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A mixed-methods evaluation of stakeholder perspectives on pediatric pneumonia in Nigeria—priorities, challenges, and champions

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**Title:** A mixed-methods evaluation of stakeholder perspectives on paediatric pneumonia in Nigeria – priorities, challenges, and champions

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**Running title:** Stakeholder perspectives of paediatric pneumonia in Nigeria

**Abstract**

*Background*

Interventions to reduce pneumonia mortality exist, however stakeholder engagement is needed to prioritise these. We explored diverse stakeholder opinions on current policy challenges and priorities for paediatric pneumonia in Nigeria.

*Methods*

We conducted a mixed-methods study, with a web-survey and semi-structured interviews, to explore stakeholder roles, policy barriers, opportunities and priorities.

Web-survey participants were identified through stakeholder mapping, including researchers' networks, academic and grey literature, and 'Every Breath Counts' coalition membership. Stakeholders included actors involved in paediatric pneumonia

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in Nigeria from non-governmental, government, academic, civil society, private and professional organisations. Stakeholder interviews were conducted with local government, healthcare managers, professional associations and local leaders in Lagos and Jigawa States. Quantitative data were analysed descriptively; qualitative data were analysed using a thematic framework.

### *Results*

Of 111 stakeholders, 38 (34%) participated in the web-survey and 18 stakeholder interviews were conducted. Four thematic areas emerged: current policy, systems barriers, intervention priorities and champions. Interviewees reported a lack of pneumonia specific policies, despite acknowledging guidelines had been adopted in their settings. Barriers to effective pneumonia management were seen at all levels of the system, from community to healthcare to policy, with key issues of resourcing and infrastructure. Intervention priorities were the strengthening of community knowledge and improving case management, focused on primary care. While stakeholders identified several key actors for paediatric pneumonia, they also highlighted a lack of champions.

### *Conclusion*

Consistent messages emerged to prioritise community and primary care initiatives, alongside improved access to oxygen and pulse oximetry. There is a need for clear pneumonia policies, and support for adoption at a state level.

## Introduction

Following a resolution at the 2010 World Health Assembly, World Health Organisation (WHO) member states were tasked with intensifying efforts to reduce paediatric pneumonia.<sup>1</sup> A subsequent research prioritisation process in 2011 listed 158 priority questions, covering the spectrum from basic science to intervention delivery.<sup>2</sup> Despite the considerable burden and calls to action, pneumonia received only 3% of research funds awarded for infectious disease research between 2000 and 2015, compared to the 38% for HIV and 6% for tuberculosis.<sup>3</sup>

Estimates from 2017 report approximately 0.8 million annual paediatric pneumonia deaths, of which approximately one in 10 occur in Nigeria.<sup>4,5</sup> The paediatric pneumonia mortality rate for Nigeria was 19/1000 livebirths in 2016, and northern Nigeria in particular is a mortality hotspot.<sup>6</sup> The Global Action Plan for Pneumonia and Diarrhoea's (GAPPD) ambitious country-level target is to reach 3 pneumonia deaths per 1000 livebirths by 2025.<sup>7</sup> Progress in reducing paediatric mortality has lagged behind those of other common childhood infections.<sup>8</sup> Therefore, a concerted effort will be needed to sustain declines in pneumonia mortality, and accelerate them to meet both GAPPD and Sustainable Development Goal 3.2 targets in the Nigerian context.

Key evidence-based interventions for the reduction of pneumonia morbidity and mortality in low and middle-income countries (LMICs) include pneumococcal conjugate vaccine (PCV) and *Haemophilus influenzae B* (HiB) vaccines, improved nutrition, water and sanitation, and improved case management – including correct diagnosis and appropriate treatment.<sup>9,10</sup> While all of these approaches have been put

into policy in Nigeria to some degree, their coverage and quality has not necessarily been high or geographically consistent.<sup>11,12</sup>

Within resource-limited settings, intervention targeting relevant to the local context is needed. Recommendations to include policy makers in intervention planning to promote evidence-based policy in Nigeria have been made, and early involvement of non-academic partners in research can increase societal benefits.<sup>13,14</sup> Therefore, as part of a larger research programme to reduce paediatric pneumonia mortality in two states in Nigeria (The INSPIRING Project), we aimed to elicit the views of international, national and local stakeholders on the current political landscape of paediatric pneumonia in Nigeria, and to rank intervention priorities.

## **Materials and Methods**

We conducted a concurrent mixed-methods study of stakeholder perspectives on paediatric pneumonia in Nigeria, including: mapping stakeholders; a web-survey; and semi-structured interviews. Data was collected between 1<sup>st</sup> November 2018 and 1<sup>st</sup> June 2019. Stakeholders perspectives were sought from the international community, national level in Nigeria, and more specifically in two States – Jigawa (North West Nigeria) and Lagos (South West Nigeria).

Jigawa has a population of approximately 5.6 million people and an under-five mortality of 192/1000 livebirths. It is a predominately rural population, with 55% belonging to the lowest wealth quintile. Lagos has a population of 21 million and an under-five mortality of 50/1000 livebirths; it is urban/peri-urban, and 75% live in the highest wealth quintile.<sup>15</sup> This allows for comparison across geographically, culturally and economically diverse contexts within Nigeria.

Mapping stakeholders:

Stakeholder mapping was the first step in this stakeholder analysis, where relevant actors for the policy domain of interest – paediatric pneumonia – were identified.

Stakeholders were defined as individuals or organisations with an active interest in paediatric pneumonia in Nigeria, and were grouped as: non-governmental organisations (NGOs); civil society organisations (CSOs), bilateral and multi-lateral agencies; funders; Federal and state-level government; healthcare providers and professional associations; and academics.<sup>16,17</sup>

Stakeholders for paediatric pneumonia in Nigeria were identified through the research team's networks, from academic and grey literature, and from delegate invitation lists for 'Every Breath Counts' (EBC) coalition facilitated meetings in held in Nigeria in 2018-2019. In addition, we gave web-survey respondents an opportunity to nominate others, who we then included. Mapping was done iteratively, and continued throughout the data collection period.

Data Collection:

*Web-survey*

We conducted a web-survey of stakeholders identified through the mapping process. The survey included the following topics: their organisational reach (i.e. number of beneficiaries and geographical coverage); policy awareness; priority setting for pneumonia reduction in Lagos and Jigawa; and stakeholder identification. We used a mix of ranking, open and closed questions.

The web-survey was conducted using SurveyMonkey, and took approximately 20 minutes to complete. The survey link was sent via email up to three times before considering them non-respondents, with the third email personalised to try and improve response rate. This was done over a three-week period. Consent was implied through participation.

*Semi-structured interviews:*

Interviews were conducted with stakeholders from Lagos and Jigawa states. We used a purposive sampling approach, targeting local representatives from the Ministry of Health, local government, senior management from government and private healthcare institutions, professional organisations and traditional authorities. We planned to conduct 10 interviews in each state.

The interviews covered the following topics: current policy implementation and gaps, planned and desired policy approaches for paediatric pneumonia, and expectations and roles of stakeholders, including financial. Interviews were conducted in person by two female research assistants (FS and IA), with Master's level education and experience of qualitative data collection. Interviews were conducted in English, and took approximately 40 minutes. They were audio-recorded and then transcribed for analysis.

*Analysis*

The web-survey data was described using summary statistics for the categorical and ranked responses, and a simple descriptive analysis of the free text data. Where possible, priorities were grouped and compared between different types of stakeholders and by state, to understand different motivations across settings. The

stakeholder interviews were analysed using the thematic networks framework, taking an inductive approach.<sup>18</sup> The first step developed codes, describing relevant parts of the text. The second step categorized the descriptive codes into basic themes, organizing themes, and global themes. Coding was done by AIu and discussed with RB. The web-survey and interview results were then triangulated to explore commonalities and divergences, using the global themes from the qualitative analysis. The interpretation was shared and discussed with the research group.

### Ethics

Ethical approval was granted by University College London (3433/002), University of Ibadan/University College Hospital Research Ethics Committee (UI/EC/19/0033), and the Ministry of Health in Lagos (LSMH/5869/140) and Jigawa (MOH/SEC3/S/738/I).

Written consent was given by interview participants, and implied consent was given by web-survey participants.

### Results

Stakeholder mapping identified 111 organisations and individuals, who were contacted for the web-survey; we received 38 (34%) completed responses (Table 1; Web Appendix 1). The majority of respondents reported an organisational reach of over one million people (n=25), and the most common activities they conduct are: training and education of healthcare providers (n=26), research (n=25), and local advocacy (n=25). Ten stakeholders were interviewed in Jigawa, and eight in Lagos. Their roles included: healthcare providers (n=8), community leaders (n=2), and government representatives (n=8).

We present the results of the web-survey and interviews together, under the following thematic areas: pneumonia policies; systems barriers (including community, healthcare and policy); priority areas; champions. Data from the two states were analysed together, highlighting divergences where they arise.

#### Pneumonia Policies:

In the web-survey, respondents were asked if they had heard of eight policy documents published by the Federal Ministry of Health with relevance to child health and pneumonia, and if so, if respondents deemed them relevant for paediatric pneumonia (Table 2). The Essential Medicine List (2016)<sup>19</sup> was most frequently selected as relevant (28/34, 82%), while the National Strategic Health and Development Plan I (2010-2015)<sup>20</sup> was least frequently selected (16/34, 47%). The policy relating to medical oxygen<sup>21</sup> was selected by 53% (18/34) of respondents, respectively. Additional policies on IMC and iCCM (n=3) and Essential Newborn Care (n=3) were provided as additional relevant policies for paediatric pneumonia in Nigeria by multiple respondents.

Interviews with stakeholders found consensus on the absence of comprehensive pneumonia guidelines and policies, or even knowledge about them, in Nigeria.

*“It is difficult to see guidelines for pneumonia but you can easily see guidelines for malaria treatment, guidelines for meningitis, guidelines maybe for eclampsia in women [...] the guideline for treating pneumonia is not popular or is not common [...] actually there is no guideline you will see in the hospital”* (Healthcare Provider,

Jigawa)

However, each stakeholder also stated having knowledge and/or adoption of pneumonia guidelines in their settings in the form of ‘standing orders’ (i.e. national patient management guidelines) or WHO IMCI guidelines. There was mention of national guidelines developed and spread by the federal government, but confusion was expressed on how such guidelines are implemented, and on how frequently they are evaluated and renewed.

In terms of who currently drives policy, web-survey respondents reported that international funders and NGOs currently exert the most influence, followed by professional associations. However, international funders and private companies, were the two groups respondents ranked as those who should have the least influence. State government and researchers were ranked as those who should influence policy (Figure 1).

Systems barriers

*Community:*

A lack of community engagement and education was considered by most stakeholders in Lagos and Jigawa as a key barrier to good health and wellbeing. There was consistency between the states on the potential benefits of community-based interventions, focusing especially on the need to change misconceptions and encourage timely and appropriate care-seeking. For example:

*“what is happening here, you know most of the patients are not coming to the hospital directly, so maybe a child will start with cough, simple cough, you understand and they will not come to hospital they will go to a [private unqualified pharmacist] to buy drugs which is not even antibiotic, it may be cough syrup which will just suppress*

*the cough and it will not cure the cough completely so they will come to the hospital when the condition is very, very bad”* (Healthcare Provider, Jigawa)

Other intervention suggestions centred on nutrition and hygiene practices, as preventive strategies to reduce morbidity. We observed differences in opinion on the use of media platforms for disseminating these messages, with respondents in Jigawa expressing more support for media as an engagement tool. Examples of successful community education projects in Jigawa (e.g. the health ambassadors project) and Lagos (e.g. the “food home grown” programme) were both highlighted.

#### *Healthcare System:*

Health system level barriers included: insufficient personnel; equipment, supply and infrastructure limitations; challenges in delivering primary care; and plurality of healthcare provision (private and government, and traditional and western medicine). Stakeholders universally reported a lack of staff for health facilities, alongside a lack of health facilities generally. Specifically in Jigawa, a lack of female healthcare staff was considered an issue and the call to hire more personnel was accompanied by an invite to pay more attention to gender-balance.

*“the state has actually employed over six hundred and fifty health workers last year and last two years [...] but we still have gaps in terms of resource”* (Local government, Jigawa)

The importance and need of training and re-training staff was discussed frequently, including the need for improved communication skills of the health workers; in Jigawa poor communication was given as a reason communities avoid hospitals and delay care-seeking.

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Stakeholder opinion differed on the availability of essential drugs, with no mention of this from respondents in Lagos, and contradictions offered in Jigawa. A drug and supplies distribution system was reportedly put in place in Jigawa to increase access, however secure storage and fair distribution of medicines was highlighted as issues of fake drugs and misappropriation were raised:

*“We have then a storage facility of those consumables, the security, where they are stored, are they secure, or thieves will come and remove some things, so those are the issues around drugs.”* (Local government, Jigawa)

The stakeholders agreed that essential equipment for paediatric clinical care is insufficient and inadequate across settings, notably oxygen and pulse-oximeters. Two specific challenges were the absence or obsolete nature of the electronic medical equipment they did have, from computers to oxygen supplies. The second being the challenge of 24-hour uninterrupted power supplies, needed for oxygen concentrators. In Lagos, solar panel distribution was given as an example of a solution:

*“There is solar on ground and there is light 24 hours”* (Local government, Lagos)

Primary health care (PHC) in Lagos and Jigawa was considered well organized, and as having a core role in providing immunization and raising awareness of preventive public health interventions. A need to strengthen its role as the first contact for healthcare services emerged, suggesting this could reduce overcrowding in secondary and tertiary facilities.

Plurality in the health system was apparent, both with government and private services. The role of private providers was more pronounced in Lagos, while respondents suggested the private sector might be wary of investing in Jigawa due to

low potential for financial returns given the poverty. Stakeholders in both states put forward advantages of having a parallel private sector, namely relieving pressure from government facilities and improving quality services through promoting competition. However, these were also acknowledged as being limited due to high out-of-pocket expenditure reducing the number of patients attending these facilities. Private pharmacy shops on the other hand were reported as the first point of access for the majority of the population, due to affordability and convenience.

*Policy:*

The principal policy-level challenge raised by interviewed stakeholders was healthcare financing, with government expenditure not considered sufficient by many interviewees to overcome all the healthcare issues. Although some respondents in Jigawa spoke positively of government financial support:

*“There is no challenge because the current government gives priority to health, he gives priority to health, I just made mention of the seventy-five million naira the state government releases monthly for maternal and child health programme, do you understand, in addition to other funds given by other implementing partners”*

(Professional Association, Jigawa)

Healthcare financing was predominately reported as coming from the government, although stakeholders also reported external donors, and an example of community funding:

*“The community people provided the facility, the building for the facility, they know their needs, they know our challenges as a government, you know it’s not easy to get a*

*PHC sited, maybe the funds or whatsoever so they came together donated a building”*

(Local government, Lagos)

Poverty of the general population was raised, and when taken alongside out-of-pocket payments in the healthcare system, was given as a reason for poor healthcare utilisation. A possible solution was given in the form of the Nigeria National Health Insurance Scheme (NHIS). In Jigawa, the role of the NHIS programme was considered limited as it only covers those in formal employment. However, Jigawa state has additionally implemented free medical care for under-five children and mothers.

Web-survey respondents were asked for three key policy opportunities and barriers; 23 (61%) respondents gave suggestions. Barriers broadly reflected those raised in the interviews, including: lack of funds; human resourcing challenges (including low motivation and inequitable distribution); lack of political will; poor coordination and communication e.g. between Federal and State government; poor implementation and leadership; lack of awareness and prioritisation of pneumonia. Opportunities focused on: existence of funding and advocacy platforms (e.g. Every Breath Counts, Saving One Million Lives); successful implementation of policies (e.g. Community Health Influencers, Promoters and Services Programme - CHIPS); increasing coverage of immunisation; existence of standardised guidelines; Government engagement and oxygen, pulse oximetry and mHealth for case management.

Intervention priorities

Web-survey respondents were asked to rank intervention approaches to reduce paediatric pneumonia at community, primary care and secondary/tertiary care levels

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for Lagos and Jigawa (Figure 2). Prioritisation across Lagos and Jigawa was similar, with increasing pneumonia knowledge ranked highest for the community. At both primary and secondary/tertiary care, training and mentorship programmes, improved antibiotic access, and pulse oximetry were prioritised.

Taking responses only from those who reported working in Jigawa, the three top community priorities were: increasing pneumonia knowledge, increasing PCV and penta vaccine coverage, and community education and engagement. However, other prioritisation remained the same. In Lagos, nutrition management replaced increasing vaccine coverage, to be ranked in the top three priorities for the community, and IMCI training and pulse oximetry became equally weighted for primary care.

When asked to prioritise between community, primary care and secondary/tertiary care, there was a clear preference for primary and community approaches in both Lagos and Jigawa (Web Appendix 2). Reasons for prioritisation in Jigawa focussed on care-seeking and recognition of pneumonia being poor in this area, and primary care being the most accessible place to seek care. In Lagos, reasons for prioritisation highlighted that care-seeking was relatively good in this population, but the quality of care when they get there is poor (e.g. *“Knowledge is sufficient in the community to mean that the focus should be on Primary Care so that the community has an effective place to seek help”*).

### Champions

We asked web-survey respondents to name CSOs, NGOs and funders of paediatric pneumonia programmes in their setting. For CSOs, eight responses were given, naming: Every Breath Counts (n=2), UNICEF (n=1), GAVI (n=1), the Paediatric

Association of Nigeria (n=1), the Jigawa Coalition of Civil Society on Nutrition (n=1), Jigawa Maternal Newborn and Child Accountability Forum (n=1) and the Partnership for Advocacy in Child and Family Health project (n=1). For NGOs, 17 responses were given, naming the top three as: Save the Children (n=7), CHAI (n=2) and UNICEF (n=2). For funders, there were 16 responses, naming Bill and Melinda Gates Foundation (n=6), USAID (n=4), DFID (n=3), the GSK and STC partnership (n=4), and the Jigawa State Government (n=1).

Stakeholder interviews recognised a range of relevant actors for paediatric pneumonia, including: Federal Ministry of Health, the Primary Healthcare board, the Ministry of Finance, local government, hospital representatives and healthcare workers, caregivers, traditional and religious leaders, external donors, NGOs, and CSOs. NGOs and external donors were widely reported as present in Lagos and Jigawa, supporting through investing in healthcare and collaborating with the government to deliver high quality services, although a stakeholder from Jigawa highlighted challenges of sustainability:

*“That’s their prospects, there is no sustainability at the end. We want donors who will come and teach us how to sustain all the programs we have, we don’t just want donors alone but donor that will teach us how to sustain our programs”* (Healthcare provider, Jigawa)

CSOs, like women’s groups, were given as an example for influencing healthcare expenditure, from doing research to ensure the right prioritization of money allocation, to participating in stakeholders’ meetings and advocating for their causes.

## Discussion

We sought the views of international, national and state-level stakeholders on barriers to and prioritisation of current policy implementation for paediatric pneumonia in Nigeria, with a focus on Lagos and Jigawa states. While there were some important differences between health system barriers and prioritisation for interventions between the two states, many findings were universal and suggest some commonality in root causes of high pneumonia-related morbidity and mortality.

A key finding was the lack of agreement on whether Nigeria has a clear policy response to paediatric pneumonia. Multiple policy documents published by the Federal Ministry of Health relate to paediatric pneumonia, such as the policy for scaling up medical oxygen,<sup>21</sup> treatment guidelines<sup>22</sup> or the national adoption of WHO's IMCI guidelines. A review of maternal and child health policies in Nigeria from 2000-2015 identified 19 policies, with specific policies for malaria, HIV and nutrition.<sup>23</sup> However, this review did not list a pneumonia-specific document. This lack of a vertical policy response could explain the discrepancy. However, it seems surprising that respondents were not universally aware of oxygen initiatives, given Nigeria's rapid response to the WHO including medical oxygen as an essential medicine.<sup>24</sup>

Recent studies from Nigeria have highlighted the poor coverage and delivery of oxygen and pulse oximetry for the management of paediatric pneumonia.<sup>25,26</sup> This was recognised as a key implementation opportunity, with oxygen and pulse oximetry ranked in the top-three for both primary and secondary care level interventions in Lagos and Jigawa. Modelled estimates suggest that IMCI, enhanced with pulse oximetry and supported by effective oxygen delivery, could avert 15,400 paediatric

pneumonia deaths annually in Nigeria.<sup>27</sup> A major challenge raised around oxygen by stakeholders was interrupted power supplies, with oxygen concentrators requiring electricity to function. This emphasises the need for oxygen to be considered as a package intervention, including training, locally appropriate power solutions (such as solar power), and pulse oximetry. With examples of successful implementation in secondary care,<sup>28</sup> supportive policy already in place, and stakeholder backing, expanding a package for sustainable medical oxygen delivery should be considered an urgent priority.

There was a clear preference to prioritise approaches at community and primary care levels, based on the need for improved knowledge of paediatric pneumonia. Despite limitations in the health system, many stakeholders held the view that PHC is well structured as a platform to achieve universal health coverage (UHC). As a cornerstone of the SDG health agenda,<sup>29,30</sup> several initiatives to promote UHC were highlighted by stakeholders as important achievements, such as the National Health Insurance scheme, and in Jigawa, free healthcare services for new mothers and children under-five. In spite of this, uptake of services was still seen as poor. In 2016 Nigeria had the lowest proportion of health spending by the government in LMICs (14.5% compared to the group average of 32%)<sup>31</sup> echoing stakeholder views that government financing for healthcare is insufficient. Therefore, advocating for increased healthcare spending for pneumonia, while also ensuring quality of care is improved, should be considered.

A recent study from Ghana, focused on research priorities, presents similar focus areas of community education and effective diagnostic technologies and case management; however, they also prioritised mHealth and surveillance.<sup>32</sup> We found mHealth and monitoring and evaluation were consistently deprioritised. This may

reflect the fact that a myriad of basic needs, from adequate infrastructure and staffing, to supplies and knowledge, were reported as lacking. Therefore, initiatives to reduce paediatric pneumonia mortality will need to take this complex context into consideration.

We had two key limitations, firstly the low response rate in the web-survey, particularly from those representing professional organisations. We had specifically targeted organisations and stakeholders with experience of Lagos and Jigawa, however, while many respondents reported working in the North West region, fewer had worked specifically in Jigawa. Secondly, we did not include community stakeholders in the study. We report results of community group discussions about knowledge perceptions and care-seeking elsewhere in this Issue.<sup>33</sup> However, we decided not to explore community views on current policy approaches and priorities, as we felt it may be too abstract. Therefore, the opinions we present do not cover the full spectrum of stakeholders.

While stakeholders named several important actors and policies related to paediatric pneumonia, there was a clear lack of pneumonia awareness across the spectrum. The adoption of a National Pneumonia Action Plan could provide an opportunity to crystalize this process, bringing both pneumonia-specific policy and increased commitments for action. However, it is important that processes to support state-level adaptation and adoption of the Action Plan be put in place. Consistent messages emerged that primary care and community-based initiatives should be the focus of efforts to reduce pneumonia morbidity and mortality in Nigeria, alongside the need to improve access to quality oxygen and pulse oximetry systems. Initiatives to

implement programmes in these areas should be rapidly prioritised and rigorously evaluated to ensure effective adoption and scale-up.

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### **Author contributions**

The study was designed by CK, TC, AGF, AAB, HG, EDM and RB, with input from all authors. Stakeholder mapping was led by AIu, with input from AIs and SB. Stakeholder interviews were conducted by IA and FS, with oversight from AGF and AAB. Interviews were analysed by AIu, with input from RB, CK, IA and FS. The web-survey was managed by CK, and analysed by CK. The paper was drafted by CK, with considerable input from AIu. All authors commented, read and approved the final manuscript.

## References

1. WHO Media Centre. Sixty-third World Health Assembly closes after passing multiple resolutions: The delegates at the World Health Assembly adopted resolutions on a variety of global health issues. In: World Health Organisation, editor. Geneva, Switzerland2010.
2. Rudan I, El Arifeen S, Bhutta ZA, Black RE, Brooks A, Chan KY, Chopra M, Duke T, Marsh D, Pio A and others. Setting Research Priorities to Reduce Global Mortality from Childhood Pneumonia by 2015. *PLOS Medicine* 2011;8(9):e1001099.
3. Brown R, Head M, on behalf of The Research Investments in Global health Study. Sizing up pneumonia research: assessing global investments in pneumonia research 2000-2015. Southampton: University of Southampton; 2018.
4. Liu L, Oza S, Hogan D, Chu Y, Perin J, Zhu J, Lawn JE, Cousens S, Mathers C, Black RE. Global, regional, and national causes of under-5 mortality in 2000–15: an updated systematic analysis with implications for the Sustainable Development Goals. *The Lancet* 2016;388(10063):3027-3035.
5. Troeger CE, Khalil IA, Blacker BF, Biehl MH, Albertson SB, Zimsen SRM, Rao PC, Abate D, Admasie A, Ahmadi A and others. Quantifying risks and interventions that have affected the burden of lower respiratory infections among children younger than 5 years: an analysis for the Global Burden of Disease Study 2017. *The Lancet Infectious Diseases* 2019.
6. Reiner RC, Welgan CA, Casey DC, Troeger CE, Baumann MM, Nguyen QP, Swartz SJ, Blacker BF, Deshpande A, Mosser JF and others. Identifying residual hotspots and mapping lower respiratory infection morbidity and mortality in African children from 2000 to 2017. *Nature Microbiology* 2019.
7. World Health Organisation. Ending Preventable Child Deaths from Pneumonia and Diarrhoea by 2025: The integrated Global Action Plan for Pneumonia and Diarrhoea (GAPPD). Geneva, Switzerland2013.
8. Liu L, Oza S, Hogan D, Perin J, Rudan I, Lawn JE, Cousens S, Mathers C, Black RE. Global, regional, and national causes of child mortality in 2000–13, with projections to inform post-2015 priorities: an updated systematic analysis. *The Lancet* 2015;385(9966):430-440.
9. Bhutta ZA, Das JK, Walker N, Rizvi A, Campbell H, Rudan I, Black RE. Interventions to address deaths from childhood pneumonia and diarrhoea

- equitably: what works and at what cost? *The Lancet* 2013;381(9875):1417-1429.
10. Gaffey MF, Das JK, Bhutta ZA. Millennium Development Goals 4 and 5: Past and future progress. *Seminars in Fetal and Neonatal Medicine* 2015;20(5):285-292.
  11. National Population Commission. *Nigeria Demographic and Health Survey 2018: Key Indicators Report*. Abuja, Nigeria2019.
  12. Gill CJ, Young M, Schroder K, Carvajal-Velez L, McNabb M, Aboubaker S, Qazi S, Bhutta ZA. Bottlenecks, barriers, and solutions: results from multicountry consultations focused on reduction of childhood pneumonia and diarrhoea deaths. *The Lancet* 2013;381(9876):1487-1498.
  13. Newig J, Jahn S, Lang DJ, Kahle J, Bergmann M. Linking modes of research to their scientific and societal outcomes. Evidence from 81 sustainability-oriented research projects. *Environmental Science & Policy* 2019;101:147-155.
  14. Uneke CJ, Ezeoha AE, Ndukwe CD, Oyibo PG, Onwe F. Promotion of evidence-informed health policymaking in Nigeria: bridging the gap between researchers and policymakers. *Glob Public Health* 2012;7(7):750-65.
  15. National Population Commission. *Nigeria Demographic and Health Survey 2018*. Abuja, Nigeria2019.
  16. Schmeer K. *Guidelines for Conducting a Stakeholder Analysis*. Reform PfH, editor. Bethesda, MD: Abt Associates Inc.; 1999.
  17. Campos PA, Reich MR. *Political Analysis for Health Policy Implementation*. *Health Systems & Reform* 2019:1-12.
  18. Attride-Stirling J. Thematic networks: an analytic tool for qualitative research. *Qualitative Research* 2001;1(3):385-405.
  19. Federal Ministry of Health. *Nigeria Essential Medicines List, 6th Edition*. 6th Edition ed. Abuja2016.
  20. Health FMo. *National Strategic Health Development Plan (NSHDP) 2010 - 2015*. In: Health FMo, editor. Abuja, Nigeria2010.
  21. Federal Ministry of Health. *National Policy on Medical Oxygen in Health Facilities*. Abuja2017.

22. Olowu A, Elusiyan JBE, Esangbedo D, Ekure EN, Esezobor C, Falade AG, Osinusi K, Mukhtar-Yola M, Meremikwu M, Ibe B and others. Management of community acquired pneumonia (CAP) in children: Clinical practice guidelines by the Paediatrics Association of Nigeria (PAN). *Niger J Paed* 2015;42(4):283-292.
23. Uneke CJ, Sombie I, Keita N, Lokossou V, Johnson E, Ongolo-Zogo P, Uro-Chukwu HC. Promoting evidence informed policy making in Nigeria: a review of the maternal, newborn and child health policy development process. *Health promotion perspectives* 2017;7(4):181-189.
24. World Health Organisation. WHO Model List of Essential Medicines for Children. Geneva, Switzerland: World Health Organisation; 2017.
25. Bakare AA, Graham H, Ayede AI, Peel D, Olatinwo O, Oyewole OB, Fowobaje KR, Qazi S, Izadnegahdar R, Duke T and others. Providing oxygen to children and newborns: a multi-faceted technical and clinical assessment of oxygen access and oxygen use in secondary-level hospitals in southwest Nigeria. *International Health* 2019.
26. Shittu F, Agwai I, Falade A, Bakare A, Graham H, Iuliano A, Aranda Z, McCollum E, Isah A, Bahiru S and others. Health system barriers and opportunities and healthcare provider perspectives for improved case management of childhood pneumonia in Lagos and Jigawa states, Nigeria. Manuscript under preparation 2019.
27. Floyd J, Wu L, Hay Burgess D, Izadnegahdar R, Mukanga D, Ghani AC. Evaluating the impact of pulse oximetry on childhood pneumonia mortality in resource-poor settings. *Nature* 2015;528:S53.
28. Graham HR, Bakare AA, Gray A, Ayede AI, Qazi S, McPake B, Izadnegahdar R, Duke T, Falade AG. Adoption of paediatric and neonatal pulse oximetry by 12 hospitals in Nigeria: a mixed-methods realist evaluation. *BMJ Global Health* 2018;3(3):e000812.
29. Ghebreyesus TA. All roads lead to universal health coverage. *The Lancet Global Health* 2017;5(9):e839-e840.
30. Kickbusch I, Gitahi G. UN high-level meeting: time to act on universal health coverage. *The Lancet* 2019;394(10200):731-732.
31. Chang AY, Cowling K, Micah AE, Chapin A, Chen CS, Ikilezi G, Sadat N, Tsakalos G, Wu J, Younker T and others. Past, present, and future of global health financing: a review of development assistance, government, out-of-

pocket, and other private spending on health for 195 countries, 1995–2050. *The Lancet* 2019;393(10187):2233-2260.

32. Abbey M, Afagbedzi SK, Afriyie-Mensah J, Antwi-Agyei D, Atengble K, Badoe E, Batchelor J, Donkor ES, Esena R, Goka BQ and others. Pneumonia in Ghana—a need to raise the profile. *International Health* 2018;10(1):4-7.
33. Bakare A, Graham H, Agwai I, Shittu F, King C, Colbourn T, Iuliano A, Aranda Z, McCollum E, Isah A and others. Community and caregivers’ perception of pneumonia and care seeking experience in Nigeria: a qualitative study. Manuscript under preparation 2019.

**Table 1:** Description of web-survey respondents

		<b>Responded</b>	<b>Invited stakeholder</b> (response rate within group)
Organisation type	Government*	4 (11%)	14 (29%)
	Academic	4 (11%)	8 (50%)
	CSOs and activists	5 (13%)	6 (83%)
	NGOs	15 (39%)	62 (24%)
	Private	8 (21%)	10 (80%)
	Professional association	2 (5%)	11 (18%)

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Years' experience	1-2 years	1 (3%)
	2-5 years	7 (18%)
	>5 years	30 (79%)
Works in Jigawa		12 (32%)
Works in Lagos		20 (53%)

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\*Two from each of the Federal and State governments; CSO = civil society organisation; NGO = non-governmental organisation

**Table 2:** Summary of policy documents which respondents were aware of and considered relevant for paediatric pneumonia in Nigeria

Policy Document	N = 34
Community Health Influencers, Promoters and Services Programmes (CHIPS)	20 (59%)
National Strategic Health and Development Plan I	16 (47%)
National Strategic Health and Development Plan II	23 (68%)

Nutrition	24 (71%)
Treatment	24 (71%)
Essential Medicine List	28 (82%)
Minimum standards for Primary Health Care	24 (71%)
Scale up of Medical Oxygen	18 (53%)

**Figures**

Figure 1: Median current and desired level of influence over paediatric pneumonia policy in Nigeria, from web-survey respondent rankings

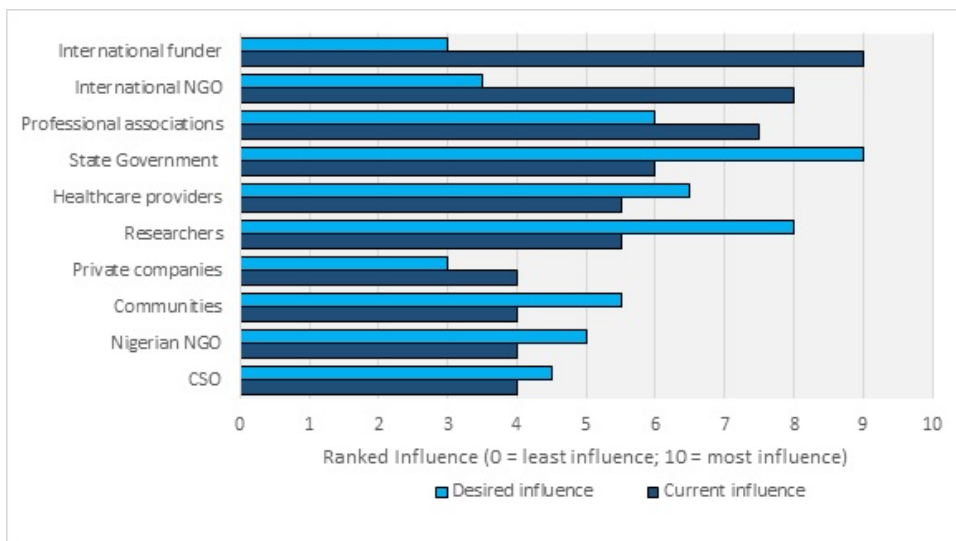


Figure 2: Intervention priority areas in Lagos and Jigawa – as community, primary care and secondary/tertiary care. [Note: 0 is the least prioritised and 10, 12 and 7 indicate the most prioritized – taken as a mean ranking across respondents]

