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An Investigation into Factors Hindering Effective Uptake of Vaccine Among Children who are Below Five (5) in Akinyele Local Government Area Ibadan Oyo State, Nigeria

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Abstract: The objective of this study was to find out the variables preventing effective vaccine uptake among children under the age of five in the Akinyele Local Government Area of Ibadan, Ovo State, Nigeria. A semi-structured questionnaire was administered to 402 women. A cross sectional study design was used to assess the factors hindering effective uptake of vaccine among under 5 children in Akinyele Local government area Ibadan Oyo State. A descriptive analysis was used and data were presented in tables and frequency, inferential statistics was used to determine the level of significant between independents and dependents variables at p less than 0.05, also A logistic regression analysis was done to explore how each of the factors influences utilization of vaccine in under-five children. The study collected indicated that majority of the children (64.9%) had incomplete vaccine utilization status. 92.5% of children have received oral polio vaccine at one time or the other. 88.3% of these children had immunization car ds. The mean age of the children was 28.3±13.7 months. More than half 52.2% of the mothers have good knowledge of vaccination. To analyse the utilization of the specific vaccines; frequency and proportion was used and their utilization was found to be BCG (83.1), DPT (88.6%), HBV (88.6), Hib (88.6), OPV (92.5), Yellow fever (53.5) respectively. Chi-square was used to investigate association between selected variables and utilization of vaccine. To analyse the factors affecting the utilization of vaccines among selected variables both bivariate and multivariate statistics were employed for analysis. The multiple logistic regression was further used to investigate factors that were significant at 5% level of significance. Education of mothers, occupation of mother, Religion, Locus of decision making power, Wealth index, Antenatal care attendance, Distance to health centers, long waiting hours, vaccine availability. In the multivariate analysis children whose mother completed secondary education

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were fifteen times more likely than those whose mother had no formal education to utilize vaccine (OR=14.72, 95% CI=2.46-87.98).

Keywords: Assessment, Vaccine, Utilization, Under 5 children immunization, Mothers.

Background of the Study

Childhood immunization is regarded as an important indicator of a healthy childhood because it assures the protection from major childhood diseases. Besides being cost effective, Immunization of children (both routine and supplementary) is by far the most successful public health interventions that have considerably reduced global childhood morbidity and mortality rates (Bekele et al, 2014).

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 (WHO 2013). 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 Haemophilus influenza type b (introduced in 2008). 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 (Ophori et al 2014).

Evidence from studies show that factors that limit vaccine distribution and delivery could be largely attributed to logistics and weak health facilities. In the southern region for instance, a study found that immunization rejection rate is relatively high with 23.6 percent unimmunized children, where it is often assumed that acceptance is not a problem hence, routine immunization has remained low in hard-to-reach areas and children in the remote and riverine communities do not complete their doses due to a good number of issues such as distance, means of transportation and sometimes attitude of health workers. Thus, this situation creates a significant epidemiological risk in the region.(Onugbogu, 2014).

In October 2018, the Routine Immunization coverage for Oyo State, Nigeria was 82% for BCG and 85% for the third dose of the pentavalent vaccine (Penta3), 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 (Ijarotimi, 2018).

The number of unimmunized children in Nigeria reported for the same month of October was 1,679. 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, three LGAs (Akinyele, Atiba and Onaara) were identified as LGAs with the highest number of unimmunized children, indicating a poor level of immunization uptake (Ijarotimi et al, 2018). This study therefore, aims to investigate causes of poor immunization utilization in the state using Akinyele Local Government Area as study site in Oyo state, Nigeria.

The challenges against vaccination on combating the deadly diseases in the developing countries cannot be overstressed. The low immunization coverage documented in the literature among children both in urban and rural areas, indicates the need for strategies to address the situation (Odusanya, et al. 2008).

Nigeria celebrated no Polio case for 3 years in August 2020, However, there is a need to intensify effort towards all other vaccination for children below five years. Despite the fact that the current trend on global vaccination coverage increased whereby about 129 countries reached 90% coverage rates, under-

vaccination continues to persist in many parts of Sub-Saharan Africa. Estimates from world health organization show that that the global vaccination coverage of infants is 82%, where 2 million children missed vaccination in 2018. (WHO, 2018). Trends in global vaccination coverage have shown increase with most countries reaching 90% coverage. However, low vaccine utilization continue to persist in parts of Nigeria particularly in the hard to reach areas. (Babalola et al 2014).

Research Questions

- 1. What is the total vaccines coverage among under 5 children in Akinyele LGA?
- 2. What is the coverage of specific vaccines among under 5 children in Akinyele LGA?
- 3. What are the factors affecting vaccines utilization among under 5 children in Akinyele LGA?

Specific Objectives

The broad objective of this study is to assess the factors hindering effective uptake of vaccine among under 5 children in Akinyele Local government area Ibadan Oyo state, Nigeria .The specific objectives are:

- 1. To determine total vaccines utilization among under 5 years' children in Akinyele LGA
- 2. To determine specific vaccines utilization among under 5 years children in Akinyele LGA
- 3. To determine the factors associated with vaccine utilization among under 5 children in Akinyele LGA

RESEARCH STUDY HYPOTHESIS

H0: There is no significant relationship between the socio-demographic variables of the respondents and vaccine utilization status

Material and Methodology

The study was conducted in Akinyele LGA, which is one of the 11 LG A in the capital city of Ibadan. It has 12 health centres which routinely provide immunization to children under five in the area. Oyo State is one of the 36 states of Nigeria and is located in the South Western region of the country. The State was created in 1976 out of the old Western region. A descriptive cross-sectional study design was used to determine the assessment of factors hindering effective uptake of vaccines in Akinyele Local government area Ibadan Oyo state, Nigeria. The study population consist of 402 mothers with one or more child aged 0–59 months old, that were selected by simple random sampling method from the source population in the local government area. The sample size was calculated using single proportion formulae on the basis of the study of full immunization coverage conducted in Akinyele local government. A multi-stage sampling techniques was used, which entails a successive selection of four wards out of twelve wards by systematic random sampling. Data was collected using an interviewer administered questionnaire The data was collected through face-to-face interview with the mothers/caregivers based on the structured questionnaire and through a review of the vaccination cards. Completeness and consistency of the collected data was checked each day by the principal investigator.

The data collected were entered, cleaned, edited, and analyzed using IBM SPSS software. Demographic variables such as age, sex, religion etc. were summarized using descriptive statistics. Continuous variables were summarized by mean and standard deviation while categorical variables by frequency and proportions. Chi-square test was used for bivariate analyses to test the significance of the association between selected independents and dependents variables.

A logistic regression analysis was done to explore how each of the factors influences utilization of vaccine in under-five children.

The ethical approval for this study was obtained from the Oyo State Ministry of Health research ethics committee before embarking on the collection of data. Also, a written informed consent note was attached including the questionnaire and interview guides. However, due confidentiality was adhered to protect the identity of respondents and participants. In addition, benefits and objectives of the study was duly communicated to the respondents and information gather was stored in a password protected laptop.

RESULT ANALYSIS

Socio-demographics characteristics of parent

The table below shows the socio-demographic characteristics of the parent. The mean age of mother was 32.05 ± 4.084 .Majorityof the parent (64.9%) lives in the rural part of Akinyele local government. 84.9% of the mothers were Yoruba and about 67% of them completed secondary school or less, also the majority (63.4%) of the fathers completed secondary school or less. 44.4% and 36.5% respectivelyof mothers and fathers were entrepreneur. More than three-quarter (79.9%) of mothers earned below 40000 naira as a monthly income and more than half (57%) of fathers earned below 40,000 naira as a monthly income. Majority of the mothers were Christian less than half (47.2%) of the parent own a house and more than half of them own a car.

Variable	Frequency	Percentage %
Type of location		
Rural	250	64.9
Semi-urban	128	33.2
Urban	7	1.8
Mothers age		
<35 years	277	71.8
≥35 years	109	28.2
Number of children		
≤3	271	72.3
>3	104	27.7
Mothers tribe		
Yoruba	326	84.9
Igbo	34	8.9
Hausa	18	4.7
Others	6	1.6
Mothers education level		
No formal education	91	23.6
Secondary or less	255	66.1
Tertiary education	40	10.4
Fathers education		
No formal education	\24	6.3
Secondary or less	243	63.4
Tertiary	116	30.3
Mothers occupation		
Private	129	35.5
Entrepreneur	161	44.4
Civil servant	47	12.9

Table 4.0 Socio-demographics characteristics of parent (N=402)

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Others	26	7.2
Others	20	1.2
Fathers occupation		
Private	96	25.4
Entrepreneur	138	36.5
Civil servant	90	23.8
Others	54	14.3
Mothers income		
Less than 40000	290	79.9
40,000 above	73	20.1
Fathers income		
Less than 40000	199	57
40000 and above	150	43
Religion Christian Muslim	209 177	54.1 45.9

Household characteristics and possession

The table below shows that majority (68.8%) of the household have 3 or less people living in the house. More than half (55.2%) of the respondents live in their own house. About 63% of the house respondent lived in was flat and more than three-quarter (77.7%) lived in a house made of block and only 7.3% lived in a house made of only mud. More than three-quarter (77.2%) owned a radio system. 64.6% of the respondent owned a upholstered chair at home. Majority (65.4%) of the household did not owned a grinding machine. Less than three-quarter(70.5%) of household owned a car.

TABLE 4.1HOUSEHOLD CHARACTERISTICS (N=402)

Type of house	Frequency	Percentages
Flat	244	62.6
Face me I face you	142	36.4
House ownership		
Yes	173	55.2
No	213	44.8
Type of wall		
Mud	28	7.3
Plastered mud	58	15.0
Block	300	77.7
Radio ownership		
Yes	301	77.2
No	89	22.8
Chair ownership		

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Yes No

Grinding machine ownership

Yes

No

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138

135

255

64.6

35.4

34.6

65.4

Motorcycle ownership		
Yes	158	40.5
No	232	59.5
Car ownership		
Yes	275	70.5
No	115	29.5
Bicycle ownership		
Yes	20	5.1
No	370	94.9
Family number		
≤3	120	31.2
>3	265	68.8

Child information

The table below shows the mean age of child was 28.29 ± 13.653 months and more than half (54.7%) of them were greater than 24 months and 60.9% of the children were male. Less than three-quarter of the children were last child as at the time of study. 88.3% of the children have immunization card and 98.2% of the children have received immunization at anytime.

Table 4.2 Child information(N=402)

Age	Frequency	Percentage (%)
\leq 24 month	175	45.3
>24 month	211	54.7
Birth position		
First	106	27.5
Last	280	72.5
Gender		
Male	235	60.9
Female	151	39.1
Immunization card ownership		
Yes	341	88.3
No	45	11.7
Received immunization at anytime		
Yes	379	98.2
No	7	1.8

Vaccines Utilization

The table below shows the utilization of vaccines was shown in table 4.3. The result revealed that majority (64.9%) of the children had incomplete vaccine status. It was revealed that 92.5% of children have received oral polio vaccine at one time or the other. 83.1%, 88.6% and 53.5% respectively received BCG, pentavalent (DPT, HiB& HBV) and yellow fever vaccine at one point in time.

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Vaccines	Frequency	Percentages (%)
Vaccine status		g., (, , , ,
Complete	137	35.1
Incomplete	253	64.9
OPV		
Yes	357	92.5
No	29	7.5
BCG		
Yes	323	83.1
No	62	16.9
DPT		
Yes	341	88.6
No	44	11.4
HiB		
Yes	341	88.6
No	44	11.4
HBV		
Yes	341	88.6
No	44	11.4
Yellow fever		
Yes	206	53.5
No	179	46.5

Table 4.3 Vaccine Utilization among under five children

Distribution of vaccine utilization related factors

The study revealed that less than three-quarter (72.3%) of the mothers attended antenatal care. 67.6% of respondent said decision on vaccination was taken by husband only while 12.4% claimed decision was taken by both husband and wife. 67.5% of respondent claimed that their house was far to the nearest health facility. Majority of the respondents (80.3%) have experienced vaccine stock out in the health facility where their child was being immunized while only 19.7% never experienced vaccine stock out.

The distribution revealed that more than one-quarter (26.9%) of the respondents have problems with transporting their children to the vaccination centers. Majority of the respondent (82.6%) have no problem with the health workers attitude while 17.4% have problem with their attitude. 17.6% of the respondents reported that the waiting hours was too long. Majority of the respondents (60.8%) seek treatment in a government hospital while only 11% seek treatment at home and TBA. Less than half (45.6%) and 30.6% respectively of the respondents delivered their child in government hospitaland traditional birth center while 23.8% delivered in private hospital.

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Distribution of factors associated with vaccine	utilization
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X7 • 11	5	
Variable	Frequency	Percentage (%)
ANC attendance		
Yes	279	72.3
No	107	27.7
Decision taker on vaccination		
Husband	261	67.6
Wife	77	19.9
Husband and wife	48	12.4
Proximity to health facility		
Far	260	67.5
Near	125	32.5
Ever experience stock out		
Yes	298	80.3
No	73	19.7
Transportation problem		
Yes	104	26.9
No	282	73.1
Health workers attitude		
Yes	67	17.4
No	319	82.6
Unavailability of vaccine		
Yes	110	28.5
No	276	71.5
Long waiting hour		
Yes	68	17.6
No	318	82.4
Treatment location		
Government hospital	237	60.8
Private	106	27.2
Others	43	11.0
Delivery location		
Government hospital	176	45.6
Private hospital	118	23.8
Traditional birth attendance	92	30.6

Factors associated with utilization of vaccine

The result of the bivariate chi square analysis was shown in the table below. It was revealed that complete utilization of vaccine was significantly higher among children whose fathers completed tertiary education

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(44%) compared fathers with no formal education (8.3%) and secondary or less education (39%) (X^2 =11.408 p=0.001). Complete utilization was significantly higher among children whose father earned 40,000 naira (48%) or more compared to those who earned less than 40,000 naira (20.1%) (X^2 =30.549, p<0.0001).Vaccine utilization was significantly higher among child whose parent delivered in government hospital (51.8%) compared to those whose parent delivered in private hospital (28.3%) and traditional birth centers(20%) (X^2 =53.536, p<0.0001)

It was observed that complete Vaccines utilization was significantly higher among child whose mother attend ANC during pregnancy (43.7%) compared to mothers who did not attend (14%) (X^2 .=29.815, p<0.0001). Complete utilization of vaccine was observed to be significantly higher among child whose mothers have no problem with transportation (46.5%) compared to those who have transportation problem (30.4%) (X^2 =7.844, p=0.005).

Vaccine utilization status Variables Complete (%) Incomplete (%) \mathbf{X}^2 P value **Mothers Age** 105(37.9) 172(82.1) 2.497 <35 years 0.114 >35 years 32(29.4) 77(70.6) **Mothers education** No formal education 3(3.3) 88(96.7) 54.502 < 0.0001* 137(53.7) Secondary or less 118(46.3) Tertiary 16(40.0) 24(60.0) **Fathers education** No formal education 2(8.3)22(91.7) 11.408 0.003* Secondary or less 84(39.0) 159(65.4) Tertiarv 51(44.0)65(56.0) **Fathers income** 30.549 < 0.0001* <40000 40(20.1)159(79.9) >40000 72(48.0) 78(52.0) Child birth position 39(36.8) 67(63.2) 0.108 0.743 First Last 98(35.0) 182(65.0) **Proximity to health facility** Far 89(34.2) 171(65.8) 0.640 0.424 Near 48(38.4) 77(61.6) Where they seek treatment Government facility 81(34.2) 156(65.8) 1.131 0.568 Private facility 42(39.6) 64(60.4) Others 14(32.6) 29(67.4) Ever experienced stock out Yes 103(36.4) 195 (65.4) 3.632 0.057 No 34(46.6) 39(53.4) **Delivery location** Government health facility < 0.0001* 107(51.8) 66(38.2) 53.536 Traditional birth attendant 17(20.0)68(80.0)

Factors associated with utilization of oral polio vaccine

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Private health facility	32(28.3)	81(71.7)		
Transport problem				
Yes	31(30.4)	71(69.6)	7.844	0.005*
No	125(46.5)	14453.5)		
Long waiting hour				
Yes	26(25.0)	78 (75.0)	6.845	0.009*
No	111(39.4)	171(60.6)		
Decision taker				
Husband	96(36.8)	165(63.2)	0.595	0.743
Wife	25(32.5)	52(67.5)		
Husband and wife	16(33.3)	32(66.7)		
ANC attendance				
Yes	122(43.7)	157(56.3)	29.815	< 0.0001*
No	15(14.0)	92(86.0)		
Sex of child				
Male	81(34.5)	154(65.5)	0.275	0.600
Female	56(37.1)	95(62.9)		

Multiple logistic regressions of factors associated with utilization of Oral polio vaccine

Variables significant at 5% level on chi square analysis were entered into a multiple logistic regression model and the result were shown in the table below. Children whose mother completed secondary education were fifteen times more likely than those whose mother had no formal education to utilize vaccine completely (OR=14.72, 95% CI=2.46-87.98). Children whose father earned 40,000 naira or more were two times more likely than those whose father earned less than 40000 naira to completely utilize vaccine (OR=2.38, 95% CI=1.28 – 4.45). Also, children whose mother never experienced long waiting hour in immunization clinics were four times more likely than those whose mother had experienced long waiting hour (OR=4.26, 95% CI=1.81-10.04).

Variables	ADJ OR	95% confi	P –value	
		Lower	Upper	
Mothers education				
No formal education	Ref			
Secondary or less	14.721	2.463	87.979	0.003*
Tertiary	0.546	0.228	1.305	0.136
Fathers education				
No formal education	Ref			
Secondary or less	1.140	0.103	12.578	0.915
Tertiary	0.930	0.930	1.667	0.807
Fathers income				
<40000	Ref			
≥40000	2.383	1.278	4.446	0.006*
Transport problem				

Multiple Logistic Regression of factors associated with Vaccine utilization

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Yes	Ref			
No	1.138	0.598	2.191	0.698
Long waiting hour				
Yes	Ref			
No	4.258	1.805	10.043	0.001*
ANC attendance				
Yes	1.702	0.776	3.733	0.185

DISCUSION OF FINDINGS, CONCLUSION AND RECOMMENDATION

DISCUSSION OF FINDINGS

Socio-demographic characteristics

The study revealed that majority of the parents were from rural settings of Akinyele local government. Most of the woman (66.1%) attained secondary level of education. This is because of the type of settings where Akinyele local government is located. Most of the mothers were of 32 years of age which is similar to the result gotten from other studies (olorunsaiye 2016, odusanya 2008)

The distribution of educational level is similar to previous studies where most respondents attained secondary level of education and this agree with the relatively low level of income as more than half of the respondents earned less than 40,000 naira monthly. Most of the parents were traders as Akinyele community is known for trading activities.

Utilization of vaccine

The utilization of oral polio vaccine in this study is 92.5%. This utilization rate is higher compared to the national oral polio vaccine of 57% estimated by WHO and UNICEF in 2018. Also, several studies results contradict this finding by having utilization rate of 78% (Uzochukwu et al, 2017), 64.2% (odusanya et al, 2008) and 71.4% (Adedire et al, 2016) which is lower than the one gotten from this study. The complete utilization rate gotten from this study is greater compared to the 16.3% (yahaya et al, 2017) utilization rate gotten from another study. The high proportion gotten from this study is due to the numerous health facilities present in rural area of Akinyele local government.

The utilization of BCG vaccine gotten from this study is 83.1% which is greater compared to the national BCG of 53% estimated by WHO and UNICEF in 2018.

Distribution vaccine utilization related factors

Majority of the mothers attended ANC and delivered there child in the hospital. It was revealed that decision on vaccination was taken majorly by husband only. Majority of the respondents reported that there main problems was that; residential home was far to the nearest health facility, mothers have experienced vaccine stock out in these hospitals before and transportation issues. Majority of the respondents seek treatment in the hospital, reported that the attitude of the health workers is good toward them and short waiting hour during immunization activities.

About 68% of mother in these communities acknowledged that the clinic is far to their residence which is similar Nevertheless, far distances to clinic and staff attitude are still challenging immunization coverage as mentioned by a few of the mothers. According to Ibnouf et al., 2007 distance of walking from the residence to the clinic for the accessibility of vaccination is one of the principal factors affecting immunization status.

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Factors associated with utilization of vaccine

In this study, mothers level of education was related to vaccine utilization as children whose mother completed tertiary education were fourteen times more likely to utilized vaccine compared to children whose mothers had no formal education. This is because education empowers a woman to access relevant health services, interact effectively and assimilate information relating to prenatal care, childhood immunization and nutritional needs (Becker et al.,1993). This result is similar to the findings of some other studies (Sally & Kenu, 2017). Father's income was shown to be related to utilization of vaccine as children whose father earn higher income were two times more likely to utilized vaccine compared to children whose father earned low income. This can be because income status of individual strongly control the behavior of individual thereby controls health seeking and ultimately child survival. In a study in Ethiopia, Lakew et al., 2015 showed that children born from fathers of higher income were more likely to have received full vaccination status compared with children born from father of low income. Similarly, Lynch et al. demonstrated that higher income status was associated with better health. However, in their study they used a more complex definition of health including quality of life, life expectancy, and specific measure such as causes of death (Lynch et al., 2004).

In this study, children born from mothers who attended antenatal care during pregnancy or who gave birth at the health facility were more likely to be fully vaccinated though the association faded out at multivariate analysis. This can be explained by the fact that women who attend ANC and give birth at health facility antenatal clinic is a means for women to be aware of immunization programme. Similar findings were seen on other studies (Lakew et al., 2015; Rainey et al; 2011; Funmilayo, 2015; Mouhamed et al., 2017). Also, this can be because the Nigeria primary health centers are the backbone of the primary health care approach and offer a range of preventive and curative services including immunization programs, which have been strengthened by the global polio eradicating initiative programme. Also, in this study children delivered at health facilities were more likely to fully utilized vaccines than children delivered at traditional birth home though after adjustment for confounders the association no longer exist. The explanation related to this may be that, mothers who gave birth at health institution are closer to the health service and most of the time the first dose of vaccination is given just after birth in health institution. Besides its relation with institution delivery, vaccines utilization of children showed statistically significant association with mothers' utilization of antenatal care (ANC). This is consistent with the study done in India and Bangladesh in which ANC follow up is related with complete immunization coverage (Jagarati et al., 2008; Partha et al., 2002).

Geographical accessibility to health facilities offering routine immunisation services is known to be a major determinant of immunisation coverage in many areas of Nigeria and most parts of sub-Saharan Africa, as demonstrated by other studies (mosuir&sarker, 2010; Jagrati et al., 2008). Our study was similar to the study where children whose mother were living close to health facilities were more likely to completely utilized vaccines compared to those living far away from the health facilities though the association fade away during multivariate analysis. This is because visibility of a clinic may attract a parent attention and act as a reminder of the parent of the immunization status of their child.

In this study, children whose mothers experienced long waiting hours were more likely not to completely vaccinate their children this is because the amount of time a patient waits to be seen is one factor which affects utilization of healthcare services. Patients perceive long waiting times as barrier to actually obtaining services and keeping patients waiting unnecessarily can be a cause of stress (Oche&Adamu, 2013).

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Conclusion

According to this survey, 35.1 percent of children under the age of five have received all of their vaccines, which is lower than the national vaccine coverage rate. Children whose mothers had a secondary education, went to antenatal care, and never had a vaccination stock out had a considerably greater proportion of vaccines used completely. In this study, the use of immunization services was low. As a result, the local authority of Akinyele should raise its awareness of the oral polio vaccine.

Recommendations

In order to boost vaccination usage in Akinyele LGA, the following recommendations are made:

- 1. Health promotion and education should be stepped up in the Akinyele local government, particularly in rural areas, to inform mothers about the dangers of not immunizing their children.
- 2. The Cold chain services and systems in the rural health facilities should be strengthened in order to enable them deliver the appropriate vaccines whenever they are needed.
- 3. Good welfare packages should be given regularly to the health workers in rural and hard to reach areas in order to motivate them towards better services. As this will enhance and improve the vaccine utilization of under 5 children in these places.

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