Determinants of Knowledge and Acceptance of Childhood Routine Immunisation among Community Members and Mothers of Under-Two Children in Ibadan, Nigeria

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Abstract: Vaccination is one of the medical achievements of the twentieth century; however, some vaccines are receiving less and less support. The study assessed knowledge and acceptance of Childhood Routine Immunisation (CRI) among adults in selected communities of Ido Local Government Area, Ibadan, Oyo State. This was a descriptive mixed-method study among caregivers of children under two years and members of the selected communities. A total of 416 questionnaires were administered among community members, while 15 In-Depth Interviews (IDIs) were conducted among mothers of Under-2 children. A 17-point knowledge scale was used to measure the respondents knowledge of CRI. Also, the level of acceptance of CRI was measured on a 7-point acceptance scale. Descriptive statistics and Chi-square tests were used to determine the statistical significance of the study. Majority (90.2%) of the respondents were females, 80.3% were married, and 49.9% had secondary education. The respondents knowledge score of CRI ranged from 1 to 15, with a mean score of 10.6±2.5, with 19.4% having poor knowledge. The result of the IDI qualitative showed that the majority of the respondents reported that it is very good to take a child to the hospital to get immunized. The respondents acceptance scores range from 2 to 14, with a mean score of 12.79 ± 2.44. The majority (94.0%) of the respondents had a high acceptance of CRI. All of the IDI respondents reported that there is no harm in getting Immunisation and it is safe for their children. This study shows that there is a significant association between respondents socio-demographic characteristics (gender, level of education, occupation, child age) and knowledge of CRI (p<0.05). Also, there is a significant association between respondents socio-demographic characteristics (age and level of education) and acceptance of CRI (p<0.05). Respondents generally have a high level of knowledge and acceptance of childhood routine Immunisation. Higher levels of education and certain occupational groups are linked to better knowledge and greater acceptance. It is recommended that strengthening health education programs, especially among less educated groups, coupled with consistent public health efforts, can sustain and enhance the positive trends observed in Immunisation acceptance.

Keywords: *Knowledge, Acceptance, Childhood routine Immunisation, Adults.*

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I. INTRODUCTION

Immunisation, usually through vaccine administration, is the procedure that makes an individual develop resistance and protects against infectious diseases. Vaccines boost the immune system to defend against recurring illnesses or disorders. Vaccinations can protect more children than most other measures [1]. Vaccine doses are routinely administered to newborns at predetermined ages according to a national schedule, which is routine vaccination. To get appropriate antigens for their age, children are typically brought to the medical institution by their parents or other caretakers. Since vaccinations are provided in multi-dose vials to reduce expense, Immunisation is typically carried out on specified days a week to prevent vaccine waste. Routine Immunisation aims to provide children and women with the full recommended doses of strong vaccines in a timely, safe, and effective manner, ultimately resulting in immunity against the desired diseases [2].

Poor health professional communication and engagement with community leaders and groups have also been linked to a lack of understanding of routine Immunisation regimens and the specific diseases they are designed to prevent. According to several studies, parents who know about diseases that are prevented by vaccination, how vaccinations work, and the recommended Immunisation schedule are more likely to vaccinate their children [3]. Notwithstanding the conflicting evidence supporting the usefulness of communication tactics in boosting vaccination uptake, good communication with parents is anticipated to be a key component in improving vaccination outcomes [4-5]. In the long run, improved maternal knowledge and attitude toward Immunisation will improve routine Immunisation (RI) and protect children from infectious diseases.

This study would aid in identifying factors influencing mothers' and caregivers' knowledge of Immunisation and identifying areas that require attention. It would also serve as a basis for effective intervention to improve maternal knowledge and attitude toward Immunisation, which will improve Immunisation and primary health over time. It will also be useful in identifying gaps in mothers' and caregivers' knowledge of and adherence to recommended routine Immunisation procedures, and it will operate as a tool for raising mothers' understanding of the significance of Immunisation for children. The findings of this study could serve as a starting point for community interventions aimed at encouraging vaccine uptake and, ultimately, improving child health. The study aims to assess childhood routine Immunisation (CRI) knowledge and acceptance among adults in selected communities in the Ido Local Government Area, Ibadan, Nigeria.

II. METHODOLOGY

➢ *Study Design*

This was a descriptive mixed-method study.

➢ *Study area*

This study was conducted in selected communities in Ido Local Government Area (LGA), Ibadan, Oyo State, Nigeria. Ido is a rural LGA with its headquarters located in Ido. According to the 2006 National Population Census, the local government has a total area of 986 km^2 and a population of 103,261 people.

➢ *Target population*

The study population consists of caregivers of children under two years and members of the selected communities.

➢ *Sample size determination*

Using the Leslie Kish formula, the sample size for the quantitative part of this study was established.

$$n = \frac{Z^2 pq}{d^2}$$

Where, n = Sample size

Z = Standard normal deviation; 1.96

p = Prevalence of women who received post-natal care (Fatiregun et al., 2013)

q = 1 – Prevalence   d = Precision; 0.05

z = 1.96; p = 41.3% i.e., 41.3/100 = 0. 413

q = 1 − 0. 413 = 0.587

d^2 = 0.05 x 0.05 = 0.0025

$$= \frac{1.96 \times 1.96 \times 0.413 \times 0.587}{0.0025} = \frac{0.9313}{0.0025} = 372.5$$

This was, therefore, increased to 400 to increase the power of the study. However, qualitative sampling was driven by the saturation technique.

➢ *Sampling Technique*

A 4-state sampling technique was used to select respondents used for this study, which are;

- Stage 1: Five out of 10 wards in the Ido LGA were randomly selected using balloting.
- Stage 2: One community was selected in each of the selected five wards
- Stage 3: Purposive sampling technique was used to select the houses of children under two
- Stage 4: Where there was more than one qualified respondent in the household, balloting was used to select only one. Respondents were chosen from each household till the required numbers were obtained.

➢ *Methods of Data Collection*

Both qualitative (In-depth interview) and quantitative (semi-structured questionnaire) data collection techniques were used. Five (Supervisor=1; Data Collectors=4) research assistants were recruited and trained by the researchers to collect the data for this study. The supervisor and one of the data collectors had a Master of Public Health (MPH) degree, while other data collectors had a bachelor's degree in public health.

➢ *The questionnaire*

The questionnaire on Immunisation knowledge by Almutairi et al. [6] was adapted and used for this study. The questionnaire was used to collect information on the respondents socio-demographic characteristics, knowledge, and acceptance of childhood routine Immunisation.

➢ *In-depth Interview Guide*

An in-depth interview (IDI) guide was used to collect information from the respondents knowledge and acceptance of childhood routine Immunisation. Fifteen mothers of under two children were selected and interviewed in either Yoruba or English Language, and each interview lasted about 20 minutes and was audio recorded. The IDIs took place immediately after the quantitative study and were moderated by the study field supervisor.

➢ *Validity and Reliability of the Instruments*

The instruments were subjected to test-retest validity after expert validation. The instruments were also piloted among the homogenous population in Oluyole LGA, Ibadan, where 41 questionnaires were administered, and two IDIs were conducted. The Cronbach Alpha test showed a reliability coefficient of 0.850 for the questionnaire, and the pilot's outcome was also used to modify and finalise the instruments.

➢ *Data Management and Analysis*

For the qualitative study, interviews were transcribed verbatim. To guarantee that the transcriptions were accurate and thorough, two researchers checked and validated individual transcripts. This included multiple surface readings of transcripts to capture context and meaning, followed by coding and categorising recurring concepts/ideas. A master list of all categories was assembled and examined for common themes. Nivivo software for

qualitative data analysis was used to sort, categorize, and analyze the data.

For the quantitative data, a 17-point knowledge scale was used to measure the respondents knowledge of CRI. A correct knowledge was one point, while an incorrect response was zero. A knowledge score of <10 was considered poor, while a score of ≥ was considered good knowledge. Also, the level of acceptance of CRI was measured on a 7-point acceptance scale. Positive acceptance was scored one, while negative acceptance was zero. An acceptance score of <4 was rated as low, while a score of 4 and above was rated as a high level of acceptance. Descriptive statistics and chi-square tests were used to determine the statistical significance of the study.

➢ *Ethical Consideration*

The study received ethical approval from the Oyo State Ministry of Health's Ethical Review Committee in Ibadan (AD 13/479/44248B), respondents were provided with an informed consent form, and participation was voluntary.

➢ *Results*

Socio-demographic characteristics of respondents A total of 416 respondents were used for this study, giving a response rate of 104.0%. The socio-demographic characteristics of respondents are shown in Table 1. Majority (90.2%) of the respondents were females, 86.8% practiced monogamy, 80.3% were married, and 49.9% had secondary education (Table 1).

Table 1 Socio-Demographic Characteristics of Respondents (N=417)

Variables	n	(%)
*Age (years)		
15-30	108	25.9
31-45	204	48.9
46 and above	104	24.9
Gender		
Male	41	9.8
Female	376	90.2
Marital Status		
Single	77	18.5
Married	335	80.3
Separated	4	1.0
Divorced	1	0.2
Type of family		
Monogamous	362	86.8
Polygamous	55	13.2
Religion		
Christianity	274	65.7
Islamic	140	33.6
Traditional	3	0.7
Level of Education		
No formal education	28	6.7
Primary	43	10.3
Secondary	208	49.9
Tertiary	138	33.1
Occupation		
Unemployed	36	8.6
Trading	189	45.5
Artisan	68	16.3

Civil servant	19	4.6
Self-employed	105	25.2
Level of Income (Naira)		
0 – 200,000	409	98.1
201,000 – 400,000	4	1
401,000 – 1,000,000	4	1
Number of children		
0 - 3	105	25.2
4 – 6	201	48.2
7 and above	111	26.2
Child's age (years)		
0 – 10	208	49.9
11 – 20	137	32.9
21 – 30	72	17.3

*Mean Age 38.77 $\pm$10.8 years

> *Knowledge of Childhood Routine Immunisation*

The Respondents knowledge score of CRI ranged from 1 to 15 with a mean score of 10.6±2.5 with 19.4% having poor knowledge (Fig. 1). Most (78.2%) of the respondents knew that vaccination is important for children from a day old -1 year, 88.0% knew that vaccination prevents infectious disease, and 57.6% knew that Bacille Calmette Guerin (BCG) should be given to children from 0-1 month. Also, 58.3% knew that the BCG vaccine protects a child against tuberculosis, and 41.5% knew the yellow fever vaccine should be given to children from 0 -1 month (Table 2).

The qualitative result showed that most respondents reported that it is very good to take a child to the hospital to get immunized. More than half also added that getting a child immunized prevents sickness and hinders all sorts of diseases. A respondent added that Immunisation helps children grow well if given a full Immunisation injection. One of the respondents specifically said; *"Immunisation helps children grow very well and gives them good health conditions. Also, for the child's progress, the child will not fall sick if he collects his full Immunisation injection."*

Two respondents added that Immunisation prevents diseases like measles, polio, meningitis, coughing, and yellow fever. Another respondent added that Immunisation should be given to a child at one month, three months, six months, nine months, and one year. A respondent said; *"I know that it is good for children, right from birth or by the 8th*

day. It prevents the child from falling sick. When a child is not immunized, it can cause the child to cough or develop many other diseases. It is very good for children to be immunized."

When respondents were asked about the vaccine being given to children during routine Immunisation and the age at which each vaccine is given, the majority could not remember the name of the vaccines and at what months each is given. Still, they mentioned that vaccination is given as early as 24 hours after birth and lasts until the child is 18 months. One of the respondents specifically said; *"I cannot remember the names of all of them, and I cannot remember the times they take the injections, but they will keep taking it from birth till they clock one year. For instance, at 2, 3, and 4 months, they take injections. Then, when the baby is 7-8 months old, they will tell us to come back when the child is 9 months old for another injection. Then we also go back for another injection after one year and a month."*

However, some respondents remembered a few vaccines given to their child/ward and could not remember the months each was administered. Few respondents said their children were given vitamin A and measles vaccines. Few also mentioned PCV, BCG, Rota, Meningitis, Yellow fever, and Vitamin K differently. Other vaccines mentioned by respondents are TB vaccine, Polio, Penta 1&2, and OPV 1&2, among others.

Table 2 Respondents' Knowledge of Childhood Routine Immunisation

Variable	n	(%)
Children's age when vaccination is important		
A day old to 1year*	326	78.2
1-2 years	66	15.8
2-3 years	17	4.1
3-4 years	5	1.2
4-5 years	3	0.7
Vaccination prevents infectious disease.		
Yes*	367	88.0
No	29	7.0
Don't know	21	5.0
Malnutrition contradict vaccination		
Yes*	170	40.8
No	247	59.2

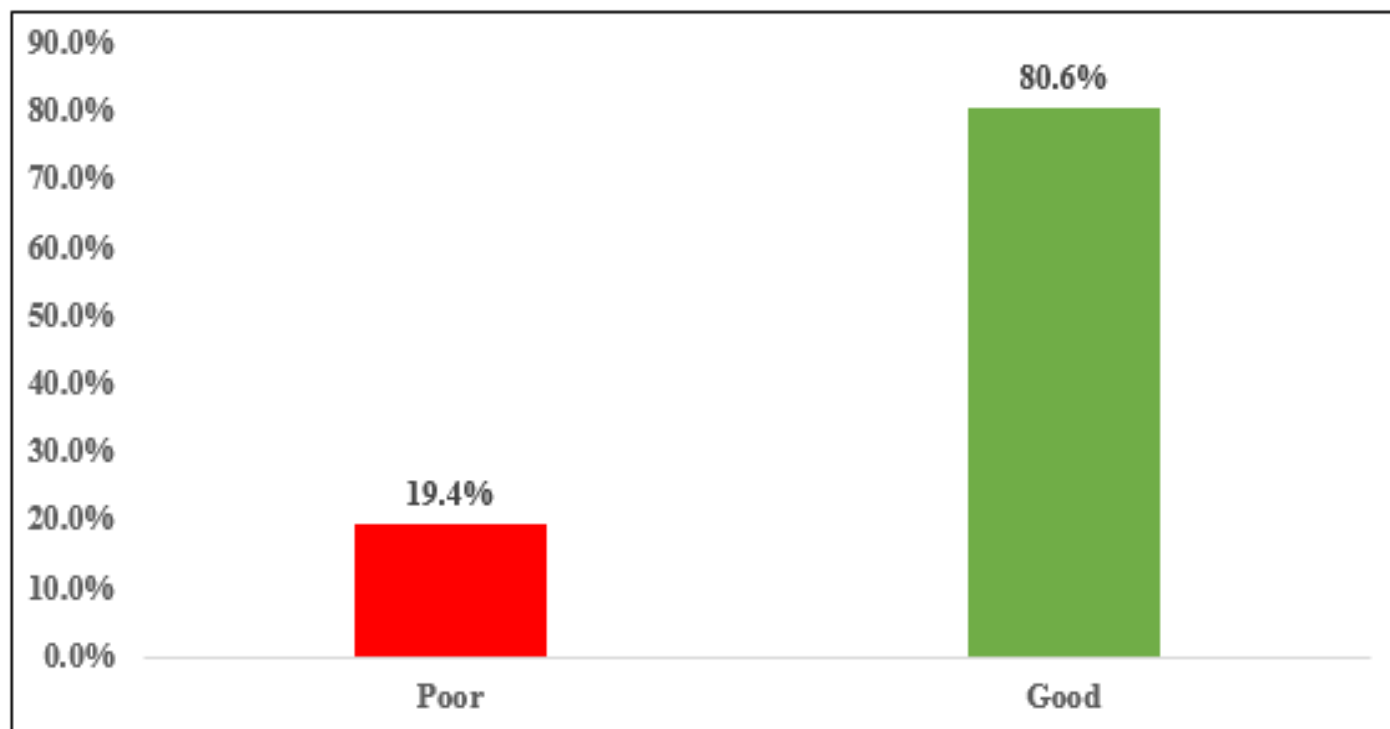|		
Low fever contradicts vaccination		
Yes	155	37.2
No*	262	62.8
Diarrhea contradict vaccination		
Yes	157	37.6
No*	260	62.4
Vaccination reduces death and disability.		
Yes*	373	89.4
No	29	7.0
Don't know	15	3.6
Hepatitis B virus can be prevented by vaccination		
Yes*	354	84.9
No	31	7.4
Don't know	32	7.7
Childhood vaccination may not control measles		
Yes	258	61.6
No*	133	31.9
Don't know	27	6.5
Healthy children may not need vaccinations		
Yes	181	43.4
No*	215	51.6
Don't know	21	5.0
First dose of child routine Immunisation should be given		
Just after birth*	290	69.5
6weeks after	54	12.9
Any time	25	6.0
After one	20	4.8
Don't know	28	6.7
Month that BCG should be given to children		
0-1 month*	240	57.6
2-4 months	73	17.5
5-6 months	44	10.6
7-8 months	60	14.4
Pentavalent vaccine may be given in		
1 dose	137	32.9
2 doses	148	35.5
3 doses*	91	21.8
4 doses	41	9.8
BCG vaccine protects a child against		
Yellow disease	91	21.8
Tuberculosis*	243	58.3
Diarrhea	14	3.4
Jaundice	69	16.5
More than one vaccine can be given to a child at the same time		
Yes*	321	77.0
No	96	23.0
Multi doses of the same vaccine given at intervals are important for child immunity		
Yes*	329	78.9
No	88	21.1
Compliance with child routine Immunisation schedule is important		
Yes*	371	89.0
No	46	11.0
Month when yellow fever should be given to children		
0-1 month	173	41.5
2-4 months	107	25.7
5-6 months	47	11.3
7-8 months	43	10.3
9 months*	47	11.3

Correct response

Fig 1 Respondents Level of Knowledge of Childhood Routine Immunisation

> *Acceptance of Childhood Routine Immunisation*

The respondents acceptance scores range from 2 to 14, with a mean score of 12.79 ± 2.44. Majority (94.0%) of the respondents had a high level of acceptance of childhood routine Immunisation (Fig. 3). Majority (95.4%) of the respondents would like their children to take Immunisation, 97.4% would recommend Immunisation to their family and friends, and 81.1% did not think Immunisation is dangerous to children's health (Table 3).

All of the IDI respondents reported that there is no harm in getting Immunisation and it is safe for their children. Almost all the respondents said that they do not think routine Immunisation should be a substitute for herbs and prayers, as each of them is important and serves a different purpose. Some respondents also believed that taking routine Immunisations backed by prayer would give the best result. One of the respondents specifically said;

"No. They should take Immunisations. While someone can take herbs and pray for their children, they should not be used to replace Immunisation. Prayer has its place, and herbs have a different place, and someone can choose whichever one they like. But none of them should replace Immunisation."

Motivating factors for taking children for Immunisation: Some respondents mentioned that knowing that the routine Immunisation was for the health and well-being of their children is enough motivation for them. A respondent specifically said; *"The health of my child is what used to motivate me; if the child's condition is okay and for someone not to be going about with a child that has sickness or not fully well, that is what motivates me."*

Three of the respondents also noted that giving incentives like pampers, mosquito net or drugs will motivate them. Other motivating factors mentioned by respondents are the provision of more facilities for routine Immunisation and a good and neat facility structure. Most of the respondents stated that no value influenced their decision to take their children for Immunisation because they know it is their sole responsibility to care for their children's health regardless of what their religious leaders think. A respondent specifically said;

"Religion does not affect my decision. Whatever the imam or clerics have to say does not affect my decision; I get them immunized regardless." However, two respondents mentioned that the health benefits of Immunisation they were told at the clinic influenced their decision. Impact of culture on acceptance of Immunisation: Many respondents believed that culture had no impact/influence on Immunisation as both are different. A respondent specifically said;

"There is no culture in being vaccinated; culture does not influence Immunisation, Immunisation stands on its own, and culture is on its own. If you give birth, take care of the child if you don't want any problem for yourself and the child."

Almost half of the respondents reported that their culture always supported Immunisation and had never been against it. One of the respondents specifically said; *"Our culture is good regarding this. Because some people will even go from house to house to ask, "Have you gone to get your child immunized? Immunisation is good for children. Have you visited our clinic? Our clinic is located at so and so place." They will even describe their clinic to us. They do well."*

Table 3 Respondents Acceptance of Childhood Routine Immunisation

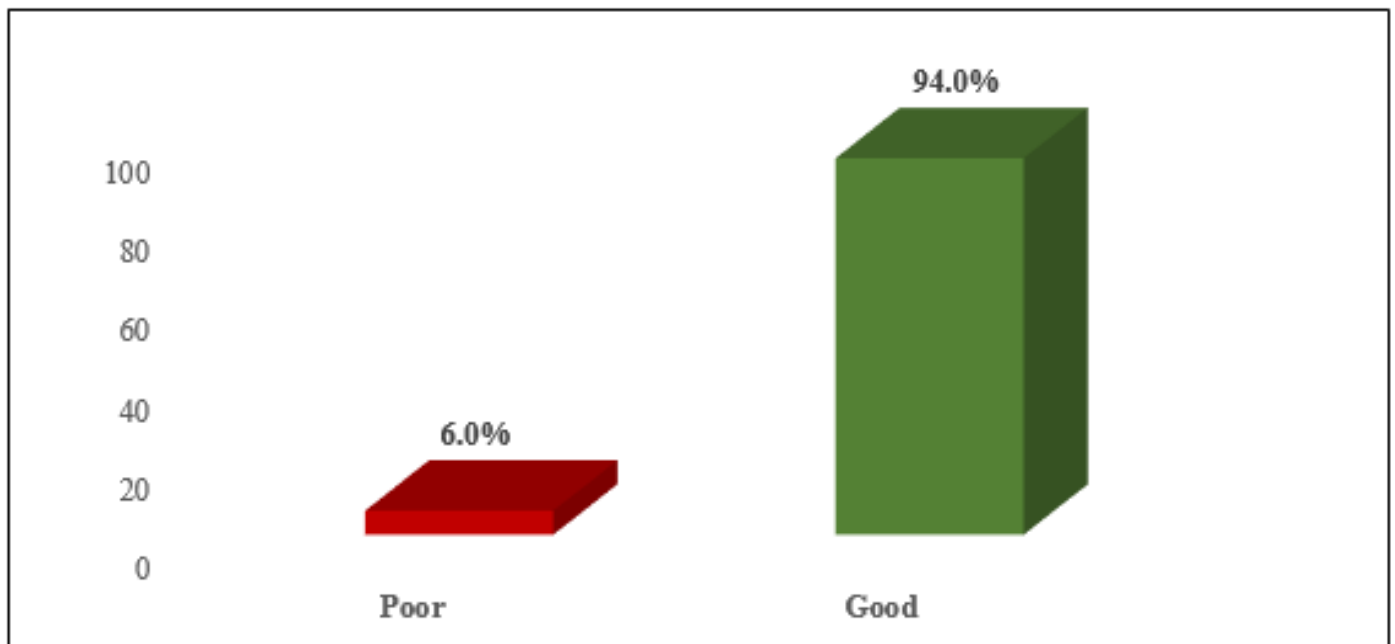| Statements	n	(%)
Would like children to take Immunisation		
Yes*	398	95.4
No	19	4.6
Would recommend Immunisation to a friend or family		
Yes*	406	97.4
No	11	2.6
Believe that Immunisation is beneficial to children		
Yes*	404	96.9
No	13	3.1
Trust the safety of vaccines used for children		
Yes*	399	95.7
No	18	4.3
Necessary to immunize children against any communicable disease		
Yes*	377	90.4
No	40	9.6
Immunisation is dangerous to children's health.		
Yes	79	18.9
No*	338	81.1
Immunisation makes children sick.		
Yes	72	17.3
No*	344	82.5

*Positive acceptance

Fig 2 Level of acceptance of childhood routine Immunisation

➢ *Determinants of Knowledge of Immunisation*

This study shows a significant association between respondents socio-demographic characteristics (gender, level of education, occupation, child age) and knowledge of childhood routine Immunisation (Table 4).

Table 4 Determinants of Knowledge of Immunisation

Variables		Knowledge			X^2	Df	P-value
		Poor (%)	Good (%)	Total (%)			
Gender	Male	17 (4.1)	24 (5.8)	41 (9.8)	14.111	1	0.000*
	Female	64 (15.3)	312 (74.8)	376 (90.2)			
	Total	81 (19.4)	336 (80.6)	417 (100.0)			
	No formal	17 (4.1)	11 (2.6)	28 (6.7)	37.341	3	0.000*
	Primary	10 (2.4)	33 (7.9)	43 (10.3)			

					X^2	Df	P-value
Level of Education	Secondary	26 (6.2)	182 (43.6)	208 (49.9)			
	Tertiary	28 (6.7)	110 (26.4)	138 (33.1)			
	Total	81 (19.4)	336 (80.6)	417 (100.0)			
Occupation	Unemployed	17 (4.1)	19 (4.6)	36 (8.6)	23.876	4	0.000*
	Trading	36 (8.6)	153 (36.7)	189 (45.3)			
	Artisan	12 (2.9)	56 (13.4)	68 (16.3)			
	Civil Servant	5 (1.2)	14 (3.4)	19 (4.6)			
	Self-Employed	11 (2.6)	94 (22.5)	105 (25.2)			
	Total	81 (19.4)	336 (80.6)	417 (100.0)			
Child Age	0-10	47 (11.3)	161 (38.6)	208 (49.9)	6.452	2	0.040*
	11-20	17 (4.1)	120 (28.8)	137 (32.9)			
	21-30	17 (4.1)	55 (13.2)	72 (17.3)			
	Total	81 (19.4)	336 (80.6)	417 (100.0)			

$p<0.05$ (i.e. Significant)

> *Determinants of Immunisation Acceptance*

This study shows a significant association between respondents socio-demographic characteristics (age and level of education) and acceptance of childhood routine Immunisation (Table 5).

Table 5 Determinants of Immunisation Acceptance

Variables		Level of acceptance			X^2	Df	P-value
		Poor (%)	Good (%)	Total (%)			
Age	15-30	11 (2.7)	97 (23.4)	108 (26.0)	10.368	2	0.006*
	31-45	13 (3.1)	190 (45.8)	203 (48.9)			
	46 and above	0 (0.0)	104 (25.1)	104 (25.1)			
	Total	24 (5.8)	391 (94.2)	415 (100.0)			
Level of Education	No Formal	6 (1.4)	22 (5.3)	28 (6.7)	15.192	3	0.002*
	Primary	4 (1.0)	39 (9.4)	43 (10.3)			
	Secondary	7 (1.7)	201 (48.3)	208 (50.0)			
	Tertiary	8 (1.9)	129 (31.0)	137 (32.9)			
	Total	25 (6.0)	391 (94.0)	416 (100.0)			

$p<0.05$ (i.e. Significant).

III. DISCUSSION

This study showed that the majority of the respondents had good knowledge of routine childhood Immunisations, and more than half of these respondents also added that getting a child immunized prevents sickness and hinders all sorts of diseases. A similar study conducted by Adefolalu et al. [7] revealed that most mothers under-five children had an average knowledge score regarding Immunisation. However, findings from a study conducted by Kaur et al. [8] revealed that most mothers of under-five children had moderate knowledge (53.0%) and inadequate knowledge (37.34%) regarding Immunisation. In another related study conducted by Uwaibi and Akhimienho [9], it was reported that there was a good knowledge of Immunisation among the caregivers regarding the true purpose of Immunisation and the age of vaccination completion.

The qualitative study's findings showed that most respondents reported that getting a child immunized prevents sickness and hinders all sorts of diseases. These results support Mantel and Cherian [10], who claimed that Immunisation and vaccination are two of the most effective and affordable public health interventions for disease prevention. Also, vaccines have substantially improved health and reduced mortality. According to Matta et al. [11], high Immunisation uptake is critical for protecting people from infectious diseases, but barriers to Immunisation are complex. Enwonwu et al. [1] also found that vaccines stimulate the body's immune system to protect the person against subsequent infections or diseases. Most of the respondents in this study acknowledged that the BCG vaccine protects a child against tuberculosis. This finding corresponds with the World Health Organization, which reported that universal BCG vaccination at birth is recommended in countries or settings with a high incidence of TB and/or leprosy burden [12].

On the level of acceptance of childhood routine Immunisation, the study revealed that the vast majority of the respondents had a high level of acceptance of childhood routine Immunisation, and this was in variance with the finding of National Demographic and Health Survey (NDHS) in which it was reported that the Immunisation completion rate was 16.6% for all age-appropriate vaccine and 23.3% for all basic vaccination in Oyo State [13]. World Health Organization reported that adherence to the Immunisation schedule guarantees protection against the disease, and it is crucial in providing maximum effectiveness against vaccine-preventable diseases in the community [14]. Also, according to Galadima et al. [15], non-adherence to the vaccination schedule can cause out-of-sequence vaccination among Fully Immunized Children (FIC) and children who do not become FIC.

IV. CONCLUSION

Based on the findings of this study, it can be concluded that respondents generally have a high level of knowledge and acceptance of childhood routine Immunisation. The study highlights significant associations between socio-demographic factors such as gender, education level, occupation, and child age with both knowledge and acceptance of Immunisation. Specifically, higher levels of education and certain occupational groups are linked to better knowledge and greater acceptance, indicating that socio-economic factors play a crucial role in Immunisation attitudes. Despite the positive outlook, the study also underscores the need for targeted interventions to address gaps in knowledge among specific demographic groups, particularly those with lower levels of education or belonging to certain occupation categories. Enhancing awareness and addressing barriers to timely vaccination can improve Immunisation rates and ensure broader community protection. It is also recommended that strengthening health education programs, especially among less educated groups, coupled with consistent public health efforts, can sustain and enhance the positive trends observed in Immunisation acceptance. These strategies are vital for achieving optimal Immunisation coverage and reducing the burden of vaccine-preventable diseases in the community.

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