights the dilemma faced by mother who enhanced their children health through improvement on their source of income may end up, paradox; usually place their children at risk by the required shortened duration of exclusive breast feeding and placing children in day care centers from a young age, according to P Fedinald,et al(50).

## **OVERCROWDING**

Most children in Nigeria are exposed to very crowded condition at home and this increases risk of transmission of illness. Sharing a bedroom by more than one person(51).The most accurate index of household overcrowding means a prolonged exposure to partner's pathogens. Different studies in developing countries found that the average area of habitable space per person is well below the WHO recommendation of 12m<sup>2</sup> (52). A case control study in Sao Paulo,Cardosa, et al, found crowding ( $\geq 4$ ) people sharing the child's bedroom to be associated with 2.5 fold increased risk of acute lower respiratory infections(52). Crowding can be as a result of family size and not having enough money to get a bigger apartment or below standard apartment. These are associated with poor social-economic status which itself exacerbates crowding with more

than one family unit sharing a single dwelling(52). Risk of acquiring ARI in a day care centre is particularly increased for younger children (less than 18 months of age) and those with poorer access to health care services.

## **INDOOR AIR POLLUTION**

The use of biomass fuels for cooking and heating is one of the most common methods of cooking in developing countries including Nigeria. The poor housing system in place does not allow proper ventilation and thereby leading to pollution. A study in very low and middle income countries found levels of NO<sub>2</sub> and SO<sub>2</sub> to be 7 times and 13 time higher respectively than the risk free levels considered acceptable(53). Children are particularly vulnerable to the long duration of time they spent with their mother during household cooking(54).

There is noticeable evidence from developing countries linking solid fuel use with incidence and severity of ARI in children U5(55).Following the reviews of 13 different studies, almost all studies found a positive association between solid fuel use and ARI in children. Even though the studies were not able to determine a combined measure of effect, solid fuel was associated with approximately twice the risk of ARI. In the single study examining mortality, the risk of death from ARI was increased 12 times in those exposed to solid fuel use(54).

In one of the studies in a local Eastern Cape, in Nigeria increased incidence of ARI was ecologically linked with communities in which indoor air pollutants were highest(53). These communities were also the poorest. Regardless of socio-economic status that was the weakness of the study, it highlighted the interplay between poverty and other risk factors for ARI and other causes of childhood illness(53). The importance of affordability rather than safety is their most concern of many in low and middle income countries(56).

An association between exposure to household biomass pollution and mortality from pneumonia has been shown by Johnson in Nigeria(57).Although a case control study in the same hospital did not identify any relationship between type of cooking fuel and hospital admission for pneumonia.Children with pneumonia who came from homes that burnt wood were 12.2 times more likely to die than those coming from homes using kerosene or gas. Exposure to cigarette smoke was also reported as a risk factor outcome in later studies. Both wood, smoke,

environmental and tobacco smokes reduces defense mechanism and predispose children to invasive pneumococcal diseases(58).

### **Child Factor**

Infants and young children are more prone to develop severe pneumonia compare to adult. This is because children U5 have narrower airways and premature respiratory defense mechanism. Djelantic, et al, found children less than 4 months old hospitalized with severe pneumonia 5.6 times more likely to die than those without these risk factor(59).Fargdule, et al, recorded highest mortality among children with pneumonia in the first three years in Nigeria(60).

### **Childcare Practice**

#### **Lack of immunization**

A recent survey found that overall vaccine coverage was 80%, 77% and 48% for vaccines due by 14 weeks, 9 months and 18 months respectively. An outraged number of children did not have early vaccines. Also, large proportion of children doesn't receive full courses of Diphtheria, Pertussis, Tetanus (DPT) and Measles vaccines(61).

Complete immunization against measles, Diphtheria and Pertussis merges as the most important protective child care practices against severe pneumonia in one study(62). Children immunized at their early age or as at when due, were less likely to suffer from ARI compared to those who were not immunized(63).

### **LACKOFBREAST FEEDING**

Breast feeding lower the frequency and duration of ARI and diseases for children under –six months of age(64).

One of the studies reviewed in Nigeria on association of ARI from developing countries and low income population in developed countries showed a consistent increased risk of ARI children who were not breastfed or partially breastfed(65). It was discovered that the risk of ARI increases by 60% in children who are never breastfed while children not breastfed are 2-3 time more likely to die from ARI compared to those who are breastfed(66).

In a cohort study carried out in the Philippines, the protective effect of breastfeeding is primarily due to its unique anti-infective properties, providing passive protection against pathogens, stimulating the infant's immune system colonization by Gram negative species(65).

## **MALNUTRITION**

Various studies in developing countries has shown consistent and significant relationships between malnutrition and mortality due to ARI in children(65).

Severe malnutrition was a significant factor responsible for children admitted with server pneumonia in Nigeria(31). In a study carried out in India, children with server malnutrition were found to be 1.85 times more likely to develop severe pneumonia compare with children with mild malnutrition or normal nutritional status(67).Different studies carried out are all showing that relatively mild degree of malnutrition increases risk of ARI. The increased risk and severity of ARI associated with malnutrition is biologically plausible as malnourished children are known to have impaired immunological responses and more severe infection(65).

### **Delayed Healthcare Seeking**

Seeking healthcare assistance at a very late hour contributes to 70% of child death. (68) The decision to take a sick child to a medical expert is associated with social-economic status of the family. (69) High medical bill tend to reduce/delay health service use in developing countries. (70).It is also discovered that educated mothers seek health care attention on time compare to uneducated mothers. (62.63).In Zambia, unawareness of severe pneumonia in U5 among mothers and health care workers and travelling a long distance to health care centres contributed to the high mortality rate among the children. (71) In Nigeria, children who were admitted within 24 hours of onset of symptoms for pneumonia had a better outcome from treatment. (72.28)

## **2. Purpose and Aim**

With Nigeria ambitious plans and strategies to reduce child morbidity and mortality caused by pneumonia—aligned and incorporated within the Federal Government of Nigeria (FGN) integrated health goals and planning, Sustainable Development Goal (SDG) 3.2 to end U5preventable deaths, and the Global Action Plan on Pneumonia and Diarrhea (GAPPD) target to reduce newborn and child pneumonia deaths to less than 3 per 1,000 live births by 2030.

### **3. Research question**

The research questions that will be answered by these specific objectives of the study are:

1. Uncover the impediments preventing Nigerian methods of combating pneumonia working despite their announcement of control strategy since the year 2000.
2. Find the resolution to the uncovered impediments.

### **4. Methodology**

#### **4.1 Study Design**

A qualitative study design with in-depth interviews and focus group discussions was used to explore nurses and pediatrician perception on impediments and resolution in fighting pneumonia among children U5 in Nigeria.

#### **4.2 Nigerian Setting**

The study was carried out in Nigeria, The Federal Republic of Nigeria is a federal constitutional republic located in West Africa with a total population of 200 million(9). Nigeria shares borders with Benin, Chad, Cameroon, and Niger. In the south, its coast is in the Gulf of Guinea. The Hausa, Igbo, and Yoruba are the largest ethnic groups. In Nigeria, approximately half are Muslim and half Christian. A small minority practice indigenous religion. The country as a total of 36 states divided in 6 geopolitical zones. The six major geopolitical zones in Nigeria are the North Central (also known as Middle Belt), North East, North West, South East, South South, and South West. Each of the zones comprises of six states. The study was carried out in six states, one state from every geopolitical zone.

#### **4.3 Study Sample Site**

The study was conducted in six different geo-political zones namely, North West (Zamfara state) Maru local government and Gusau local government capital of the state, North east (Gombe state) Funakaye local government and Wafada local government the capital of the state, North central(Kwara state) Asa local government and Ilorin south the capital of the state, South West

(Ondo state) Ondo east local government and Owo the capital of the state, South south (Cross river state) bekwar local government and eleme local government the capital , South east(Anambra state)awka south and Amobiaawka the capital city. Recruitment was done at different places in the six zones namely, primary health care centres (PHC), Government teaching hospitals (GTH) and private hospitals (PH) in both urban and rural area of the selected states in order to get a purposeful sample of participants from various regions.

#### **4.4 Study Period**

The study was planned to be carried out from September 2020 until November 2020but was latter performed April 2021 until June 2021 due to coronal lockdown. The participants were informed of the research objectives and aims prior to the commencement of the interviews and discussions.

#### **4.5 Study participants**

The study includes thirty-two nurses, 18 nurses were included in three FGDs and 14 nurses were individually interviewed, across six different states and six pediatricians from the same six states. The interviewees were both men and women within the age range of 38 and 54 years of age. Three nurses and one pediatrician were interviewed in each state individually (one nurse from private hospital (PH), one nurse from a primary health care centre (PHC), one nurse from a Government teaching hospital (GTH) and a pediatrician from the government teaching hospital).. The participants answers were coded due to the number of the participant, e.g. 1-32, by the profession, eg N(urse) or 1-6 Ped(iatrician) and by the health facility they were working at e.g. PHC, PH or GTH. Participation was voluntary and they could leave if they wish without giving a reason.

##### **4.5.1 Inclusion criteria**

Only nurses working in children wards, primary health care centers with a minimum of six years working experience, and pediatrician with a minimum of six years' experience were recruited for the research.

##### **4.5.2 Exclusion criteria**

Nurses and pediatrician with less than six years of experience in children wards or practicing in other states were not including in the research, because it was difficult to reach them and get their perception judging by the time frame of the research.

#### **4.5.3 Recruitment of participant**

The researcher visited the location and spoke with the possible participant that showed interest in the research. The ones that meet the inclusion criteria were included voluntary and the date and time were set for the interview/focused discussion respectively.

#### **4.6 Data collection**

Three focused groups contained of six nurses, two from primary health care centre (PHC), two from private hospital (PH) and two from government teaching hospital (GTH). Each of the FGD varied between 45 minutes and one hour. The FGDs were conducted in conference centres in a hotel. The individual interviews were performed through telephone or physically at PH, PHC, and GTH respectively. The interviews were conducted in English, local dialect and Pidgin English. This was to enable the participant to communicate and understand the interviewee properly, as the interviewer speaks all the languages. Permission was taken from the participant before recording. The transcribe material in local and pidgin English was translated into English.

##### **4.6.1 Data analysis**

We performed manifest content analysis following Graneheim and Lundman in an attempt to understand the meaning of the transcriptions (76). From the interviews and focus group, the data was transcribed. The transcriptions were consistently read to enable the researcher to become familiar with the context and to identify their inherent value. Meaning units were identified condensed and coded. The process was continued until a compromising result was attained on the subcategories and categories by the researcher and the supervisors. Making use of this form of data coding and analysis was beneficial in achieving the aims and objectives of this study. Mindjet's mind manager version 2019 was used to visualize information and identify meaning units in the interview(77).

#### **4.7 Research ethics**

The protocol was approved by the host institution NTNU, the Regional Ethic committee in Mid-Norway (nr 147793) stated as no personal health information from the participant would be asked for, no approval was needed. The local ethical committee in Nigeria also approved the research before the commencement of the study. Privacy of the participants were maintained, by performing the interviews in a quiet environment/room, with no other people listening and the data material was only available for the researcher,

## 5. Findings

### IMPEDIMENTS AND RESOLUTION

CATEGORY	SUBCATEGORIES
Anxieties of the current situation	Children are dying unnecessary We are helpless
Impediments	Poverty and illiteracy Culture and religion Malnourishment and indoor cooking
Policies and strategies	Knowledge of governmental strategies Access of vaccinations Follow up vaccinations
Resolution	Government campaigns Household education Women will spread the word

#### **Anxiety of the current situation**

The health workers shared their sincerely felt concerns regarding the loss of young children in pneumonia. There are available vaccinations to prevent pneumonia, possibility to diagnose and treatment. Nurses and doctors were worried and anxious of the situation, and perceived that children are unnecessarily dying and should have been possible to treat. They expressed helplessness and sometimes they felt hopeless, when they were unable to save the child's life.



They talked about poverty, lack of knowledge, culture and religion affecting the situation. The parents, often the mothers, came too late to the health facility, and they had to witness children dying. The parents may have searched for other, less expensive, treatments before turning to the health sector, and the women meant they have to wait for the husband's approval before taking the baby to a clinic for treatment. The health workers highlighted that decision making is solely for the husbands. The care seeking was most often executed by the wives and the cultural norms demonstrated that women identify problems/illness and notified their husband for approval, before taking action regardless of the urgency of the situation.

### ***Children are dying unnecessarily***

I lost count of pneumonia patient we always admit here. The mothers use different available medium to treat their children, when their effort fails, then you see them here. No mother will want to watch her child dies. (3N, GTH)

Most of them say their husband tells them when to go to the clinic. When we ask them why they waited that long till the situation of the child got worst before coming to the centre...most of them will reply, it's my husband that dictates when to visit or not visit the centre. (1N, PHC)

### ***We are helpless***

I once attended to a mother that lost her baby to pneumonia. She said the only reason she considered a traditional healer was because her husband said there was no money to take the child to the hospital. But when she was not seeing any improvement, she started begging for money from friends, but when she eventually came to the hospital, it was too late because the situation was complicated already, so the baby died the same day. (3N, GTH)

I am just three weeks old in this center. I don't think I will continue after one month here. I can't stand the way children are dying out of ignorance of their parent. People in this community believe so much in herbs. Even with the high death rate, they are still adamant on not changing their methods. I can't continue witnessing a daily death. As a mother, I find it difficult sleeping at night after work. Preventable diseases like pneumonia should never take life again, even if it should, not in this manner or rate. (11FN, GTH)

### **Impediments**

Health care providers from different states and health sectors explained how poverty, illiteracy, culture and religion indirectly affected the outcome of pneumonia. They further shed more light

on how children are dying daily as a result of the negligence of the parents. Pneumonia was a highlighted as an unnecessary cause of death and impediments were addressed. Even though there were no specific topics in the interview guide focusing on poverty or illiteracy, these perceptions came up in every discussion. The cultures to use local herbs, visiting healers or attend to unqualified kiosk keepers were known to the health providers. Religion was also seen having an impact on decision making and women's access to health care. The health providers mentioned the family's faith in Allah was another cause of why they turned up too late to a health facility. Allah decides on death, sickness as punishments for sin committed by their parents. Others believe in fasting and prayers to cure any disease without taking either vaccination or medications. The husbands may deny a visit to the clinic, due to poverty or having no knowledge of the severe consequences the condition may end up in, death. The health providers discussed the reasons that most husbands stop their wife from making use of the available facilities, because of their financial ability to foot medical bill, coupled with their level of education. Most of them being farmers, and in rural communities it was said that some farmers were killed, which increased poverty and hunger and made it difficult for the rest of the family to afford medical bills of their children.

### ***Poverty and illiteracy***

When health issues become complicated, the bill goes up, this is just the fact. (2PED, GTH)

I put the blame on the husbands...I don't think they just stop their wife from accessing the hospital just because they derive pleasure in doing that. Its either because they don't know the importance or because they don't have the financial ability to pay for hospital bill.It can even be difficult to afford transport fare from their house to our hospital not to talk of footing the medical bills when the situation grew worst.(2N, PH)

They don't even know the word pneumonia. They mostly see any pneumonia symptoms as cold. When you diagnose pneumonia, they see it as cold. Many try to treat their child as cold but in most cases end up in our hospital when they are not seeing the expected changes on the health. (11N, GTH)

Most of the mothers that visit our health center don't know either the cause of pneumonia or how to prevent it. I will even say 99 percent of them don't have a clue. (30N, PH)

### ***Culture and religion***

There is a [local] medicine that majority of the mother uses in this community for any related pneumonia symptoms. They claim its take care of everything vaccination will do. (17N, PHC)

They usually make plant medicine from leaves... They claim it works well on their children. We have over 300 patients in this hospital with pneumonia all below the age of four....in one week. Now tell me, is the plant they are using working?... We are always their last resort. (20N, GTH)

It's so strange to comprehend that someone will want to treat a dyeing child with fasting and praying. I have seen a lot in this community. I am a spiritual man, but my spiritualism does not stop me from giving my kid [treatment]. I wish I understand where they got that concept of praying from. (2PED, GTH)

That sickness came from Allah but only few remember to keep calling on Allah when the situation of the child gets worst. It's when the child is about to die that they give you audience and expect you to perform magic on their child...most of the time, it's too late to do anything. (3PED, GTH)

There is a medicine called Okwumein our dialect, that is what majority of the mother uses in this community for any related pneumonia symptoms. They claim its take care of everything vaccination will do. Only few people bring their babies for vaccination and most of them on complicated pneumonia cases. (17N, PHC)

### ***Malnourishment and indoor cooking***

They tell it to my face that their husband cannot afford such luxury. And you begin to ask yourself what is luxury in eating balanced diet? (9N, GTH)

I have witness on several occasions on my way home, women cooking with fire woods having their baby on their back inhaling smokes with other kids. (6N, PHC)

I don't know of any plan on malnourishment, you can see how the environment looks like. That goes to the water we drink here. I buy bottle water. You will not believe mothers give their babies waters like this without even boiling them. (11FN, PH)

Please don't be deceived, there is no single plan on malnourishment by the government that I know off. When we notice a child is malnourished, we try to update them on what to be administering to the child to boost the child'shealth. (9N, GTH)

### **Policies and strategies**

The knowledge of governmental policies differed. Some health workers were not aware of any strategies or access to pneumococcal vaccinations (PCV) while others did have this knowledge and regularly provided vaccination to prevent pneumonia. To eradicate the identified impediment

on knowledge and information, some of the participant suggested the need for home delivery services. They further buttressed the matter with already existed services previously carried out on polio that yielded a good result. Some of the participant suggested the government intervening before a positive outcome could be attained. They claimed parents can still refuse the nurses vaccinate their kids if the government did not make any treat to mandate the parents to allow the health care assistance do the needful.

### ***Knowledge of governmental strategies***

We don't have any vaccine in our hospital here neither is there any strategies in place regarding pneumonia that I am aware of. (2N, PH)

I am aware of the strategies in place about pneumonia in Nigeria by reading. It was never brought to the hospital here. I don't work at the primary health centre but I have a friend working there. To my best of knowledge, apart from making the (PCV) available in the centre which are not even available at all centers, I don't think there is any other plans in place. (3N, PHC)

I am hearing it from you for the first time that there is a strategic in place, may be you educate me about it so I can pass on the information to the mothers when they visit us for help. (14N, PHC)

### ***Access of vaccination***

The vaccines are available in some centre. But it's not available here.... the primary health care centre, are supposed to carry us along, knowing fully well that we receive the highest number of mothers daily at this hospital. (20N, GTH)

We don't have any vaccine for pneumonia here, but I know the centre where it available. They are supposed to make it available at every centre for easy accessibility. (11N, PHC)

### ***Follow up vaccination***

We have the vaccine here, but the turn up is very low. Do you know I end up going to some women house to follow up on them? It's outside my work. But I am human; there are limits to what I can do and to how far I can go. (2N, PHC)

Will you believe countless numbers of mothers will not return to the clinic as they were instructed? You will only see them again when the situation of the baby is close to giving

up. Off course as a mother, I am always emotional; I want to lose my anger on them but will compose myself as a professional. (5N, GTH)

## **Resolutions**

Having discovered the impediments faced by the care given when attempting to access treatment for children suffering of pneumonia, participants were requested to share their opinion and ideas on the best accessible ways to solve the problems identified. It was noted that the idea suggested are not easy and speedy resolutions but it's achievable. Matters such as illiteracy and poverty cannot be resolved with health interventions but instead can be addressed by using local resolutions at community level. Resolutions suggested by participants are presented according to the impediments. Some of the participant from the rural community complained about the killing of farmers by the herdsmen. They suggested it has affected men working in their farms as usual thereby increasing poverty and hunger. This has made it difficult for parents to be able to afford medical bill of their children. Some suggested door to door service delivery claiming it yielded result when applied on polio in their community. Some argued that regardless of one on one service, parent can't still refuse to comply if there is no law in place to make them allow the health care worker carry out the duty of vaccination. Some suggested building good roads and building facilities close to every street even though it was seen as a long process. The participants believed government need to fund the necessary healthcare worker to visit homes and educate each household all they need to know about pneumonia and also use the media to engage on mass vaccination. This they believe will work based on the fact that such method was previously used to eradicate polio in the country, and it was fruitful.

## ***Governmental campaigns***

The government imposing law and penalty will take ages before they can implement the laws. The fastest way is to continue to broadcast the negative impact of not vaccinating your child. This can be done even in radio stations so that everybody will be hearing it. When campaigning becomes much and loud, it will set in fear among the parent who will in turn consider giving the vaccination a try. (6PED, GTH)

The government needs to start from tackling the insecurity problems in the state, provide free education so that the group of upcoming generation will be educated. A child can comfortably educate his illiterate parents compare to you and me. (1PED, GTH)

I will say the government need to come in. the country is rich enough to handle under five pneumonia issues. Why must the children bedying because their parents cannot afford hospital bill? We are not entitled to any benefits as citizens of the country. Government should make available free medical bills on pneumonia related illness. That is my own view. (1PED, GTH)

Its true government provides the vaccines, but they did not provide any means to settle people who ignorantly did not vaccinate their child and finally got the pneumonia and wishes to make amendment. They should either provide a base for treatment or a way to be settling the bills for the affected families. (2PED, GTH)

I don't think there is anyway government can take care of family income level. Even if the government allocates monthly health insurance to families, they can still divert the money to other family need. The best government can do is to equip the centre to the full. (5PED, GTH)

Deaths recorded so far comes after complication. We should rather attack and prevent pneumonia reaching complicated stage. Government should fund us to take the preventive methods to their door step. (20N, GTH)

The process of door to door service was used during polio campaign. Children were vaccinated at their various homes. I think if the government can fund another campaign on pneumonia, it will make a good impact. (12N, PHC)

### ***Household education***

Rehabilitating the road for an easy access will be expensive and time consuming. Providing an ambulance service will still depend on the good road. The ambulance will not fly; it will drive through the road. Our roads are bad. I think the best thing to do is to be visiting them home by home for vaccination. (4FN, PHC.)

Even if you decide to broadcast things on pneumonia in order to educate the community, where is the electricity to watch the broadcast? And if there is electricity, how many families can afford to buy television. Going to their houses to educate them will be the best. (17N, PHC)

I think home service lecturing will be the best. But since I work in a private clinic, we can still be off assistance in delivering such service. We can help with the house address of patient with less than five years children in order to be of help to the recommended nurses. (8FN, PH.)

I just wonder why we should think twice or wait further before implementing home services. I was actively involved in the last polio campaign. The home delivery service was totally effective. All the government need to do is to implement the same strategies on pneumonia case. (21N. PHC)

We are not a staff at the primary health care centre neither are we paid by the government. But look at those posters and flyers on polio; it's the government that brought it to our clinic. Encourage us to shear to our patients. Despite we are operating in a private sector, we can also be off help in one way or the other if the government really want to start educating the parents on pneumonia. I do strongly believe that home service will go a long way. (11N, PH)

### *Women will spread the word*

If after saving a child of an ignorant mother, she will do the spreading of this news in the community. She will tell her neighbor what she went through for not taking the (PCV) in the first place. They will believe the words of such person compare to you and me. (5N, GTH)

## 6. DISCUSSION

### 6.1 GENERAL DISCUSSION

Our result showed that despite the governmental strategies in place in Nigeria to reach the world GAPPD target by 2025, there are still many un-resolved issues that must be addressed before the aims of the target can be achieved. Addressing the identified impediments from our result will aid in attaining a progressive and sharp reduction of unnecessary deaths U5. Children were not vaccinated due to lack of equipment and vaccine at health facilities which should perform PCV, parents may be reluctant to vaccination and pneumonia was unrecognized, undiagnosed or untreated among the young children in Nigeria.

Our finding reviles that most of the established strategies were not functioning as planned in the country. Areas that were in operation receive less number of service users because the communities were unaware of such existence of service, the available centers were not equipped for complete services and were located far from the people in need of the services. It was further realized that insecurity in the country left many families internally displaced making it more difficult for some of the centers to operate as usual.

A similar research was carried out March 2020 by the integrated management of childhood illness (IMCI) on pneumonia-related ideations, care-seeking, and treatment behaviors among children less than 2 years with pneumonia symptoms in the Northwestern part of Nigeria. The results indicated that interventions and strategies alone, may not be sufficient to improve care-seeking and treatment rates and should be expanded to address perceived and actual poor-quality health services and parents beliefs about treatment efficacy, social factors, illness severity, and susceptibility(78).

Another similar study was carried out January 2020, a web-survey and semi-structured interviews to explore stakeholders involved in pediatric pneumonia in Nigeria from non-governmental, government, academic, civil society, private, and professional organizations, and their views on policy barriers, opportunities, and priorities rules. The interviews were conducted in two state in Nigeria, Lagos and Jigawa states. The result of the research reported a lack of pneumonia-specific policies, despite acknowledging guidelines had been adopted in their settings (79). Impediments to effective pneumonia management were seen at all levels of the system, from the community to healthcare policy, with key issues of resourcing centers not fully equipped, and infrastructure/location of the centers, confirming the same result our study identified at Zamfara, Ondo, Cross river, Gombe, Kwara and Anambra state by exploring the nurses and pediatricians.

In this study, the participant revealed that the financial capacity of the service users was one of the potential factors preventing them from using the health care and hospitals. In a study conducted in the US among patients of low socioeconomic status, they found that their participants viewed hospital care as more affordable than primary care, because uninsured patients could not afford the fees for regular primary care visits and therefore relied on charity hospital when they fell ill. In contrast, the participants in our study pointed out that higher cost of bill was as a result of paying for diagnosing illness, doctor consultation and treatment. Therefore, since the Nigerian healthcare systems is completely funded by the service user, this could impact on how service patronizes the recommended health care centers or hospitals.



Other suggestions during the interviews with the participants regarding the best way of addressing the service include having fully equipped centers, with available drugs for treatments, and equipment for diagnose with trained doctors and equal distribution of primary health care center in close proximity to service users.

This study found that children U5born to service users living in rural area were at more risks of dying of pneumonia compare to those living in urban centre, according to the interviewed health personal. This finding is in consistent with mortality study conducted in Rwanda, Burkina Faso and Bangladesh(80-82).

Our study also finds out that living in poor households,as a result of economic status, have a great impact on children surviving rate(24-25).In Nigeria more than two third of the population live below the international poverty line of \$1.25 per day(26). Living below this line makes it difficult for most service user be able to access appropriate healthcare services for their U5 children therefore ending up losing their child to death.

## 6.2 LIMITATION AND STRENGHT

### 6.2.1 LIMITATIONS

This study has some limitations.The study had a qualitative design and the findings of this study were based on perceptions among the participants. Apart from the focus groups that was conducted in conference rooms, the rest of the interviews were conducted during working hours on the premises of the health facilities, which may have affected the level of in-depth the participants may have been willing to talk in order to save time and complete their normal daily routine. This study was only carried out among health care provider in primary health centres, government teaching hospitals and private hospitals; service users were not included, thus their perceptions may have differed from the current findings. The present unusual condition of herdsmen and book haram killing in the country as at when this study was carried out, may have influenced the findings.

### 6.2.2 STRENGHT

The data collected reveals the complexity and richness of the area of research. Apart from the fact that participating in this study was voluntary, the researcher background and country of

origin seems to have influenced the research process in a positive way, in terms of gaining access to health care facilities and workers, ability of speaking and understanding local dialect and fostering the interview relationship with the healthcare providers. Accordingly, the concept of reflexivity in qualitative research acknowledges the input of the researchers in actively co-constructing the situation which they want to study(83)). However, the use of probing questions also was an added advantage to elicit specific answers from the participants. The collaboration during the data analysis with the supervisors, one international and medical doctor and one national doctor with experiences of similar research in Nigeria ensured the credibility. Further, the findings were illustrated by direct quotes from the participants. Transferability was provided by describing the setting where the study was done, the participating health providers and how the data was collected and analyzed. Dependability was enhanced by doing the study in a short period of time.

## 7. CONCLUSIONS

The result from this study highlighted a number of contextual issues playing a major role in U5 pneumonia death rate in Nigeria, which will also need a contextual approach in order to address them. The finding suggests that factors such as the capability of service user financing the medical bill, inability to understand the importance of vaccination, the religion and culture of individual on treating pneumonia related illness, location of the health facilities far to most of the service users, inability of the service user to know the causes of pneumonia and how to prevent it and unequipped health centres.

In other to curtail the above listed impediments, the study propose a number of resolution which includes, locate health centres in close proximity to service user to enable easy accessibility of health facilities, implementing new policies that will mandate every service user to participate in mandatory health programs, knowing the implication of not taking part, equipping the health centers with all the apparatus from diagnosing tool, medicine down to availability of a pediatrician in all centers, starting a door to service on vaccination program and closing down of un authorized centre/shop where uneducated and unqualified people sell drugs and administer treatments to service users in different part of the country. Future studies may be aimed at a

qualitative examination of the identified resolutions in this study in order to enable generalization.

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## **RESEARCH QUESTION**

### **INTRODUCTION**

My name is ChidiOkafor, a master student at NTNU Trondheim, Norway. I am here to conduct a research on barriers and solutions to under-five pneumonia death in Nigeria.

#### **The purpose of the study**

The purpose of my study is to investigate why children in Nigeria are still dying of pneumonia when evidence showed it can be avoided. Your opinion and suggestion are important for me to explore as that will enable me give a conclusive intervention measures to the ministry of health to improve on the health care system that will minimize the numbers of death to pneumonia in Nigeria.

#### **What participation involve**

The discussion will take approximately 1 hour. We will be discussing about your perceptions on pneumonia death in Nigeria, specifically targeting children under the age of five. I am advising that you talk freely; there is no right or wrong opinions/suggestion in the discussion on these subjects. You should only share thoughts during the discussion you feel comfortable with the others in the group knowing. In order to be able to remember and interpret our discussion later, I have to record the discussions.

#### **Confidentiality**

I assure you that I will be keep the discussion confidential and only used for research purposes. Your name or organization will not be cited or mentioned in my writings. But I cannot guarantee the disclosure of information by any other member of the group.

#### **Risks and benefits**

Our discussion here will not cause any harm. I will learn by hearing your opinions and suggestion, and including them in my study, and hopefully this will be for the benefit of others for future purposes.

#### **Right to withdraw**

Choosing to participate in these discussion is voluntary, if you choose to participate or either feels like withdrawing in the middle of the discussion, you are free to do that. You can do that without given your reason for withdrawer.

#### **Topic 1. The strategy of reducing under-five death in Nigeria**

#### **Topic 2. What does the primary health sector do to reach the goal**

### **Topic 3. Are the vaccines readily available and do you handle the task of vaccination at primary health care center**

The Nigerian ministry of health/federal government integrated health goals and sustainable development action plan to reduce under five pneumonia death in Nigeria. One of the major action was working with primary health worker/private organization at both state and local level, are you aware of such action plan?

If yes, is your organization working in collaboration with the ministry of health on those plans?

Can you brief me the action plans that are active at the moment

Evidence shows that one of the major challenges is limited awareness at all level from mother to government officials of this forgotten killer pneumonia, do you agree with this?

Is your organization doing anything about this?

A child who is severely malnourished is four times more likely to die from pneumonia. Do you know of any active action to stop malnutrition among under five?

Pneumococcal vaccines (PCVs) could prevent most bacterial pneumonia cases in most western world. Do you know such vaccines are well circulated to those that need them?

Can you give a rough estimate of how many people you vaccinate in a year? Do you think it was enough? What do you think would have been done to reach target if you think the target was not met?

One-third of children with pneumonia-like symptoms do not seek appropriate care.

Antibiotics which could prevent 70% of all pneumonia deaths, costing just \$0.50 on average, are frequently not accessible and often unavailable at local level. Poor children are most at risk from pneumonia but health systems disproportionately provide for wealthier children. Do you think this is true? Do you know of any active action to solve this problem?

With the entire action plan in place in Nigerian, the mortality rate to pneumonia is still very high. From your experience, what do think should be done to reduce these preventable deaths?

NIGERIA ETHIC APPROVAL PROPOSAL LETTER

**IMPEDIMENT AND RESOLUTION IN FIGHTING PNEUMONIA AMONG  
CHILDREN UNDER FIVE IN NIGERIA**

**THESIS SUBMISSION FOR AWARD OF MSC GLOBAL HEALTH**

[6/11/2020]

The Agency Chairman

NEHRC, Federal ministry of Health

Attn Ado Danladi

To Whom It May Concern:

I am writing with regard to gaining ethical approval to participate in a qualitative study design to uncover the impediments and resolutions in fighting under five pneumonia related cases in Nigeria using an in-depth interview and focus group discussion from primary healthcare providers, nongovernmental organizations and pediatricians at major hospitals. The research will be conducted under the leadership of Professor Elisabeth Darj, NTNU Norway and assisted by Dr Abimbola Olaniran research fellow, London school of Tropical Medicine. Ethics approval for conducting this project has been obtained from the Research Ethics Board at Norwegian University of Science and Technology, Norway and a copy of the signed approval letter is attached.

We believe that this study has no major ethical concerns, and there is minimal risk associated with participating organization and medical practitioners. I have also attached external ethics approval letter from NTNU Norway and my research proposal to assist in review of my application.

If following review of this information, you feel that an additional information should be forwarded to the committee for consideration, please do not hesitate to contact me for provision of the appropriate information or documents.

Thank you in advance for your consideration. I look forward to hearing from you.

Yours Sincerely,

Chidi Emmanuel Okafor

Phn-+4740589275

Email-chidiforvictory@yahoo.com

## APPENDIX ONE



ETHICAL ONE.docx

## APPENDIX TWO



ETHICAL TWO.pdf

APPENDIX THREE



ETHICAL THREE.pdf

## APPENDIX FOUR



ETHICAL FOUR.pdf



