

## ORIGINAL ARTICLE

# Immunisation services in North-Eastern Nigeria: Perspectives of critical stakeholders to improve uptake and service delivery

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**Abstract.** We investigated the perspectives of parents, health workers (HWs) and traditional medical practitioners (TMPs) on immunisation advocacy, knowledge, attitudes and immunisation practice and ways of improving immunisation uptake in Borno State, North-eastern Nigeria. A cross-sectional study analysing quantitative data from the three stakeholders' categories. It was conducted across 18 local government areas of Borno State. A representative sample of 4288 stakeholders (n=1763 parents, n=1707 TMPs, and n=818 HWs aged 20 to 59years, had complete data. The sample has more males: 57.8% (Parents); 71.8% (TMPs) and 57.3% (HWs). The awareness of immunisation schedule among the stakeholders ranged from 87.2 to 93.4%. The study showed that 67.9% of the parent and 57.1% of the health workers had participated in immunisation except the TMPs (27.8%). Across the stakeholders' categories, between 61.9 and 72.6% have children who had Adverse Event Following Immunisation (AEFI). The most common AEFI was fever. Safety concerns, preference for herbs and charm, culture and religions, and vaccination perception as a western culture were the major barriers to immunisation uptake. While 63.6 to 95.7% of respondents indicated that community leaders, religious and spiritual leaders and TMPs should be involved in immunisation advocacy, 56.9-70.4% of them reported that community leaders should be involved in immunisation policy. Upscaling the critical stakeholders' involvement in advocacy, policy development and implementation of immunization activities may improve acceptance, create demand and engender ownership

in vulnerable communities of Borno State, Nigeria. AEFI could be detrimental to immunisation access and utilization. Consequently, health education by health workers needs strengthening to minimise vaccine hesitancy.

## Introduction

Immunisation coverage in Nigeria has been largely unimpressive despite the well-documented benefits and the relative availability of vaccines at no-cost to the caregivers (1-4). The coverage of immunisation, particularly routine immunisation (RI), has been unacceptably low (<80%) in Nigeria with differential levels of uptake across the six geopolitical zones of the country (3,4). The North-western and North-eastern zones of Nigeria have particularly low immunisation coverage for routine and supplementary immunisation activities (RI and SIAs) (3-7).

Until recently, Nigeria was one of the three Polio endemic countries in the world due to the country's inability to implement rounds of high-quality SIAs and the poor RI coverage (8). Northern Nigeria, specifically the North-western and North-eastern parts of Nigeria, were the sanctuaries for Polio transmission (9). Besides Polio, Northern Nigeria has witnessed several vaccine-preventable disease outbreaks, such as meningitis, measles, rubella, whooping cough, cholera, and yellow fever (10-15). The region is vulnerable to vaccine-preventable diseases due to low immunisation coverage, low literacy level, poverty, nomadic/mobile populations, geographic barrier (difficult terrains), and recently, insecurity (3-6,9). The polio eradication programme in northern Nigeria witnessed a serious setback between 2003 and 2005 due to a widespread anti-vaccination campaign, bothering on the safety of the oral polio vaccine (OPV) (16-18). The safety concern of OPV could have emanated from a lack of trust in western medicine and western countries, religious and cultural beliefs, no felt need, poverty, and political issues. These sentiments were thought to be pervasive among many religious and political leaders as well as concerned parents and some health workers and medical professionals in northern Nigeria.

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Borno State in North-eastern Nigeria became prominent on the global polio eradication initiative map due to the emergence of wild poliovirus type one (WPV1) in the State in August 2016 (19,20). The emergence of WPV1 from Borno State could be explained by the long years of non-vaccination due to the violent conflict from the Boko Haram insurgency since 2009 to date, compounding the existing barriers to immunisation uptake. Until recently, neither SIAs nor RI services could be conducted in most parts of Borno State due to inaccessibility to many towns and rural communities that were hitherto under Boko Haram control. Thus, it is an urgent public health research priority to understand the factors to improve immunisation services and uptake in Borno State, North-eastern Nigeria. Although some studies have identified drivers of vaccine hesitancy in northern Nigeria, such as religious and cultural beliefs, lack of trust in western medicine, safety concerns, lower female education, poverty and low literacy level, these studies were conducted in the north-western part of the country (6,21,22).

Moreover, most of the previous Nigerian studies have focused on the barriers and communication strategies to break the chain of immunisation rejection (23-25). The preponderance of literature focusing on the north-western part underscores the need for an insight into the local perspective and the peculiarities of Borno State in the context of the ongoing insurgency in the State and the subtle socio-cultural differences between the largely dominated Kanuri tribe in the State and the predominant Hausa/Fulani tribe in the north-western part of Nigeria.

To our knowledge, no study in Nigeria has empirically examined the subject of immunisation from a tripartite view of critical agents of change or stakeholders (i.e., parents, health workers and traditional medical practitioners). Further, the sustained interruption of WPV transmission for more than three years culminating in the acceptance of Nigeria's documentation (on June 18, 2020) and eventual polio-free certification attainment (in Africa on August 25, 2020) was heavily dependent on the SIAs and its attendant substantial financial and human resource investments (8). To achieve a sustainable approach to immunisation in Nigeria, research focusing on information from critical stakeholders and their perspectives is needed to strengthen RI and primary health care (PHC) services. Therefore, this study aims to investigate the perspectives of the major stakeholders- parents, health workers and TMPs on immunisation advocacy, knowledge, attitudes and practice as well as ways of improving immunisation uptake in Borno State, north-eastern Nigeria.

## Materials and methods

**Study design.** We conducted a cross-sectional study by obtaining quantitative data from three categories of respondents, namely parents, health workers and traditional medical practitioners. The study was conducted across 18 Local Government Areas (LGAs) of Borno State, North-eastern Nigeria.

**Study setting.** Borno State is in the North-eastern geopolitical zone of Nigeria. It has international borders with Republics of Chad, Cameroon and Niger. The State also has local borders

with States of Adamawa, Gombe and Yobe. Borno State has a total population of 6,629,190 from the projected 2006 census population figure (24). There are 27 LGAs with 311 political wards and 15,606 town and villages. The State has 7 traditional Emirates- Borno, Biu, Askira/Uba, Gwoza, Shani, Bama and Dikwa. However, the State has been embroiled in the fight against Boko Haram insurgency since 2009.

**Selection of local government areas.** We purposively selected 18 of the 27 LGAs, representing 67% of the State and urban/semi-urban-rural distribution of Borno State based on the three senatorial districts of South (Biu, Kwaya Kusar, Hawul, Gwoza and Damboa), North (Monguno, Kukawa, Gubio, Magumeri, Kaga, Nganzai and Maffa) and Central (Maiduguri Metropolitan Council (MMC), Bama, Dikwa, Jere, Konduga and Ngala). MMC, Bama, Biu, Jere, and Gwoza were considered as urban/semi-urban LGAs based on their populations and infrastructure while Konduga, Magumeri, Kaga, Monguno, Damboa, Kukawa, Kwaya Kusa, Maffa, Dikwa, Hawul, Ngala, Nganzai and Gubio were purposively selected to represent the rural LGAs (Fig. 1).

**Sample size determination.** The sample size was calculated using the Daniel formula (as shown below) (25) which generated a sample size of 245.75 per LGA but was approximated to 250 per LGA.

$$N = z^2 \frac{P \times q}{D^2}, \text{ where } z = 1.96,$$

95% confidence interval p is the immunisation coverage in the State = 0.2, q = 0.8, D = 5%

$$\frac{3.84 \times 0.2 \times 0.8}{0.0025} = 245.75$$

The total minimum sample size for the 18 LGAs surveyed in the State was therefore  $250 \times 18 = 4500$ .

**Sampling technique.** Each LGA was divided into four village clusters each and the LGA headquarter from which households were randomly selected using the snowball method. Thus, five villages and the LGA headquarter were randomly selected from each LGA representing the geographic and ethnic composition of the LGA. Village clusters are usually homogeneous in terms of ethnicity and culture. Mothers and fathers (parents) were selected alternately from each household. The selection of the respondents was done in such a way that equal representation of male and female, young and old, was achieved. Of the 250 calculated sample size, 100 were selected among parents, 50 from health workers (HW) and 100 among Traditional Medical Practitioners (TMP), such as herbalists, barbers/wanzamis, spiritualists, Traditional Birth Attendants (TBAs), bonesetters and religious leaders. All cadres of health workers were recruited from the available sample frame. Household was defined as a family living together and eating from the same pot which usually comprise of a father, mother(s) and children. In the case of a household with more than one mother, the most senior was selected. TMPs, Religious leaders were purposively selected from the same clusters of villages and LGA headquarters from which the parents were selected from and the health workers were

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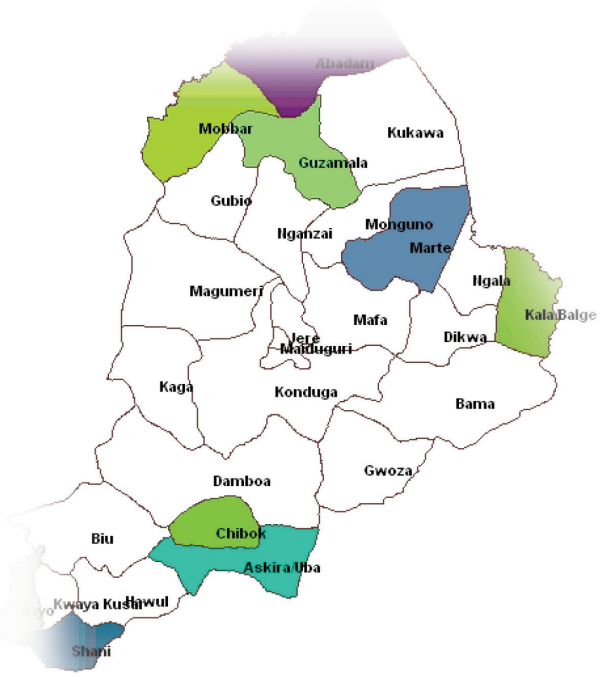


Figure 1. Selected local government areas of Borno state in white background.

also purposively selected from health care institutions in the clusters of villages and LGA headquarters.

Information on socio-demographics, knowledge and practice of immunisation and immunisation advocacy was obtained by using semi-structured questionnaires. The questions were a mixture of open and closed-end types and adapted for each study group. Four research assistants and one team leader were selected and trained from each LGA on the sampling technique and administration of the questionnaires using the research guide protocol developed by the investigators. Interviews were conducted in the participants' homes after obtaining participant's consent.

**Data collection and entry.** A total of 4288 out of 4500 (93.3%) across the State comprising 1763/1800 (97.9%), 1707/1800 (94.83%) and 818/900(90.8%) valid questionnaires were obtained for parents, traditional medical practitioners, and health workers, respectively. The data collection was carried out for eight weeks. The completed questionnaires were collected and examined for completeness and entered in the IBM SPSS (Statistical Package for Social Science) Statistics version 19.0 software. The data were cleaned, and exploratory statistics was carried out in preparation for analysis.

**Data analysis.** The data was analysed using the IBM SPSS Statistics version 19.0. The quantitative data was analysed using descriptive statistics. Frequency tables with percentages were computed for demographic characteristics, and charts were drawn, where applicable. The mean and standard deviation were calculated for continuous variables. For analytical statistics, differences between groups were computed using a t-test for continuous data and chi-square for categorical data. The level of significance was set at <0.05 for all statistical analyses.

**Ethical consideration.** The authors obtained ethical clearance from the University of Maiduguri Teaching Hospital Ethical and Research Committee prior to commencement of field study. Verbal consents were obtained from the all the study participants before questionnaires were administered and the rights of the participants were clearly communicated to them. The confidentiality of the study participants was maintained during and after the study. The ethical clearance document with approval number- ADM/TH/497/VOL1 was also attached as supplementary document.

**Results**

Table I below showed the demographic distribution of respondents in the three groups in this study. The age distribution revealed that the majority of the respondents fell between the age of 20 and 59 years in all the three groups, while the male has a preponderance in the sex distribution across the three groups (57.8%-Parent; 71.8%-TMP and 57.3%-HW). The illiteracy level was highest among TMPs (8.1%) as against 3.1 and 1.2% among parents and health workers (HWs) respectively. Over 80% of the respondents in the three groups resided in villages. The majority (80-90%) were Muslim, while the rest were Christians with a few traditional worshippers. Traditional worshippers were found among the TMPs where they participate in traditional practices. Monogamy was the dominant form of marriage indicated across the three groups, although polygamy was more common among TMP than other groups. The majority of the respondents had between one to nine children (63 to 72.8%), and the TMPs have the highest number of children. Farming was the most common occupation among parents and TMPs, while most of the HWs belonged to their profession exclusively.

Table II below showed the responses from respondents on awareness, knowledge, and practice on immunisation. The level of awareness of the respondents in the three groups on immunisation schedule was high, ranging between 87.2 and 93.4%, and the highest was among health workers. We observed that 33(4%) of them (health workers) were not aware of immunisation schedule in the community. Among those who were aware of immunisation, most of the parents (67.9) and (57.1%) HWs indicated that they have participated in immunisation in one form or another except among TMPs (27.8%). Various healthcare institutions were the places where immunisation was received, followed by home, while school, church and mosque represented the least. Most of the respondents in the three groups indicated that their children had been vaccinated before (89.7 to 91.9%). Most respondents in the three groups knew the two routes of immunisation (oral and injection 74.2 to 88.0%); the highest knowledge reported was among health workers. Both methods were acceptable to most of the respondents (66.1 to 80.0%), the least among TMPs and the highest among health workers. Most respondents involved their spouses in the method of immunisation they prefer or rather in immunising their children. Slightly more than half of the respondents in each of the groups recommended immunisation in the first six months of life, while only a few recommended after one year in the three groups. Between 61.9 and 72.6% of respondents have children who have had side

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Table I. Demographic variables of the respondents in the three groups.

Demographic data	Parent, (n=1763) PQ (%)	TMPs, (n=1707) TMP (%)	HWs, (n=818) HWQ (%)	Chi Square	P-Value
<b>Age Group (years)</b>					
<20	32 (1.8)	12 (0.7)	5 (.6)	372.1	<0.0001
20-29	394 (22.3)	184 (10.8)	184 (22.5)		
30-39	612 (34.7)	418 (24.5)	315 (38.5)		
40-49	443 (25.1)	507 (29.7)	233 (28.5)		
50-59	175 (9.9)	305 (17.9)	60 (7.3)		
≥60	71 (4.0)	241 (14.1)	13 (1.6)		
<b>Sex</b>					
Female	682 (38.7)	425 (24.9)	287 (35.1)	81.73	<0.0001
Male	1,019 (57.8)	1,225 (71.8)	485 (59.3)		
<b>Educational Background</b>					
None	32 (1.8)	138 (8.1)	25 (3.1)	889.4	<0.0001
Quranic	595 (33.7)	360 (21.1)	31 (3.8)		
Primary	280 (15.9)	459 (26.9)	75 (9.2)		
Secondary	345 (19.6)	234 (13.7)	183 (22.4)		
Technical College	281 (15.9)	152 (8.9)	386 (47.2)		
University Graduate	115 (6.5)	40 (2.3)	62 (7.6)		
<b>Where were you Born</b>					
Village	1,473 (83.6)	1,497 (87.7)	673 (82.3)	16.76	0.0002
City	277 (15.7)	200 (11.7)	138 (16.9)		
<b>Where do you Live</b>					
Village	1,335 (75.7)	1,326 (77.7)	586 (71.6)	11.00	0.0041
City	414 (23.5)	368 (21.6)	225 (27.5)		
<b>What is your Religion</b>					
Muslim	1,572 (89.2)	1,543 (90.4)	720 (88.0)	12.09	0.0024
Christian	169 (9.6)	115 (6.7)	85 (10.4)		
<b>Married</b>					
No	144 (8.2)	177 (10.4)	107 (13.1)	15.46	0.0004
Yes	1,582 (89.7)	1,504 (88.1)	694 (84.8)		
<b>How many wives do you have</b>					
One	479 (30.3)	484 (32.2)	281 (40.5)	26.03	0.0010
Two	254 (16.1)	277 (18.4)	113 (16.3)		
Three	63 (4.0)	106 (7.0)	38 (5.5)		
Four	27 (1.7)	40 (2.7)	10 (1.4)		
More Than 4	3 (0.2)	4 (0.3)	6 (0.9)		

Demographic data	Parent, (n= 1763) PQ (%)	TMPs, (n=1707) TMP (%)	HWs, (n=818) HWQ (%)	Chi Square	P-Value
<b>How many co-wives do you have</b>					
One	37 (6.2)	47 (13.1)	14 (6.1)	20.86	0.0003
Two	15 (2.5)	21 (5.8)	8 (3.5)		
More than Two	7 (1.1)	7 (4.0)	7 (3.0)		
<b>Not Married</b>					
Single	77 (53.5)	78 (44.1)	66 (61.7)	30.78	<0.0001
Widower	4 (2.8)	14 (7.9)	2 (1.9)		
Widow	8 (5.6)	17 (9.6)	1 (0.9)		
Divorced	25 (17.4)	11 (6.2)	6 (5.6)		
<b>Number of Children</b>					
0	61 (3.5)	74 (4.3)	44 (5.4)	32.82	<0.0001
1-9	1,284 (72.8)	1,193 (69.9)	515 (63.0)		
10-19	221 (12.5)	250 (14.6)	86 (10.5)		
≥20	21 (1.2)	52 (3.0)	7 (0.9)		
<b>Male Children</b>					
<5	1,194 (67.7)	1,047 (61.3)	527 (64.4)	36.11	<0.0001
≥5	366 (20.8)	470 (27.5)	134 (16.4)		
<b>Female Children</b>					
<5	1,263 (71.6)	1,182 (69.2)	531 (64.9)	13.28	0.0013
≥5	250 (14.2)	314 (18.4)	99 (12.1)		
<b>Occupation</b>					
Farmer	815 (46.2)	554 (32.5)	105 (12.8)	2592	<0.0001
Animal Breeder	89 (5.0)	73 (4.3)	12 (1.5)		
TMP	33 (1.9)	648 (38.0)	12 (1.5)		
Religious Leader	33 (1.9)	57 (3.3)	2 (0.2)		
Community Leader	49 (2.8)	48 (2.8)	5 (0.6)		
Health Officer	120 (6.8)	58 (3.4)	508 (62.1)		
Others	353 (20.0)	122 (7.1)	50 (6.1)		
<b>Day per week dedicated to business</b>					
<3 days	101 (5.7)	1,616 (94.7)	51 (6.2)	2582	<0.0001
≥3 days	1,110 (63.0)	91 (5.3)	514 (62.8)		

<sup>a</sup>Not Significant. NB: The values in the columns do not add up to the sample in each category due to missing data.

effects consequent upon immunisation and the most common reported experiences of side effects in each of the three groups. side effect was fever, which constituted more than half of Only a very few have children who died supposedly from the



Variable	Father & mother, n=1763 FMQ (%)	Traditional medical practitioner, n=1707 TMP (%)	Health worker, n=818 HWQ (%)	Chi-Square	P-Value
<b>Immunisation</b>					
Are you aware of immunisation schedule in your community					
No	198 (11.2)	171 (10.0)	33 (4.0)	34.77	<0.0001
Yes	1,537 (87.2)	1,507 (88.3)	764 (93.4)		
Have you ever participated in immunisation campaign					
No	475 (30.9)	1,062 (70.5)	26 (3.4)	830.9	<0.0001
Yes	1,043 (67.9)	419 (27.8)	436 (57.1)		
Which place do you receive immunisation in your community					
General Hospital	205 (13.3)	264 (17.5)	139 (18.2)	314	<0.0001
Health Centre	503 (32.7)	446 (29.6)	368 (48.2)		
Local Church	30 (1.9)	31 (2.1)	8 (1.0)		
Dispensary	214 (13.9)	463 (30.7)	153 (20.0)		
School	20 (1.3)	2 (0.1)	6 (0.8)		
Mosque	3 (0.2)	1 (0.1)	1 (0.1)		
Home	504 (32.8)	266 (17.7)	85 (11.1)		
Has your children been vaccinated before					
No	97 (6.3)	119 (7.9)	49 (6.4)	3.1	0.2120 <sup>a</sup>
Yes	1,413 (91.9)	1,367 (90.7)	685 (89.7)		
What method of vaccination do you know					
Oral	227 (14.8)	315 (20.9)	74 (9.7)	63.09	<0.0001
Injection	58 (3.8)	47 (3.1)	13 (1.7)		
Both	1,238 (80.5)	1,118 (74.2)	672 (88.0)		
None	3 (0.2)	6 (0.4)	2 (0.3)		
In your opinion, which method would you prefer?					
Oral	324 (21.1)	417 (27.7)	124 (16.2)	63.9	<0.0001
Injection	98 (6.4)	58 (3.8)	24 (3.1)		
Both	1,095 (71.2)	996 (66.1)	611 (80.0)		
None	3 (0.2)	5 (0.3)	0		
In selecting the method, do you involve your spouse					
No	141 (9.2)	138 (9.2)	56 (7.3)	2.018	0.3646 <sup>a</sup>
Yes	1,361 (88.5)	1,313 (87.1)	666 (87.2)		
What should be the minimum age that you would recommend to vaccinate a child					
0-6 months	777 (50.6)	786 (52.2)	437 (57.2)	32.46	0.0034
6-12 months	256 (16.7)	287 (19.0)	123 (16.1)		

Table II. Continued.

Variable	Father & mother, n=1763	Traditional medical practitioner, n=1707	Health worker, n=818	Chi-Square	P-Value
	FMQ (%)	TMP (%)	HWQ (%)		
<b>Immunisation</b>					
What should be the minimum age that you would recommend to vaccinate a child					
12-24 months	61 (4.0)	70 (4.6)	37 (4.8)		
24-36 months	16 (1.0)	22 (1.5)	11 (1.4)		
3 years	77 (5.0)	47 (3.1)	24 (3.1)		
5 years	262 (17.0)	202 (13.4)	99 (13.0)		
6 years	21 (1.4)	13 (0.9)	9 (1.2)		
7 years or more than 7 years	46 (3.0)	40 (2.7)	13 (1.7)		
Do you experience any side effect(s) after vaccinating your children?					
No	520 (33.8)	506 (33.6)	181 (23.7)	29.40	<0.0001
Yes	951 (61.9)	947 (62.8)	555 (72.6)		
<i>Fever</i>	836 (54.4)	770 (51.1)	427 (55.9)		
<i>Abscess</i>	69 (4.5)	85 (5.6)	73 (9.6)		
<i>Eruptive Diseases</i>	11 (0.7)	28 (1.9)	7 (0.9)		
<i>Allergy</i>	30 (2.0)	28 (1.9)	18 (2.4)		
<i>Swelling</i>	115 (7.5)	44 (2.9)	60 (7.9)		
<i>Neuralgia</i>	3 (0.2)	1 (0.1)	3 (0.4)		
<i>Functional Impairment</i>	3 (0.2)	2 (0.1)	9 (1.2)		
<i>Death</i>	8 (0.5)	3 (0.2)	2 (0.3)		
Taboo or rumours that encourage/discourage vaccination of children in your community					
No	991 (64.5)	988 (65.6)	380 (49.7)	63.32	<0.0001
Yes	508 (33.1)	482 (32.0)	365 (47.8)		
Beliefs that encourage/discourage immunisation of children in your community					
No	1,060 (69.0)	1,007 (66.8)	430 (56.3)	37.11	<0.0001
Yes	431 (28.0)	463 (30.7)	306 (40.1)		
Should community leaders/TMPs be involved in immunisation policy					
No	592 (38.5)	489 (32.4)	191 (25.0)	43.35	<0.0001
Yes	874 (56.9)	925 (61.4)	538 (70.4)		

\*Not Significant. NB: The values in the columns do not add up to the sample in each category due to missing data.

side effect or as a side effect (0.2 to 1.2%). The majority in the three groups indicated that taboos or rumours had no impact on immunisation except among health workers in which the response was almost the same (49.7% vs. 47.8%). Likewise, beliefs were not thought to affect immunisation as mentioned by the majority of the respondents in the three groups. Most of the respondents (56.9 to 70.4%) indicated that community leaders should be involved in immunisation policy.

Table III below showed the responses on advocacy by respondents of the three groups and indicated that some of them knew the various components of what advocacy is (41.8 to 52.4%), with the lowest observed among TMPs and the highest knowledge among health workers. The majority (63.6 to 95.7%) of respondents in the three groups indicated that traditional leaders/community leaders, religious/spiritual leaders and TMPs should be involved in advocacy on immunisation.

Table III. Immunisation advocacy among respondents of the three groups.

Variable	Parents, n=1763 PQ (%)	Tmps, n=1707 TMPQ (%)	Hws, n=818 HWQ (%)	Chi square	P-value
Immunisation advocacy					
What do you understand by immunisation advocacy					
Process of influencing decision makers on immunisation	282 (16.0)	308 (18.0)	136 (16.6)	33.11	<0.0001
Process of influencing public perceptions about immunisation	189 (10.7)	156 (9.1)	53 (6.5)		
Process of mobilising community action towards immunisation	381 (21.6)	333 (19.5)	139 (17.0)		
All of the Above	805 (45.7)	713 (41.8)	429 (52.4)		
None of the Above	4 (0.2)	10 (0.6)	4 (0.5)		
Should the following set of Leaders be involved in Immunisation Advocacy					
Religious Leaders	1,592 (90.3)	1,467 (85.9)	783 (95.7)	9.937	0.1274 <sup>a</sup>
Spiritual Leaders	1,121 (63.6)	1,100 (64.4)	529 (64.7)		
TMPs	1,316 (74.6)	1,355 (79.4)	679 (83.0)		
Community Leaders	1,601 (90.8)	1,500 (87.9)	712 (87.0)		
During immunisation advocacy, should taboos, rumours, cultural practices and beliefs be taken into considerations?					
No	769 (43.6)	590 (34.6)	312 (38.1)	28.07	<0.0001
Yes	951 (53.9)	1,060 (62.1)	467 (57.1)		
Are you satisfied with the present process of immunisation in your community?					
No	297 (16.8)	196 (11.5)	101 (12.3)	22.18	<0.0001
Yes	1,430 (81.1)	1,470 (86.1)	690 (84.4)		
Do your community people belief in immunising their children?					
No	215 (12.2)	161 (9.4)	50 (6.1)	22.93	<0.0001

<sup>a</sup>Not Significant. NB: The values in the columns do not add up to the sample in each category due to missing data.

On taboos, rumours and cultural practices, a modestly higher proportion (ranging from 53.9 to 62.1%) of the respondents in the three groups indicated that they were important considerations in advocacy on immunisation. More than 80% in each group are satisfied with the present process of immunisation and that people in their communities present their children for immunisation. Although in the three groups, a higher proportion of the respondents reported that taboo, rumours and certain beliefs do not interfere with immunisation, however, close to half of the health workers reported that rumours or taboos and certain beliefs impact immunisation in the communities. Only 3.5, 7.7 and 15% of the respondents, namely parents, TMPs and health workers indicated that

community leaders and TMPs were involved in immunisation, respectively.

## Discussion

*Knowledge, attitude and practice of immunisation among the critical stakeholders.* Our study revealed a high level of immunisation awareness across the three groups studied, though highest was among the health workers by virtue of their professional responsibilities. The majority of the TMPs have not participated in immunisation activities in our study setting. This has implications for immunisation advocacy to create demand in the community. The low level of participation of TMPs could



1 be a contributor to the initial severe resistance to immunisation  
 2 in northern Nigeria. Perhaps, leveraging on the centuries-long  
 3 relationship between the communities and the TMPs might  
 4 have softened the hitherto widespread resistance to immuni-  
 5 sation in northern Nigeria. The failure of the programme to  
 6 collaborate with the TMPs warrants a rethink of the current  
 7 approach, particularly in respect of mobilisation for RI services  
 8 at the PHC level. The TMPs are more accessible to the commu-  
 9 nities and provide alternative healthcare at an affordable cost to  
 10 people (8). This relationship built trust and empathy between  
 11 the communities and the TMPs. Perhaps, strategies to minimize  
 12 the widespread resistance to immunization in Northern Nigeria  
 13 should focus on leveraging such established trust-relationship  
 14 between the communities and the TMPs

15 Most respondents involved their spouses in the method  
 16 of immunisation they prefer or rather in immunising their  
 17 children. This finding has an implication on the decision  
 18 to vaccinate. Our field experience suggests that men are  
 19 critical decision-makers with respect to the vaccination of  
 20 their children, especially in northern Nigeria. Regarding the  
 21 recommended vaccination age, most respondents recom-  
 22 mended less than one year. The preponderance of less than  
 23 one year could be due to their local experience whereby all the  
 24 Expanded Programme on Immunisation (EPI) vaccines were  
 25 administered to children less than one year, except the suppl-  
 26 mental doses of OPV. Until recent years when campaigns  
 27 were conducted against yellow fever, meningitis and cholera,  
 28 vaccines were infrequently administered to older children or  
 29 adults in Nigeria (26).

30 Our study found that adverse events following immunisa-  
 31 tion (AEFI), commonly termed as 'side effects' within the  
 32 community was rife, but they are essentially non-serious  
 33 AEFI cases. Functional impairment and deaths were rare  
 34 occurrences, as shown in the study. Our study is consistent  
 35 with the literature where the majority of AEFI cases are mild  
 36 (non-serious) and mostly present as fever, injection site reaction  
 37 (swelling, tenderness) and rash (26-29). AEFI is an important  
 38 factor that deters access and utilisation of RI services in  
 39 Nigeria and other parts of the world (3,28,30,31). Studies have  
 40 consistently shown that mothers were not willing to undertake  
 41 repeat visits due to adverse events experienced by their chil-  
 42 dren. Anti-vaccine campaigners have often raised concerns  
 43 about the safety of vaccines for children, and has impacted on  
 44 the uptake at varying degree all over the world (3,30,32). The  
 45 undesirable effect of occurrence of AEFI on RI uptake could be  
 46 minimised if health workers prioritise health education prior  
 47 and after vaccination sessions and minimises programmatic  
 48 errors. Hence, the need for periodic supportive supervision  
 49 and periodic training of immunisation service providers on  
 50 the safe administration of injectables.

51 *Knowledge of advocacy.* Generally, there was a fair under-  
 52 standing of immunisation advocacy among the respondents  
 53 with a slightly differentially higher knowledge among health  
 54 workers. The imperative of the involvement of leaders in  
 55 immunisation advocacy drawn from the community, religious  
 56 and spiritual and TMPs was expressed by all the groups  
 57 investigated. Also, the study finding showed the relevance  
 58 of considerations to taboos, culture, and beliefs of the local  
 59 population during immunisation advocacy.

61 Our study reported the need to consider rumours, taboos,  
 62 cultural practices and beliefs in immunisation advocacy as  
 63 they could impact immunisation uptake. For example, the  
 64 common traditional practice whereby women were mandated  
 65 to stay indoors for 40 days post-delivery in the study setting  
 66 could have a negative implication on immunisation service  
 67 access and utilisation. Similar restrictive cultural practices  
 68 have been reported in Nepal (6). A recent study conducted by  
 69 Akwataghibe *et al* (28), in the Southwestern part of Nigeria,  
 70 revealed the influence of certain cultural elements on immuni-  
 71 sation service utilisation, such as traditional ritual and festivals  
 72 (leading to imposition of curfew) within the Yoruba ethnic  
 73 extraction, and belief regarding the effectiveness of traditional  
 74 remedies over orthodox practices by migrant population from  
 75 Cotonou and Igedes. Similarly, the study showed that women  
 76 prioritised the processing of certain agricultural commodities  
 77 during farming season over a visit to immunisation centre.  
 78 These beliefs and traditional practices differentially affect  
 79 women and hinder them from accessing immunisation services  
 80 for their children.

81 Further, the belief that vaccines contain substances that  
 82 make the child infertile persisted within the communi-  
 83 ties (16,18,33). This may be intertwined with vaccination  
 84 being perceived as western culture. A study published in 2018  
 85 from Zambia found that traditional remedies, alcohol use and  
 86 religious beliefs were drivers of vaccine hesitancy and were  
 87 reinforced by distrust towards western medicine (34). Similar  
 88 findings have been reported by reviews and empirical studies  
 89 done in northern Nigeria (16,18,21). Several studies have  
 90 reported general misconceptions about vaccines, and more  
 91 importantly, Oral Polio Vaccine, among some stakeholders  
 92 in northern Nigeria. For example, Jegede (18) and a few other  
 93 studies reported that the northern political and religious leaders  
 94 of Kano, Zamfara and Kaduna States, in 2003, called parents  
 95 not to allow their children to be immunised – that the vaccine  
 96 could be contaminated with estradiol hormone (an anti-fertility  
 97 agent), HIV and cancerous agents (21,16). More recent studies  
 98 still reported vestiges of such myths and misconceptions about  
 99 vaccines leading to vaccine hesitancy and, in turn, sub-optimal  
 100 RI service utilisation (25,35). Our study showed sub-optimal  
 101 involvement of religious leaders in immunisation policy in our  
 102 environment as most of the respondents indicated that commu-  
 103 nity and religious leaders should be involved in immunisation  
 104 policy issues. The Polio Eradication Initiative made a significant  
 105 step in involving religious leaders in immunisation programme  
 106 implementation, but the religious leaders were rarely engaged in  
 107 immunisation policy development.

108 The involvement of Islamic preachers/religious leaders  
 109 and community leaders would encourage immunisation at the  
 110 community level. Our experience from the field is in tandem  
 111 with this finding- their involvements have been very useful in  
 112 advocacy and creating demand for immunisation, especially  
 113 in northern Nigeria. The traditional institution is highly  
 114 hierarchical in northern Nigeria and is mostly well-respected.  
 115 The community leaders and the religious leaders hold  
 116 allegiance to the traditional leaders, especially in northern  
 117 Nigeria (23). These underscored the relevance of the views of  
 118 these immunisation stakeholders interviewed in this study. In  
 119 recent years, the polio communication programme was able  
 120 to make headways in northern Nigeria with the involvement

of the traditional institution, leading to a massive engagement of religious clerics and Islamic teachers (6,23,25,32-35). These targeted actions have contributed to the successes recorded in the polio eradication initiative in Nigeria. As regards routine immunisation, Obi-Jeff *et al* (36). found community leaders (traditional and religious leaders) as a strong and enduring influence on social norms surrounding immunisation as their strong support promoted the acceptability of RI and related intervention. Having recognised the relevance and values of the community leaders and the TMPs, in the last few years, the Polio surveillance system has also incorporated the TMPs and community leaders (as informants) into the alternative or informal reporting system, and this has contributed to the improved detection, reporting and investigation of acute flaccid paralysis in Nigeria (37,38).

Our study is not without its limitations. The study is prone to respondent bias, as there were different stakeholders with varying levels of understanding of routine immunisation service delivery. However, part of the objectives of the study was to assess the knowledge of the different critical stakeholders within the community, including the health workers. In this study, we investigated three major stakeholders, i.e., health workers, TMP, parents (fathers and mothers), and this may not be an exhaustive list of stakeholders or influencers within the community. However, these three stakeholders have some extended influences and connections with other potential stakeholders, such as the polio survivor group, youth groups and community or faith-based organisation, such as Federation of Muslim Women Association of Nigeria. Therefore, their views may likely reflect that of other stakeholders that were not part of the study.

## Conclusions

We concluded that there is a need to scale-up the involvement of traditional and religious leaders in advocacy, policy development and implementation of immunization, especially at the PHC level, to improve acceptance, create demand and engender ownership. The involvement of traditional/religious leaders and TMPs in health policy development and implementation, especially in rural communities, will engender trust and create a better understanding of modern health approaches. It will provide an avenue to explore the potential within alternative (traditional) medical practice. We also concluded that AEFI appears to be a detrimental factor to immunisation access and utilisation. Therefore, periodic training of health workers should be prioritised to minimise programmatic errors. Adequate health education before and after immunisation sessions should be provided to alleviate mothers' fear in the event of an AEFI, therefore, mitigating drop-out. Based on our study findings, we recommended multiple communication strategies within the cultural limits of the communities to address remnant of heretic beliefs about vaccine safety, build trust in orthodox medicine and generate demand for immunisation, while government concurrently integrates health interventions at the PHC level to attract clients and address a variety of health needs of the local population.

## Conflict of interest

The authors declare no potential conflict of interest.

## Ethical approval and consent to participate

The authors obtained ethical clearance from the University of Maiduguri Teaching Hospital Ethical and Research Committee prior to commencement of field study. Verbal consents were obtained from the all the study participants before questionnaires were administered and the rights of the participants were clearly communicated to them. The ethical clearance document with approval number- ADM/TH/497/VOL1 was also attached as supplementary document.

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