Deep Dive Identification and Evaluation of Critical Factors Responsible for Poor Routine Immunization Uptake in Oyo State

Bassey Enya Bassey, Fiona Braka, Sisay Gashu Tegene, Kofi Boateng, Rosemary Onyibe, Olufunmilola Olawumi Kolude, Marion Mosunmola Osanoto, Leonard Idemudia Ugheighele, Ayomide Oluwaseyi Aibinuomo, Joy Ogechi Max-ikechebelu, Olayiwola Suliat Olanike, Angela Ugochukwu Okocha-ejeko

World Health Organization, Country Representative Office, Abuja, Nigeria

Email address:
Bassey69@yahoo.com (B. E. Bassey)

Abstract: The uptake of Routine immunization services continues to decline in Oyo State despite best efforts to improve Routine Immunization (RI) services. This study aims to investigate the root cause of poor routine immunization uptake in the State using Ibadan north and Kajola Local Government Areas (LGAs) as sentinel study sites in Oyo state, Nigeria. A cross-sectional Community survey was conducted between 26th-30th November 2018 using structured questionnaires uploaded onto Open Data Kit-collect (ODK) mobile software in the 2 LGAs namely Kajola and Ibadan North LGAs, Oyo state. Majority of the respondents Local Immunization Officers, RI Focal Persons, Other Health Workers and Community Members were fully aware of RI services, its benefits/importance and were mostly satisfied with the services they received at their community health facility. However, 95% of the respondents stated that they were not part of the RI planning processes in their communities neither were they actively involved in selecting the date, time or venue for RI in their communities. Also 76% of the respondents stated that Health workers neither rescheduled RI sessions for missed children neither did they visit /track the missed children. Functional Village Development Committees (VDCs) and updated Reaching Every Ward (REW) micro-plan was not present in 67% and 62% of the visited facilities respectively. World Health Organization (WHO) was mostly responsible for funding of immunization activities. Funding and poor engagement with members of the communities have been discovered to be a major contributing factor to poor immunization uptake in these LGAs. We advise that this gap be bridged for the purposes of improved RI uptake in the state.

Keywords: Routine Immunization, Unimmunized Children, Vaccination Coverage, Immunization Uptake

1. Introduction

Childhood immunization is regarded as an important indicator of a healthy childhood because it assures the protection from major childhood diseases. [1]. Besides being cost effective, the routine immunization (RI) of children is by far the most successful public health interventions that have considerably reduced global childhood morbidity and mortality rates. [2, 3].

In 1974, World Health Organization (WHO) launched the Expanded Program on Immunization (EPI) aimed at controlling six-childhood diseases namely: tuberculosis, diphtheria, pertussis (whooping cough), tetanus, poliomyelitis and measles [4]. Currently, Nigeria's EPI aims to immunize all children between the ages of 0 and 23 months against eight vaccine-preventable diseases, which include, in addition to the above-mentioned diseases, hepatitis B (introduced in 2002) and Hemophilus influenza type b (introduced in 2008) [5, 6]. Guidelines states that one child should receive four doses of Oral Polio Vaccine (OPV),

three doses of Hepatitis B, Diphtheria, pertussis, tetanus and Haemophilus influenza type b vaccines, and one dose each of measles, Baccile Calmette-Guerin (BCG) and yellow fever vaccines by the age of one (year) [7].

However, there continues to be a global decline in the uptake of RI despite efforts to improve immunization services. Annually, an estimated 18.7 million children under 1 year do not receive basic vaccination worldwide [8]. Consequently, millions of children die from vaccine-preventable diseases [9, 10].

In October 2018, the RI coverage for Oyo State, Nigeria was 82% for BCG and 85% for the third dose of the pentavalent vaccine (Penta 3), which serves the measure for RI coverage in the country. This was lower than the expected national coverage of 90% set by the Global Vaccine Action Plan (GVAP) launched by WHO to increase global vaccination coverage by 2020 [11].

The number of unimmunized children reported for the same month of October was 38,679. Reports following data analyses identified 14 Local Government Areas (LGAs) with highest number of unimmunized children. These LGAs contributed immensely to the suboptimal immunization coverage of less than 90% recorded in the state. Upon further analyses, two LGAs (Ibadan north and Kajola) were identified as LGAs with the highest number of unimmunized children, indicating a very poor level of immunization uptake. This study therefore aims to investigate the root cause of poor routine immunization coverage in these LGAs and identify possible solutions that should help improve the RI coverage of the state in general.

2. Methods

Study Location

This study was carried out in Oyo State. The state is one of the six states in the Southwest geopolitical zone of Nigeria. The State has a total projected population of 8,351,831 people in 2018 from the 2006 census with annual target populations of 1,670,366 (children under 5 years) and 334,073 (Under 1 year). Oyo state comprises 33 Local Government Areas (LGAs) with Ibadan north and Kajola being the LGAs of focus in this study.

Ibadan north and Kajola LGAs has 49 and 20 Health facilities respectively but only 32 and 17 of the health facilities respectively conduct RI activities.

Study population

Study population included 181 (130 from Ibadan south, 51 from Kajola) caregivers and 13 Health facilities/health workers (9 from Ibadan south, 4 from Kajola) in the LGAs. Total study population, n=194.

Study design

A cross-sectional survey was conducted between 26th-30th November 2018 using structured questionnaires uploaded onto Open Data Kit-collect (ODK) mobile software in the 2 LGAs in Oyo state.

Three questionnaires were developed for the purposes of this study. The questionnaires were administered to the health workers at the health facility level (one heath worker per facility) and the respondents at the community/household level.

Inclusion and exclusion criteria

Ibadan north and Kajola were selected based on their high rates of unimmunized children. On the average, 23% of the health facilities conducting Routine Immunization were randomly selected within the above listed LGAs. At the selected health facilities, 30% of the catchment settlements were randomly selected. Five (5) households were selected from each settlement using simple random or systematic sampling methods.

Ethical consideration

A written permission was obtained from the Ministry of Health, Oyo State, and verbal/oral approval of the study participants (parent/caregiver) were obtained prior to data collection.

Data Collection tools and techniques

The standardized questionnaires were used for face-to-face interviews in the communities and at the health facilities. Responses were collected in real-time using Online Data Kit (ODK) with the assistance of a research assistant.

Data analysis/Reliability and Validity of Data

Geospatial analyses were conducted to know the exact location of the health facilities and location of respondents. Cross tabulation was used to check interference of socio demographic variables across the dependent variables.

3. Results

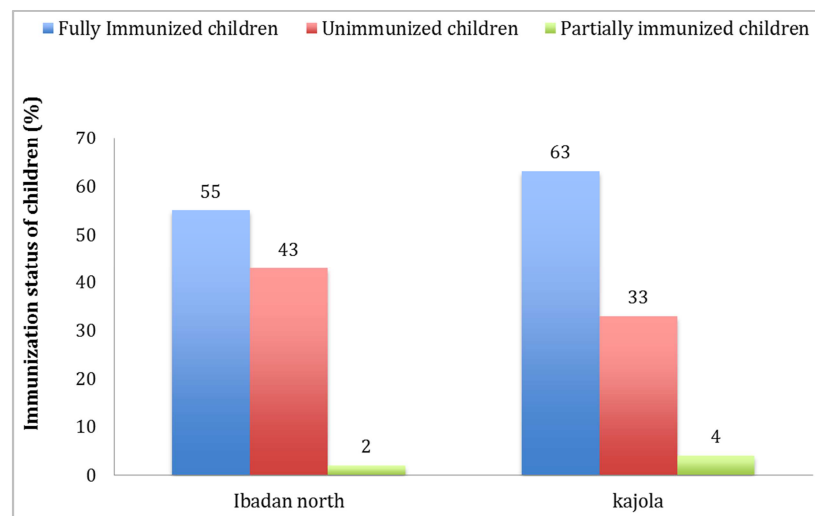*Table 1.* Household Awareness on Routine Immunization services in the Community settings.

Variables	Yes (%)	No (%)
Are you aware of RI Services in your community (n=181)	177 (98)	4 (2)
Are you aware of the location of health facility that offers RI (n=181)	175 (97)	6 (3)
Do you know the benefits of Routine Immunization (n=181)	172 (95)	9 (5)
Are you satisfied with the Immunization services in the Community (n=181)	172 (95)	9 (5)
Do you know any Anti Immunization/ campaigner in your community (181)	18 (10)	163 (90)
Do you have a vaccination card where your child name is written (n=181)	158 (87)	23 (13)
Has there been a planning meeting on Routine Immunization in your community you are aware of (n=181)	59 (33)	122 (67)
Has a health worker ever worked in your community for RI (n=181)	141 (78)	40 (22)
If yes, Did the community select Date, Venue and time for RI? (n=181)	62 (44)	119 (66)
Do health workers gives notification before coming for RI in your community (n=181)	112 (62)	69 (38)
Do health workers reschedule RI sessions if missed for any reason (n=181)	43 (24)	138 (76)
Do health worker visit if child misses date of appointment (n=181)	43 (24)	128 (76)

***Table 2.** Knowledge of Health workers on Routine Immunization Services.*

Variables	Yes (%)	No (%)
Does the Health worker reside in this community (n=13)	3 (23)	10 (77)
Has Heath worker been trained on Routine Immunization in the past 1 year (n=13)	10 (77)	3 (23)
Does the Health Worker knows the 6 key messages on immunization passed on to caregivers on immunization days (n=13)	12 (92)	1 (8)
Does the community/representatives of the community take part in REW Micro-planning for immunization purposes (n=13)	7 (54)	6 (46)
Does the health facility receive funds for immunization (n=13)	9 (69)	4 (31)
Source of Funding (Multiple response) (yes=WHO, no= LGA, n=9)	8 (89)	1 (11)
Does the health facility have vaccine stock out of any antigen (n=13)	0 (0)	13 (100)
Is there a functional Village Development Committee (n=13)	9 (69)	4 (31)
If yes, Evidence of Minute of Meeting (n=9)	3 (33)	6 (67)
Is there a Defaulter tracking mechanism in the health facility (n=13)	8 (62)	5 (39)
Does the health facility have a functional Megaphone to announce immunization activities (n=13)	6 (42)	7 (54)
Does the health facility have an updated REW micro-plan (n=13)	5 (39)	8 (62)
Does the health facility have Session Plan on display (n=13)	5 (39)	8 (62)
Does the health facility have a Monitoring chart (n=13)	11 (85)	2 (15)
If yes, Do they understand the chart and use the information for action (n=11)	7 (54)	4 (31)
Is the data in the health facility properly archived in the health facility (n=13)	11 (85)	2 (15)
If yes, are the records in the last six months seen in the health facility (n=11)	9 (69)	2 (15)
Does the Health Facility analyze data by settlement and used for action (n=13)	4 (31)	9 (69)

***Table 3.** Effects of socio-demographic factors on Routine Immunization uptake in the LGAs.*

Socio-economic Factors	Not immunized (%)	Fully Immunized (%)	Partially immunized (%)	Total	P value
Type of Settlement					
Urban	37 (42.5)	48 (55.2)	2 (2.3)	87 (100)	
Rural	13 (28.3)	31 (67.4)	2 (4.3)	46 (100)	0.345
Semi-Urban	19 (44.2)	23 (53.5)	1 (2.3)	43 (100)	
Isolated/Village	4 (80.0)	1 (20.0)	0 (0.0)	5 (100.0)	
Highest Level of Education					
No formal education	11 (57.9)	7 (36.8)	1 (5.3)	19 (100.0)	
Primary Education	19 (51.4)	16 (43.2)	2 (5.4)	37 (100.0)	0.280
Secondary Education	38 (39.2)	57 (58.8)	2 (2.1)	97 (100.0)	
Tertiary Education	5 (17.9)	23 (82.1)	0 (0.0)	28 (100.0)	
Occupation of Respondent					
None	4 (80.0)	1 (20.0)	0 (0.0)	5 (100.0)	
Trader	37 (42.0)	49 (55.7)	2 (2.3)	88 (100.0)	
Artisan	20 (40.0)	28 (55.7)	2 (2.3)	50 (100.0)	
Farming	6 (60.0)	3 (30.0)	1 (10.0)	10 (100.0)	0.222
Teaching	3 (33.3)	6 (66.7)	0 (0.0)	9 (100.0)	
Housewife	2 (33.3)	4 (66.7)	0 (100.0)	6 (100.0)	
Others	1 (7.7)	12 (92.3)	0 (0.0)	13 (100.0)	
Household Size					
1-4	24 (33.3)	47 (65.3)	1 (1.4)	72 (100.0)	0.154
4 and above	49 (45.0)	56 (51.4)	4 (3.7)	109 (100.0)	

***Figure 1.** Routine Immunization status of children by LGA.*

The Routine Immunization status of the children of surveyed respondents was shown in figure 1. There were 130 and 51 respondents from Ibadan north and Kajola LGA respectively with 89% of them being mothers. About 55% (Ibadan north) and 63% (Kajola) of the children were fully immunized while 43% and 33% of the children Ibadan north and Kajola LGAs respectively were unimmunized.

The level of awareness on Routine Immunization at the community level was accessed next as shown in table 1. About 97% of the respondents knew about RI activities in their communities. They were also mostly aware of the location of the health facilities for RI purposes (97%) and were mostly satisfied with the services rendered at the facilities (95%). Also, 95% of the respondents agreed that they were well informed on the benefits of RI.

However, 67% of the respondents were not involved in the RI planning process and were mostly not involved in picking out dates, location for RI in their communities. Although 62% of the respondents agreed that the health workers give prior notification of RI, they mostly don't reschedule missed sessions (76%) and mostly don't visit or tract children who missed sessions (76%).

Knowledge of health worker on RI was assessed as indicated in Table 2. At the health facility level, 77% of the health workers surveyed agreed to have had refresher training on RI done in the past year.

About 54% of the health workers had the community members involved in the Reaching Every Ward (REW) micro-planning process for immunization activities while 46% did not. This REW micro-plan was also not updated by the health workers in 62% of the facilities. A village development committee was present in 69% of the communities but only 33% had the 'minutes of meeting' as evidence of functionality.

About 69% of the respondents agreed that their facilities received funding for RI activities with WHO being the major contributor (89%). Defaulters tracking mechanisms were however in place in 62% of the facilities and there had never been a stock out of vaccines in the facilities.

The effects of certain socio-economic factors on the uptake of immunization in the communities were accessed in table 3. Respondents in isolated villages had the highest rate of unimmunized (83%) and the lowest rate of fully immunized children (20%). The rural dwellers had the highest rate (67%) of fully immunized and the lowest rate of unimmunized children.

Respondents with no formal education recorded the highest rate of unimmunized children and the least rate of fully immunized children while respondents with tertiary education recorded the least level of unimmunised children and the highest rate of fully immunized children.

Respondents with no occupation had the highest rate of unimmunized children and the least rate of fully immunized children while respondents with other forms of education not captured in this survey recorded the highest rate of fully immunized children and the least rate of unimmunized children.

Respondents in households with more than 4 people had the highest rate of unimmunized children while households with 1-4 people had the highest number of fully immunized children.

4. Discussion

Reasons for poor immunization uptake and coverage have mostly been attributed to certain maternal aspects (e.g. knowledge on RI with particular emphasis of timing of the next due vaccination date, distance travelled to health facility and even attitude of health workers) by several studies [12, 13]. However, not much attention has been paid to the factors at the health facilities/health services/community interface and how those factors influence RI behaviour either by facilitating or hampering it. This study deep dives into the root cause of poor RI uptake in 2 LGAs (Ibadan north and Kajola) with the highest number of unimmunized children in Oyo state, Nigeria.

About 89% of the respondents in this study were mothers. Majority of these mothers were also fully aware of RI services, its benefits/importance and were even mostly satisfied with the services they received at their community health facility. This agrees with similar studies carried out in Ibadan and Edo state where only 3% of the mothers knew nothing of RI [14, 15].

However, 95% of the respondents according to our results stated that they were not carried along or part of the RI planning processes in their communities neither were they actively involved in selecting the date, time or venue for RI in their communities, even though health workers majorly gave prior notice before coming for RI. Also 76% of the respondents stated that Health workers neither rescheduled RI sessions for missed children neither did they visit /track the missed children.

Though some of these problems could be attributed to short staffing or the fact that majority of the health workers did not reside in the communities, which they work especially as it concerns defaulters visits and rescheduling of RI sessions as per our results, we believe that the major problem and solution largely depends on the functionality of the Village Development Committees (VDC) and the effectiveness of the Reaching Every Ward (REW) micro-planning for RI activities [16].

The idea behind the establishment of VDCs was to create a forum where community members and the health workers meet regularly to discuss all things RI for the purposes of improving RI services. During a focus group discussion with the respondents after the survey, the respondents talked about, seized vaccination cards by a health worker because fees charged for RI could not be paid, some also complained that the health workers would not open new BCG vials for vaccination because there were few children and didn't want to waste the vaccine, some others talked about the fear of health workers aggression towards them whenever they forget their next due date. These are issues that could have been discussed and resolved with clear recommendations if there were functional VDCs. RI services are free and WHO would rather have one child immunized as against sending that child away in anticipation of a more reasonable number, as there are no guarantees of the child's return. Issues likes

these would have been captured in the minutes of the meetings and would have attracted prompt action from WHO staff/DSNOs during their weekly supervisory visits.

From all these, it is obvious that a breach in communication between the community and health facilities has contributed its fair share to the problem of missed immunization sessions.

On the flip side, health workers in the facilities suggested that the non-functionality of their VDCs could be attributed to poor participation of community members' because funds were not available to host or support such meetings. The burden of funding of RI services was majorly borne by WHO both in this study and several other studies carried out in Edo, Kebbi and indeed across Nigeria with little input coming from the state or LGA, despite RI being the major responsibility of the Government [17]. We believe that the provision of more funds for immunizations activities by the Government would create room for sustainable subventions to be allocated for these meetings. This would encourage participation, bridge communication/planning gaps and ultimately improve RI uptake in the communities.

WHO guidelines on RI planning activities that basic information about communities must first be collected before an effective health intervention plan can be made [18]. The REW micro-planning process embodies this recommendation as it includes information of the communities down to the ward unit (the smallest administrative unit in the country) and as such must be done in collaboration with members of communities and constantly updated to accommodate the changes in the communities. However, our results indicate a 54%: 46% ratio in the participation of the communities while 62% of the facilities didn't have their REW micro-plans updated. It is difficult to effectively plan and cater for a community with incorrect information. We believe this also majorly explains why 76% of the respondents whose children missed immunization sessions weren't visited or tracked by the health workers even when 62% of the facilities claim to have defaulter tracking mechanisms in place and cite non-availability of funds as reasons why it might not be fully effective. Therefore, we recommend that health facilities constantly update their REW micro-plan and effectively rapport and collaborate with their hosting communities towards achieving best results from RI.

Effects of certain socio-demographic factors such type of settlement (rural or urban), occupation, level of formal education and household size on RI uptake were also analysed. Our results indicated respondents in urban areas had the least number unimmunized/partially immunized children in comparison to their rural/isolated village counterpart. Though with a p-value >0.05, it might not be of statistical significance. A study done in Ogun state, Nigeria correlates this by stating in its findings that location or type settlement was not a predictor of immunisation status [19]. Also, respondents with secondary school or tertiary education had the least number of unimmunized children in comparison to their counterparts with no education. This agrees with another study in Ibadan where levels of education affected immunization status but with a p-value >0.05 as in both studies, it might not be considered as a

major predictor of immunization status [20]. Even though these demographic factors were strongly associated with immunization status a per our results, it is our believe that their effect might be due to confounding or intervening factors and there is need to further research into this.

5. Conclusion

Funding RI and poor systematic engagement with members of the communities have been discovered to be a major contributing factor to poor immunization uptake in these LGAs. We advise that the funding gap and weak community engagement should be bridged for the purposes of improved RI uptake in the state.

Authors' Contributions

OOK, MMO, BEB, LIO, and AOA, JMI, OSO, contributed to the study design, interpretation of results, and manuscript conceptualization and preparation. FB SGT, BF, BEB, data management and interpretation, and manuscript conceptualization and preparation. BEB and AO contributed to the study design and manuscript preparation. All authors read and approved the final manuscript.

Ethics Approval and Consent to Participate

The consultation of an ethics committee and consent to participate is not required for analyses based solely on secondary data.

Competing Interests

The authors declare that they have no competing interests.

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