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Rural–urban comparison of routine immunization utilization and its determinants in communities in Anambra States, Nigeria

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Abstract

Objectives: The study determined the levels of geographic differences in the utilization of routine immunization between households in an urban and a rural community. It also identified and compared the determinants of utilization of routine immunization in the two geographic areas.

Method: The study was undertaken in two randomly selected communities (one rural and one urban) in Anambra State, Nigeria. Interviewer-administered questionnaires were used to collect information on utilization of immunization services from households. Data were analyzed using descriptive and multiple logistic regression analyses.

Result: Households in the urban community had a higher level of utilization of routine immunization (95.5%) than those in the rural community (75.3%) and the difference was statistically significant ($p < 0.05$). It was also found that more rural dwellers (83.3%) received immunization services from public health facilities compared to the urban dwellers (42%; $p < 0.05$). Health facilities were nearer to households in the urban community than the rural community ($p < 0.05$). Mean cost of service per visit was higher in the urban community ($p < 0.05$), but the difference in the mean cost of transportation per visit was not significant ($p = 0.125$). Regression analysis shows that place of residence was highly significant for utilization of routine immunization services ($p < 0.05$).

Conclusion: Urban–rural differences exist in utilization of routine immunization services. Health facilities are more proximal to consumers in the urban community than the rural community, with higher travel costs among rural dwellers. Ensuring that there is a functional primary healthcare center in every ward and provision of routine immunization services in market places on local market days can help to increase utilization and reduce rural–urban differences in utilization of immunization services.

Keywords

Routine immunization, utilization, determinants, rural, urban, Nigeria

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Introduction

Immunization is one of the most powerful and most cost-effective tools for improving public health.[1] The benefits of immunization are enormous both to the family and society. It prevents disability and death in children. Statistics show that vaccines avert 2.5 million child deaths every year.[2] Consequently, it gives children the opportunity to grow up healthy and improve their life prospects.[1] Globally, immunization services have been the center of renewed interest with improved funding to improve services. For instance, the World Health Organization (WHO) on the platform of Global Immunization Vision &

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Strategy (GIVS) increased funding of immunization services for advocacy, human capacity building, technical assistance, and sustaining immunization services in Nigeria to promote access to routine immunization (RI).[1,3]

In Nigeria, the Expanded Program on Immunization (EPI) was introduced in 1979 in order to combat six major childhood diseases, namely, tuberculosis, poliomyelitis, diphtheria, pertussis, tetanus, and measles. Initially, under the EPI, there was consistent increase in the coverage of RI until the late 1980s when the coverage reached 81.5%, but the coverage dropped to less than 30% in the 1990s[3] due to low political will, lack of social support, inadequate funding, poor community involvement, and participation.[4] At that time, not all health facilities provided immunization services and those that did provide were not consistent due to vaccine stock out and staff absenteeism.[4,5]

In pursuance of better coverage, Nigeria revitalized the EPI in 1995 and renamed it the National Program on Immunization (NPI), which was housed as an agency under the Federal Ministry of Health (FMoH). By 1999, there was increase in immunization coverage although below 50%. In 2004, Nigeria included hepatitis B and yellow fever vaccines in its schedule to increase the number of vaccines under RI, making it eight in number. The country also adopted the WHO-African Regional Office's (AFRO) Reach Every District (RED) strategy and named it Reach Every Ward (REW), since the ward is the lowest administrative and political body in Nigeria.[6,7] The idea behind REW was to ensure that all Nigerian children have equitable access to RI services, irrespective of where they reside.

However, despite all these efforts by Nigerian government and international agencies to ensure optimal utilization of RI, millions of children are still at risk of preventable diseases.[6] Worldwide, approximately 3 million children die every year as a result of diseases that could be prevented by immunization, which is a reflection of incomplete coverage with existing vaccines.[8] Nigeria failed to meet the fourth goal of the Millennium Development Goal (MDG), which expected under five mortality rate to reduce to 64 deaths per 1000 births by 2015.[9]

In line with the National Policy on Immunization in Nigeria, RI services are expected to be provided to all eligible children free of charge.[7] Three service delivery strategies are designed so as to ensure that all eligible children have access to immunization, irrespective of where they reside. The strategies are fixed posts, outreach posts, and mobile services.[10] Fixed posts are both public and private health facilities that provide services for those living within 5 km from the health facility. Outreach posts, which are also referred to as temporary fixed post are for those living above 5 km from the health facility. Finally, mobile services are for populations that neither have access to a health facility nor are large enough to merit an outreach post. These include riverline fishermen and nomadic cattle headers. In this case, the teams move from place to place where they are likely to meet eligible children.[10]

In Nigeria, multilevel multivariate regression analysis of Nigerian demographic and health survey (NDHS) identified different factors influencing immunization coverage. For instance, factors such as financial autonomy of women, women level of education, place of residence, high socioeconomic status (SES), and mothers being employed were identified to be associated with high immunization coverage,[11–14] while far distance to the health facility negatively associated with immunization coverage.[15] However, other studies that analyzed the NDHS revealed that RI utilization was clustered within families and communities in Nigeria.[16,17] Studies in southwestern Nigeria on uptake of immunization revealed that clashes of immunization days with economic activities of mothers, especially market days, delays in vaccine supply, mothers being too busy, and attitude of the personnel were responsible for low patronage for RI services.[18,19] A study identified good knowledge of immunization as a factor that promotes immunization utilization.[20] A related study in Northern Nigeria found that the occupation of the mother, education attainment, and religion were positively associated with immunization uptake.[21] Similar studies from southeastern Nigeria found that high SES positively influenced utilization of RI.[22,23] Overall, it appears that the different factors affecting utilization of RI were context specific.

There are contradictory reports from studies outside Nigeria on whether utilization of RI services is more among those residing in urban areas than those residing in the rural areas. While some authors found that utilization of RI was better in urban areas,[24–26] another author reported no significant difference in utilization of RI between urban and rural residents.[27] A study that was undertaken in Australia revealed that factors associated with low immunization uptake differed in rural and urban areas.[28]

This study therefore seeks to provide new information on the relative utilization of RI services between a rural community and an urban community in a southeastern state of Nigeria. This is important to establish the level of utilization of RI, differences that exist in the different geographic locations, and their contextual factors. The findings will be used to inform policymakers on specific issues that will address poor utilization of RI to enhancing access and utilization of RI services in Nigeria.

Methods

Study area

The study was undertaken in Anambra State. The state is located in southeast Nigeria and is bounded by Delta State to the west, Imo State to the south, Enugu State to the east, and Kogi State to the north. Anambra State has a population of 4,612,666 (projected from 2006 census). Its capital city is Awka, and it comprises 21 local government areas (LGAs). The inhabitants of the area are mainly of Igbo origin and predominantly Christian. The state comprises numerous densely populated villages, a number of small towns, and a

few major towns. The data were collected for 2 weeks in September 2011. The state has an immunization office that is under the State Ministry of Health. In Anambra State, vaccines and materials for immunization are stored at the State immunization office at the state capital, Awka. All the 21 LGAs that made up the state get their vaccines and materials for immunization from the state immunization office for distribution to health facilities that offer immunization service in their LGAs. At the end of every month, each health facility summarizes the vaccines used and the number of children that were immunized on the appropriate booklets, and will then submit the data to the LGA immunization officer as a part of the LGA immunization summary. The LGA immunization officer sends the LGA summary to the state immunization office for proper monitoring and evaluation.

Study design

The study was a comparative cross-sectional study that was undertaken in two communities in Anambra State: one urban community (Awada) and one rural community (Ezi-owelle). A household survey was undertaken to collect data from primary caregivers or their representatives (in their absence) with an interviewer-administered questionnaire.

A multistage sampling method was used to select the respondents. Simple random sampling method was first used to select one LGA from a sampling frame of a list of the 21 LGAs in the state. Then, the communities in the selected LGAs were grouped into urban and rural communities and simple random was then used to select one rural community and one urban community from the sampling frame of rural and urban communities. The minimum sample size for the study was calculated using Anambra State Routine Immunization percentage coverage (72%) as the prevalence at 95% confidence interval, giving a sample size of 310. This number was increased to 350 to cover for a 10% nonresponse. The final sample size for each community was determined by proportionate random sampling, which was determined using the estimated population of the selected communities. In the rural community the sample size was 150 households, while in the urban community it was 200 households. Using the Primary Health Care (PHC) house numbering system as the sampling frame, 150 and 200 households that had children below 2 years of age were randomly selected in the rural and urban communities, respectively. In each household, one female household primary caregiver (mother), or the representative in the absence of the mother was interviewed using a pretested questionnaire.

Instrument for data collection

A structured interviewer-administered questionnaire was used to collect data from the respondents. The questionnaire had three sections: the first section was used to collect sociodemographic data, the second section was used to collect data on previous immunization services received, and the third section was used to collect data on household asset holdings. The instrument was validated by two senior lecturers in the Department of Health Administration and Management, University of Nigeria Nsukka so as to ensure its content and face validity. The instrument was pretested and pilot tested in one community.

Data collection

Seven trained interviewers were employed for data collection, which lasted for 2 weeks. Four out of the seven interviewers collected data from the urban community while the remaining three interviewers collected data from the rural community. In each selected household (with child or children that are less than 2 years old), a pretested questionnaire was administered by a trained interviewer to the primary caregiver (mother) or a representative in her absence. In cases where two children were less than 2 years in a household, information was collected on the youngest child's use of RI services. The items on the questionnaire were uniformly translated to the local Igbo language by the enumerators.

Data were collected on area of residence, utilization of RI, mother's age, mother's occupation, household head's occupation, type of health facility visited for immunization, distance of health facility from home, means of transportation to health facility, waiting time, payment of services, cost of services, and transportation cost. The interviewer skipped any household that did not have a child or children less than 2 years old. Supervision was undertaken by the first named author during the survey by random field visits to ensure quality data collection.

Data analysis

Descriptive analysis was undertaken by cross-tabulating a binary variable representing the urban and rural communities as independent variables with sociodemographic data and respondents' previous immunization. The mean cost of transportation to health facility and cost of services per household were compared between rural and urban dwellers. Principal component analysis was used to develop an SES index, using information on household asset ownership and cost of food as was earlier done in similar studies.[23,29] The SES index was broken down into SES quartiles: Q1 = Poorest poor; Q2 = very poor; Q3 = poor; and Q4 = least poor. Multiple logistic regression analysis was used to assess the influence of some variables on utilizing RI services. The dependent variable was utilization of RI, while the independent variables were place of residence, mothers' occupation, waiting time, distance of health facility, payment of service, and type of health facility attended. The odds ratios of the relationships between the dependent and independent variables were computed. The exchange rate that was used was 120 Naira = US$1.

Table 1. Sociodemographic characteristics of households in the two communities.

Variables	Rural N = 150, n (%)	Urban N = 200, n (%)
Marital status:		
Married	138 (92)	197 (98)
Single	12 (8)	3 (2)
Age in years: mean (SD)	33.40 (11.878)	28.92 (5.429)
Mothers level of education:		
Primary	44 (31.7)	16 (8.3)
Secondary	83 (59.7)	106 (54.6)
Tertiary	12 (8.6)	72 (37.1)
Status of the respondent:		
Mother	92 (61.3)	193 (96.5)
Representative	58 (38.7)	7 (3.5)
Mother's occupation:		
Farmer	32 (21.3)	2 (1.0)
Unemployed	26 (17.3)	63 (31.5)
Petty trader	39 (26.0)	55 (27.5)
Civil servant	12 (8.0)	13 (6.5)
Private employee	11 (7.3)	24 (12.0)
Big business	9 (6.0)	22 (11.0)
Self-employed	13 (8.7)	18 (9.0)
Others	8 (5.3)	3 (1.5)
Household head occupation:		
Farmer	41 (27.5)	2 (1.0)
Unemployed	5 (3.4)	2 (1.0)
Petty trading	15 (10.1)	16 (8.0)
Civil servant	12 (8.1)	10 (5.0)
Private employee	11 (7.4)	6 (3.0)
Big business	17 (11.4)	139 (69.5)
Self-employed	34 (22.8)	23 (11.5)
Others	14 (9.4)	2 (1.0)
SES of respondents in quartile:		
1st quartile (poorest poor)	24 (12.4%)	61 (42.1%)
2nd quartile (very poor)	43 (22.3%)	41 (28%)
3rd quartile (poor)	64 (33.2%)	21 (14.5%)
4th quartile (least poor)	62 (32.1%)	22 (15.2%)

SD: standard deviation; SES: social economic status.

Ethical consideration

Ethical approval for the study was obtained from the Ethics Committee of the University of Nigeria, Enugu campus. Written informed consent was obtained from all the respondents. The consent letter was read and interpreted by the interviewers for respondents who could not read.

Result

Table 1 shows that 150 and 200 households from rural and urban communities, respectively, responded to the interview, which was a 100% response rate in the two communities. The results show that a majority of the respondents were married (96%) with an average age of 31 years. Fewer percentage of mothers from the rural community attained tertiary education, compared to the urban dwellers. In the rural community, 61% of respondents were primary caregivers, while in the urban community, 97% were primary caregivers. A majority of the household heads in the rural area were subsistence farmers (27.5%) while most of their urban counterparts were big businessmen (69.5%). A majority of the households in the rural community belonged to the low SES quartiles, while a majority of those in the urban community belonged to the high SES quartiles.

Table 2 shows that a greater percentage (95.5%) of households in the urban community utilized RI, compared to households in the rural community (75.3%). However, those that reside in the rural community utilized RI services more in public health facility compared to the urban dwellers that utilized the services more from private health facilities. However, the urban dwellers experienced longer (42.4%) waiting time at health facilities when compared to the rural dwellers (6%). There were significant statistical differences between the urban and rural dwellers on the level of utilization of RI services, type of health facility attended, and waiting time ($p < 0.05$).

Table 3 shows that households in the urban community had health facilities closer to their homes (55.5%) compared to households in the rural community (12.7%). In both communities, trekking and use of motorcycles were the commonest means of transport to health facilities.

Table 4 shows that a greater percentage of households in the urban community paid for immunization services compared to rural dwellers. The mean costs of RI services and transportation were higher in the urban community N265.89 (US$2.22) and N165.88 (US$1.38) compared to the rural community N78.44 (US$0.65) and N135.12 (US$1.13), respectively. However, while the difference in the mean cost of utilization of immunization services is significant, that of cost of transportation is insignificant. There was no significant difference in the mean cost of transportation to health facilities (t-test 1.541, $p > 0.05$).

Table 5 shows only the place of residence was a statistically significant predictor of utilization of RI services ($p < 0.05$) in the multiple logistic regression analysis. The logistic model was statistically significant ($p < 0.05$).

The logistic regression analysis indicated that households that reside in urban areas were 8.8 times more likely to utilize RI than those residing in the rural areas.

Discussion

The findings showed that there was disparity in utilization of RI services in the urban and rural communities. Households in the urban community utilized RI services more than those in the rural community. This finding is consistent with other findings from similar studies.[24–26,30,31] This could be because a greater percentage of the primary caregivers in the urban

Table 2. Utilization of routine immunization services by rural and urban communities.

Variables	Rural N = 150, n (%)	Urban N = 200, n (%)	χ^2(p value)
Utilized immunization	113 (75.3)	191 (95.5)	30.450 (<0.05)
Type of facility attended:			
Public	125 (83.3)	84 (42.0)	60.699 (<0.05)
Private	25 (16.7)	116 (58.0)	
Waiting time:			
<15 min	68 (45.3)	58 (29.3)	36.406 (<0.05)
15–39 min	60 (40.0)	42 (21.2)	
40–60 min	13 (8.7)	14 (7.1)	
>60 min	9 (6.0)	84 (42.4)	

Table 3. Distance of health facility from household and usual means of transportation to health facility by rural and urban areas.

Variables	Rural N = 150, n (%)	Urban N = 200, n (%)	χ^2 (p value)
Distance to health facility:			
<5 km	19 (12.7)	111 (55.5)	50.802 (<0.05)
5–9 km	86 (57.3)	54 (27.0)	
10–15 km	30 (20.0)	29 (14.5)	
>15 km	15 (10.0)	6 (3.0)	
Usual means of transportation:			
Trekked	81 (54.0)	96 (48.0)	2.678 (>0.05)
Bus	12 (8.0)	15 (7.5)	
Motorcycle	52 (34.7)	68 (34.0)	
Taxi	1 (0.7)	4 (2.0)	
Got a free ride	3 (2.0)	6 (3.0)	
Used private car	1 (0.7)	11 (5.5)	

community had tertiary education, which made them to have a better understanding of the importance of RI. This is in line with findings from similar studies where high maternal level of education was identified as a factor that influences utilization of immunization.[11,14,21,31–33] SES of mothers in the rural area could also be a factor for the increased utilization of RI services, because a greater percentage of mothers in the urban community belong to the high SES than their rural counterparts. Previous studies have shown that high SES was positively associated with utilization of RI.[13,21–23] Another reason for more utilization of RI in the urban community may be because a majority of mothers in the urban community were unemployed, which made them to have enough time to attend immunization services. On the other hand, the rural dwellers were mostly petty traders, possibly implying that they would have less or no time for RI services. This finding reinforced findings from similar studies in Nigeria, where clashes of immunization days with economic activities of mothers, especially market days and mothers being too busy, constrained utilization of RI services and general immunization uptake.[18,19,34]

This study also revealed that a majority of the households in the urban community had a health facility closer to their homes than their rural counterparts. This finding must have contributed to reasons why urban dwellers had better access to RI. Long distance to health facility had been identified as a major contributor to low level of immunization coverage.[15,35,36] In essence, long distances to a health facility from homes can prevent those that are willing to patronize RI services from receiving the service. This is because the households may not afford the resource needed to access RI service.

The finding that households in the urban community patronized private health facilities more than public health facilities is similar to the finding of a survey conducted in a private clinic that revealed high utilization of RI in a private clinic.[37] Also, a related study in southeast Nigeria that investigated the cost and payment strategies for primary health services revealed that people prefer private health facilities to public health facilities due to the poor attitude of health workers in public health facility.[38] The implication is that access to healthcare services in the private health facility may be limited to high SES households that can afford the services, thereby crowding out the poor households.

Unexpectedly, a longer waiting time was reported by households in the urban community where use of RI services was higher. This is an indication that a long waiting time may not be a major factor influencing household preference for health facility to receive RI services. This is contrary to a

Table 4. Cost of receiving routine immunization by rural and urban areas.

Variables	Rural N = 150	Urban N = 200	Test of significance (p value)
Payment of immunization:			χ^2
Paid n (%)	64 (42.7)	193 (96.5)	126.950 (<0.05)
Payment by type of health facility attended			
Public n (%)	50 (78.1)	79 (40.9)	
Private n (%)	14 (21.9)	114 (59.1)	
Mean cost of services:			t-test
Naira: mean (SD)	78.44 (60.794) 0.65	265.89 (140.404) 2.22	10.351 (<0.05)
US$ equivalent			
Mean cost of transportation:			
Naira: mean (SD)	135.12 (33.437) 1.13	165.88 (73.182) 1.38	t-test
US$ equivalent			1.541 (>0.05)

US$1 = ₦120.

Table 5. Logistic regression analysis of utilization of routine immunization.

Variables	SE	p	Odds ratio	95% confidence interval for odds ratio	
				Lower bound	Upper bound
0 intercept	1.474	0.006			
Years of formal education	0.054	0.333	1.054	0.948	1.172
Place of residence: rural	–	–	–	–	–
Urban	0.639	0.001	8.877	2.539	3.034
Mother's occupation: farming	0.990	0.820	1.253	0.180	8.716
Unemployed	0.952	0.633	.635	0.098	4.106
Petty trading	0.926	0.750	0.744	0.121	4.574
Government worker	1.051	0.853	0.823	0.105	6.452
Employed in private sector	0.993	0.347	2.545	0.364	17.806
Big business	1.042	0.699	1.497	0.194	11.530
Self-employed professional	1.067	0.698	0.661	0.082	5.349
Any other occupation	–	–	–	–	–
Waiting time: less than 15 mins	0.648	0.751	1.228	0.345	4.372
15–30 mins	0.646	0.682	1.302	0.368	4.616
30–60 mins	0.797	0.513	1.684	0.353	8.034
Above 60 mins	–	–	–	–	–
Distance of health facility: less than 5 km	0.746	0.693	1.342	0.311	5.796
5–10 km	0.678	0.970	1.026	0.272	3.872
10–15 km	0.743	0.961	1.037	0.242	4.453
Above 15 km	–	–	–	–	–
Payment of service: no	0.423	0.871	0.934	0.408	2.138
Yes	–	–	–	–	–
Type of health facility attended: public	0.442	0.898	1.058	0.445	2.514
Private	–	–	–	–	–

The reference category is "rural."

finding from a related study in Nigeria that found that a long waiting time negatively affects immunization coverage.[4]

Payment of RI services was found in both rural and urban communities despite the fact that immunization is meant to be free of charge. More worrisome is the fact that a greater percentage of the rural households that paid received RI at public health facilities, indicating that there are some forms of informal payment for RI at the facility level. Informal payments can deter the use of services because of the added extra cost to the people, especially the poor and rural dwellers.[39] A study has also found that informal payments are a threat to the utilization of health services even when services are free or subsidized to improve access to health services.[40]

There was a significant difference in the mean cost of immunization services in the urban and rural communities. Those residing in the urban community paid more than their rural counterparts. This is quite unfortunate because immunization services are subsidized in both public and private

hospitals as the government provides vaccines and devices for RI free of charge to both public and private health facilities. This is a pointer to the need for the government to develop a clear guideline and create scaled-up public awareness on the provision and payment for RI services.

The finding that there was no significant difference in the mean costs of transportation in the two communities may explain the negative effect of the distance to the health facility on utilization of RI services. This probably means that the total cost of RI is comparatively very high for an average rural dweller compared to an urban dweller, because of their lower levels of income or SES. This is consistent with other findings in Nigeria[41] and other countries,[42,43] where cost was identified as a barrier to utilization of RI.

The findings from the logistic regression analysis confirmed the result in the descriptive analysis, which showed that there was a significant difference in the utilization of RI in the rural and urban communities. More utilization of routine services among urban households in this study is consistent with others in the literature.[30,44,45]

It is important to mention some of the limitations of this study. In the course of data collection, interviewers in some cases had to visit households more than once as planned, which increased the resources needed for the study. In addition, we did not determine the number of females that were heads of households, as it is likely to affect the decision-making ability of the household. The findings of this study should be generalized with caution because of the context of the study.

In conclusion, this study shows that there was relatively less utilization of immunization services by rural dwellers compared to the urbanites, which may be due to long distance to health facilities, cost of RI services, cost of transportation, level of education of the primary caregivers, and mothers' and household heads' occupation. Utilization of RI services could be improved by the government ensuring that immunization services are provided very close to the people, possibly at market places on local market days. The government should provide clear guidelines for the provision of RI services in private health facilities, including stipulating a fixed service charge for private health facilities to check indiscriminate charges. It is also important for the government to improve in its oversight function to curb informal payment in public health facilities.

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Ethical approval

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Informed consent

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Supplemental material

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