ROUTINE IMMUNIZATION COVERAGE AND ASSOCIATED FACTORS AMONG CHILDREN AGED 12 – 23 MONTHS IN ODEDA LOCAL GOVERNMENT AREA, OGUN STATE NIGERIA

BY

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DECLARATION

The work reported in this dissertation was undertaken by me at the Department of Epidemiology and Medical Statistics of the University of Ibadan. This dissertation has not been submitted either in part or whole to any other examining body, in support of an application for another degree or qualification.

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CERTIFICATION

I certify that this project was carried out at the Department of Epidemiology and Medical Statistics of the University of Ibadan under my supervision.

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DEDICATION

I dedicate this work to God Almighty. He gave all that was needed to make this programme successful. I thank Him greatly.

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God bless you all.

ABSTRACT

Vaccine preventable childhood diseases are serious health problems in Nigeria. As a result, programmes have been put in place to improve immunization coverage with a view to reducing their burden across the country. However, available evidence suggests that these diseases contribute significantly to childhood morbidity and mortality in spite of concerted efforts aimed at preventing them through Routine Immunization (RI). Furthermore, the status of immunization coverage and the factors which militate against full RI are yet to be fully explored. The study was therefore conducted to assess the status of routine immunization coverage and factors responsible for incomplete coverage in Odeda Local Government Area, Ogun State Nigeria.

The cross-sectional survey was carried out among 510 women with children aged 12-23 months. Respondents were selected using the WHO cluster sampling technique. A pre-tested structured questionnaire was used to obtain information on mothers' knowledge about immunization and immunization status of their children aged 12 – 23 months. A child was considered fully immunized if he has received a dose of Bacillus Calmette - Guerin (BCG), three doses of Oral Polio Vaccine (OPV), three doses of Diphtheria – Pertussis – Tetanus (DPT), three doses of Hepatitis B Vaccine (HBV), and a dose each of Measles and Yellow Fever vaccines by 12 months of age while a partially immunized child would have missed one or more of these doses. A composite knowledge score about immunization was computed for each respondent on a 7 - item scale. Respondents with scores of ≥5 and <5 points were considered to have adequate and inadequate knowledge respectively. Descriptive, Chi-square and logistic regression statistics were used for data analysis at $p=0.05$.

Mean age of the respondents was 28.8 ± 5.4 years, 68% had formal education and 57.3% were employed. The mean age of children was 17.9 ± 3.9 months and 49.2% of them were males. Full immunization coverage was 22.2% while 51.9% were partially immunized and 25.9% were not immunized at all. Full coverage in respect of each of the antigens were BCG (57.5%), OPV (21.7%), DPT (23.8%), HBV (14.6%), measles (59.5%) and yellow fever (60.5%). Majority (68.3%) had adequate knowledge about

immunization. Respondents with inadequate knowledge were twice more likely to have their children fully immunized than those with adequate knowledge (OR=0.5, 95% CI=0.3-0.9). Thirty percent of respondents with secondary education had their children fully immunized compared to 17.3% of the non-educated ones. Employed mothers were twice more likely to fully immunize their children than unemployed mothers (OR=2.3, 95% CI= 1.4-3.8). Inconvenient immunization scheduling (14.4%), lack of social support (12.2%), lack of knowledge about need for additional doses (9.4%) and lack of vaccine (8.1%) were among the reasons for incomplete routine immunization coverage.

Full immunization coverage among children aged 12-23 months old in the study area was below the national target of at least 80.0%. Inadequate knowledge of mothers and logistic problems are the major limitations to inadequate coverage. Public enlightenment, social support and ready availability of vaccines are needed to address these challenges.

Key words: Routine immunization, Coverage, Vaccine preventable diseases, Mother's knowledge.

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LIST OF ACRONYMS

BCG - Bacille Calmette-Guerin

DPT - Diphtheria-Pertussis-Tetanus

DFID - Department for International Development

EPI - Expanded Programme in Immunization

FMOH - Federal Ministry of Health

GAVI - Global Alliance for Vaccines and Immunization

GIVS - Global Immunization Vision and Strategy

HBV - Hepatitis B Vaccine

LGA - Local Government Area

MICS - Multiple Indicator Composite Survey

NGO - Non-Governmental Organization

NICS - National Immunization Coverage Survey

NID - National Immunization Day

NIP - National Immunization Policy

NPC - National Population Commission

NPI - National Programme on Immunization

OPV - Oral Polio Vaccine

PEI - Polio Eradication Initiative

PHC - Primary Health Care

REW	-	Reach Every Ward
RI	-	Routine Immunization
SMOH	-	State Ministry of Health
UCI	-	Universal Childhood Immunization
UNICEF	-	United Nations Children's Fund
VPD	-	Vaccine Preventable Diseases
WHA	-	World Health Assembly
WHO	-	World Health Organization
WPV	-	Wild Polio Virus

CHAPTER 1

INTRODUCTION

1.1 Background

Immunization remains one of the most important public health interventions and a cost effective strategy to reduce the morbidity and mortality associated with infectious diseases (WHO, 2009). Immunization is the process by which an individual's immune system becomes fortified against pathogenic agents (immunogens) that cause specific diseases (WHO, 2009). Globally, immunization currently averts more than 2.5 million deaths every year (WHO, 2008). In spite of this, vaccine preventable diseases (VPDs) remain the most common cause of childhood mortality with an estimated three million deaths each year (WHO, 2008).

Vaccines are routinely administered to keep people from falling ill, this is far better than treating them when they fall ill. Suffering, disability and death are also avoided by the use of vaccines. In addition, this can reduce contagion, ease strain on health-care system and money that can be used for other health services can be saved. Immunization is a proven tool for controlling and even eradicating diseases for example, eradication of natural occurrence of smallpox as a result of campaigns carried out by World Health Organization (WHO) from 1967 – 1977 (WHO, 2009).

The fourth Millennium Development Goal (MDG 4) targets the reduction of under – five mortality rate by two – thirds, with a time line between 1990 and 2015. Indicators of this goal are; under – five mortality rate, infant mortality rate and proportion of 1-year-old children immunized against measles (UNICEF, 2009). Thus an increase in routine immunization coverage (including an increase in measles antigen coverage) will promote the attainment of this goal which will on the long run impact positively on the health condition of children in the world at large.

Nigeria commenced immunization activities, focusing on the control of yellow fever and smallpox, about 50 years ago (NPCHCDA, 2009). The Expanded Programme on Immunization (EPI) was launched in 1979 with the aim of providing immunization services to children aged 0 – 23 months.

The EPI routine immunization schedule includes a dose of Bacille Calmette Guerin (BCG), three doses of oral polio vaccine (OPV), three doses of diphtheria, pertussis and tetanus (DPT), three doses of Hepatitis B vaccine (HBV) and one dose each of measles and yellow fever vaccines. The programme recorded initial successes with BCG coverage of 23% in 1981 but decline in uptake of services were quickly observed when BCG coverage dropped progressively to 21%,19% and 16% in 1982,1983 and 1984 respectively [Babalola et al.2003]. This trend necessitated a re-launch of the programme in 1984. EPI was also renamed National Programme on Immunization (NPI) in 1997 (NPCHCDA, 2009).

As a result of concerted efforts of the Federal Ministry of Health, State Agencies and international organizations (UNICEF and WHO) between1984 and 1990, Nigeria attained universal childhood immunization (UCI) (Babalola et al, 2003) with BCG coverage of 80%, OPV3 - 55%, DPT_1 – 59%, DPT_3 – 56% and Measles coverage of 54% and an overall immunization coverage of 81.5% for all antigens in 1990 (FMOH, 1997). The success however was not sustained and by 1999, immunization coverage began to decline gradually. The decline was evident for all the antigens. For example, between 1993 and 1999 the BCG coverage fell from 52% to 43 %, while Oral polio vaccine fell from 28% to 19%. Within the same period the DPT_1 coverage declined from 54% to 41%, DPT_3 fell from 29% to 23%, and measles coverage declined from 40% to 35%. (WHO/UNICEF, 2004), this decline was confirmed by the survey data from the National Demographic Health Survey (NDHS) and Multiple Indicator Cluster Survey (MICS). Most striking of all, the proportion of children with complete immunization fell by almost half from 30% to 17% between 1990 and 1999 (UNICEF, 2003).

However following a campaign in 1997, coverage rates increased to an average of53% for all antigens. A progressive increase has been recorded since then as illustrated by coverage rates between 2003 and 2007 when BCG coverage increased from 55% to 69%, Oral polio vaccine coverage increased from 45% to 61%, while DPT_1 coverage increased from 53% to 72%. Within the same time frame, an increase in DPT_3 from 35% to 54% and measles coverage of 45% to 62% was experience (WHO, 2009). However, these results still connote a far cry from the target of 90% immunization coverage that ought to have been achieved by year 2000 as set at the 49th World Health Assembly in 1988 (WHO, 2009).

A multimethod study carried out by Partnership for Transforming Health Systems (PATHS) and sponsored by Department for International Development (DFID) between July and

December 2004, identified community and systemic factors that affect immunization coverage. The influence of wider contexts such as the political, economic, social and cultural environment, socio-demographic characteristics, the disease burden and the media are mediated through a set of proximate determinants which includes ideational (or psychosocial), community and systemic factors. Other factors affecting immunization practices in Nigeria include the supply and demand elements. On the demand side, there is a lack of community ownership of immunization programmes fostered by a poor understanding of immunization, suspicions, myths, and rumours. On the supply side, immunization programmes are fraught with poor infrastructure, inadequacies in vaccine supply and distribution, poor provider skills and inadequate funding (Babalola and Adewuyi, 2005).

1.2 Problem Statement

Reasons for incomplete vaccination and non-uptake of immunization services are poorly understood (Abdulraheem et al, 2011). Nigeria is a signatory to the Declaration on Survival, Protection and Development of children, which was made at the 49th World Health Assembly in 1988 and reinforced by the World Summit for Children in 1990. This declaration called for eradication of the polio virus from the world by the year 2000 (Babalola et. al., 2005). Out of all 193 WHO member states, Nigeria is one of the 4 countries (Pakistan, Afghanistan, India and Nigeria) that were still polio-endemic in 2007 (WHO, 2009) and by February, 2012, WHO removed India from the list of countries considered to have never interrupted the transmission of wild poliovirus because, India has not had a case of polio since January, 2011 and no recent environmental samples have detected wild poliovirus in India (Ogundipe, 2012).

In addition, in 2010, global figures indicated that about 19.3 million infants did not receive the basic vaccine against diphtheria-tetanus-pertussis and nearly seventy percent of these children live in ten countries: Afghanistan, Democratic Republic of the Congo, Ethiopia, India, Indonesia, Iraq, Nigeria, Pakistan, South Africa and Uganda (WHO, 2005).

According to global polio surveillance data from August 28, 2012, 128 polio cases were reported, the bulk of which (96 percent or 123 of the 128 cases) are from the three remaining endemic countries - Pakistan, Afghanistan and Nigeria. This figure is the lowest number of

cases globally to have been recorded during a seven-month period in the last 10 years (FMOH, 2012). Unfortunately, Nigeria remains one of the few reservoirs of the wild polio virus around the world (Babalola and Adewuyi, 2005) and the most polio endemic country with over 70 cases of new infections by the end of August 2012. As at June, 2012, wild Polio Virus and one circulating vaccine-derived Polio Virus were recorded in 10 States (Weekly epid report, 2012). This suggests under utilization or inavailability of immunization services in the country (UNICEF, 2009).

Nigeria has one of the lowest immunization coverage rates in the West African subcontinent despite efforts by the government and other non governmental organizations to increase coverage rates. This is illustrated by the following immunization coverage rates for year 2007. BCG coverage for Nigeria was 53% while Ghana had 99% and Mali had 86%. OPV3 coverage of 54% was observed in Nigeria compared with 94% in the Ghana and 76% in Mali. Nigeria also had measles containing vaccine coverage of 41% while Ghana recorded 86% and Mali 66%. DPT3 coverage of 42% was recorded in Nigeria while Ghana had 94% and Mali 74% coverage. This is really a problem that needs to be addressed (UNICEF, 2009).

1.3 Justification of the Study

Inadequate levels of immunization against childhood diseases remain a significant public health problem in resource poor nations like Nigeria. WHO recommends that routine immunization coverage be assessed every five years to evaluate immunization service performance but the last recorded immunization coverage survey in Odeda LGA was conducted in 2003 (Alagh, 2003). This survey revealed poor coverage rates which should have prompted a re-evaluation of coverage in the area in 2008.

After Nigeria attained universal childhood immunization in 1990, immunization coverage has declined substantially. Coverage rates obtained for individual antigens were better in 2010 than in 2011 as portrayed by a decline from 69% to 47% for DPT3 and a decline from 75% to 72% and 66% to 50% for OPV3 and HBV3 respectively (WHO, 2012). Research in other parts of the world has shown that individual, community and systemic factors which affect immunization coverage are potentially modifiable (UNICEF, 2000). This problem of unacceptably low coverage of immunization in Nigeria can only be addressed if adequate

information on the factors affecting the uptake of immunization services in different parts of the country is available (Babalola and Adewuyi, 2005)

Resistance to immunization activities in any part of the country can put millions of children in Nigeria and neighbouring countries at risk of mortality and morbidity from vaccine preventable diseases, steps to increase immunization coverage ought to be embarked upon. This study therefore centers on collecting appropriate information useful for identifying factors that determine uptake of immunization in the study area. The information so generated may serve to encourage continued support from donor – supported initiatives since available data on Nigeria's performance on immunization coverage show that overall progress has been poor.

1.4 Research Questions

1. What is the routine immunization coverage rate of children 12-23 months old in Odeda LGA?
2. What level of knowledge does the respondent have about immunization and vaccine preventable diseases?
3. What are the factors affecting immunization compliance in Odeda LGA?

1.5 Objectives

1.5.1 General Objective

To determine factors affecting immunization coverage among children aged 12 – 23 months old in Odeda Local Government Area.

1.5.2 Specific Objectives

1. To determine routine immunization coverage rate of vaccine preventable diseases among children aged 12 – 23 months in Odeda LGA.
2. To assess knowledge levels about vaccine preventable diseases among mothers of children 12-23 months old
3. To identify factors affecting routine immunization coverage among children aged 12 – 23 months old in Odeda Local Government Area.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

Edward Jenner is well known around the world for his innovetive contribution to immunization and the ultimate eradication of smallpox (Lakhani, 1992). Jenner's work is widely regarded as the foundation of immunology--despite the fact that he was neither the first to suggest that infection with cowpox conferred specific immunity to smallpox nor the first to attempt cowpox inoculation for this purpose (Dasgupta, 2010). In 1796, Edward Jenner demonstrated that scratching cowpox virus onto the skin produced immunity against smallpox. Following this scientific demonstration, the practice of vaccination gradually became widespread during the 19th century, and began to be applied to other infections.

When Edward Jenner first successfully 'vaccinated' against Small Pox, hardly could he imagine that his experiment would change the future of public health forever. Immunization prevents deaths and for last 3-4 decades it played a pivotal role in tackling infectious disease throughout the world. Immunization is probably the most popular among all public health interventions, as revealed by the fact that more than 100 million children are vaccinated annually with more than 1000 million doses of different vaccines (WHO, 2009).

Immunization is a proven tool for controlling and eliminating life-threatening infectious diseases and is estimated to avert between 2 and 3 million deaths each year. It is one of the most cost-effective health investments, with strategies that make it accessible to all populations. It has clearly defined target groups and can be delivered effectively through outreach activities (WHO, 2012).

2.2 Immunization Activities in Nigeria

In recognition of the risks associated with Nigerian children, one of the important services covered by primary health care (PHC) in Nigeria is immunization (Obioha et al., 2010). Nigeria commenced immunization activities, focusing on the control of yellow fever and smallpox, about 50 years ago (1956). Motivated by the concern and response of the World

Health Organization (WHO) to the global increase in the mortality of children under the age of 2 years. Nigeria launched the Expanded Programme on Immunization (EPI) in 1979. The programme was aimed at the provision of immunization services to children aged 0 – 23 months. EPI experienced some initial successes. However, a few years after the programme started, it was clear that it was no longer achieving its stated objectives and had to be re-launched in 1984. As a result of concerted efforts of the Federal Ministry of Health, State Agencies, and International organizations, Nigeria attained universal childhood immunization (UCI) of 81.5 percent coverage for all antigens in 1990. But the success was not to last long and by 1996, immunization coverage has declined substantially to less than 30 percent for DPT3 and 21 percent for the three doses of oral poliovirus vaccine (OPV) (Babalola and Olabisi, 2004).

However, in view of the critical need to enhance the effectiveness of immunization, which was fast declining, nnd to meet the global challenges of immunization, the EPI was restructured in 1997. It was renamed National Programme on Immunization (NPI) and established as a Parastatal of the Federal Ministry of Health by decree 12 of 1997.

Following the Federal Government Health Sector Reform, NPI wns merged with the National Primary Health Care Development Agency (NPHCDA) in May 2007 (NPHCDA, 2009). Nigeria is a signatory to the declaration on the survival, protection and development of children, which was articulated at the 49th World Health Assembly in 1988. This was further reinforced by the World Summit for children held in New York in 1990 (NPHCDA, 2009). Nigeria in 1995 also adopted the World Health Assembly Resolution (WHAR) and United Nations General Assembly Special Session (UNGASS) goals that by 2005, all countries must achieve: polio eradication, measles mortality reduction and maternal and neonatal tetanus elimination (MNTE). The Millennium Development Goal (MDG) four that: Two-third reduction in under-five mortality rate be achieved between 1990 and 2015 was also adopted. In addition to the above, the country similarly ratified the UNGASS goals, that by 2010: Nigeria should aim at: ensuring full immunization of children under one year of age at 90% coverage nationally with at least 80% coverage in every district or equivalent administrative unit, and vitamin A deficiency elimination (Obioha et al 2010).

Vaccine preventable diseases continue to account for approximately 22% of child deaths in the country, amounting to over 200,000 deaths per year. Nigeria confirmed 48 polio cases in 2010. Two cases had been confirmed as of 18th March 2011. Numerous partner agencies are

implementing projects one after the other with the Government of Nigeria aiming to strengthen routine immunization in the country, particularly across the northern states. These include USAID's Community Participation for Action in the Social Sector Project (COMPASS), World Health Organization, UNICEF, EU Prime, and DFID (Babalola and Adewuyi, 2005).

After a great deal of effort to improve the EPI during the 1980s, an "In-Depth Review" in 1989 reported that an estimated 100,000 lives per year were saved through EPI efforts alone. A series of surveys in 1991 showed that national coverage of fully immunized children up to two years of age was almost 80%. EPI programme progress was most impressive (WHO/UNICEF, 2004).

Immunization remains the primary strategy in both the control and prevention of common childhood diseases, particularly in the developing world. Immunization and health care services were commenced in a rural community in Nigeria in 1998, when vaccine coverage for all Expanded Programme on Immunization (EPI) diseases (tuberculosis, polio, diphtheria, pertussis, tetanus, measles, and hepatitis B) was considerably low with only 43% of children fully immunized (Odusanya et al ,2003).

Vaccine coverage has slowly improved since 2000 but remains below mean regional levels. That year, WHO/UNICEF estimated that DPT3 coverage among children 12-23 months was 23%, polio third dose was 26% and measles containing vaccine (MCV) was 33%. By 2009, the estimates were, respectively, 42% (DPT3), 54% (Pol3) and 41% (MCV) (WHO, 2009).

2.3 Immunization legislation

Decree 29 (1992) established the National Primary Health care Development Agency, locus of the National Immunization Programme. Chapter I, Part 1, Article 17 of Nigeria's 1999 Constitution states "The State shall direct its policy towards ensuring that there are adequate medical and health facilities for all persons". The Fourth Schedule ("Functions of a Local Government Council"), Part 3, Article 2 of Nigeria's 1999 Constitution states: " The functions of a local government council shall include participation of such council in the Government of a State as respects the following matters -... (c) the provision and maintenance of health services" (NPHCDA,2009).

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2.4 Target Vaccine Preventable Diseases

In 2002, WHO estimated that 1.4 million (14% of global total mortality) of deaths among children under 5 years were due to diseases that could have been prevented by routine vaccination (WHO, 2005), while in 2008, an estimate of 1.5 million (17% of global total mortality among children under 5 years) deaths was made (WHO, 2012). Also, global figures indicated that about 19.3 million infants did not receive the basic vaccine against diphtheria-tetanus-pertussis in 2010. Nearly seventy percent of these children live in ten countries: Afghanistan, Democratic Republic of the Congo, Ethiopia, India, Indonesia, Iraq, Nigeria, Pakistan, South Africa and Uganda. These figures portray a globally weak routine immunization programme (WHO/UNICEF, 2005). At least 90% of childhood morbidity and mortality in Nigeria can be attributed to diseases such as diarrhoea, malaria, acute respiratory infection and vaccine preventable diseases (WHO, 2010).

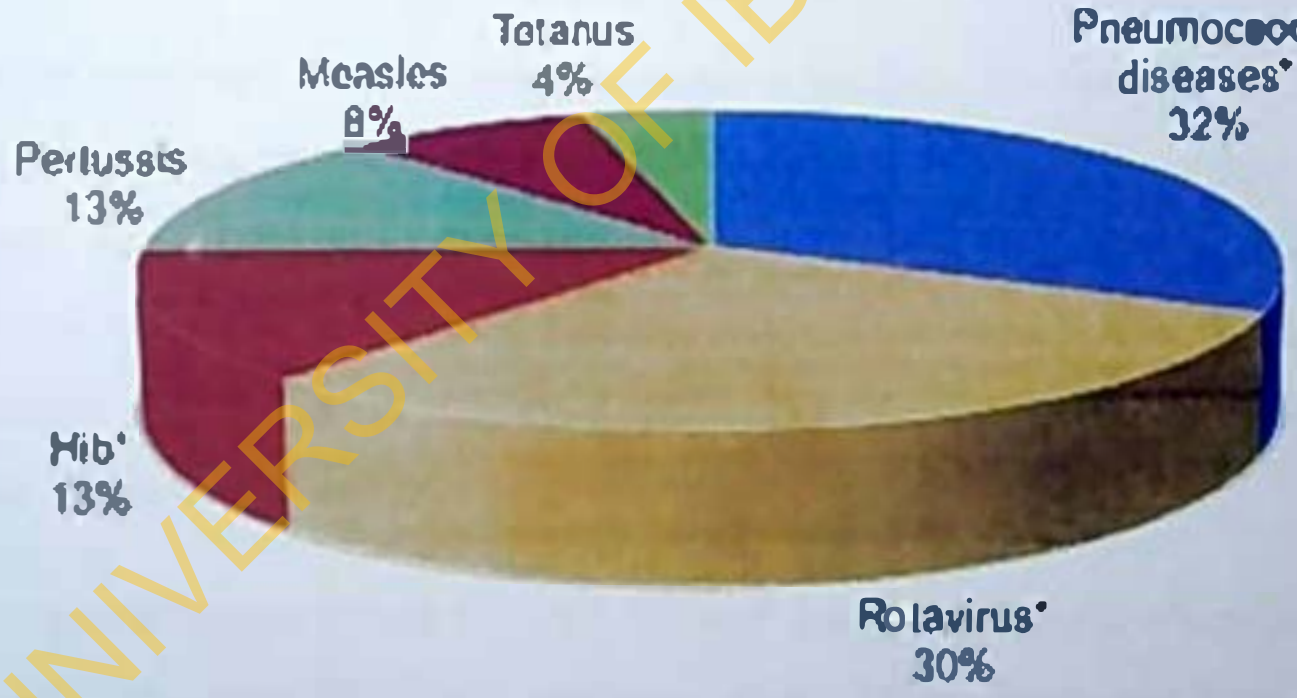

FIGURE 1: Distribution of estimated deaths among children under 5 years from vaccine preventable diseases in 2008.

Routine immunization activities in Nigeria are geared towards protection of children against the following diseases:

2.4.1 Diphtheria

Diphtheria is caused by bacteria called *Corynebacterium diphtheria* which produce toxin that can harm or destroy body tissues and organs. The type of the disease common in the tropics causes ulcers on the skin while another type affects the pharynx and other parts of the throat. Diphtheria affects mostly non-immunized children under the age of 15years. It can also affect people of all ages (FGN/NPI, 2004).

The type of diphtheria that causes ulcers on the skin is spread through contact with skin ulcers. The disease is often disseminated on clothing and other articles contaminated with fluid from ulcers. Overcrowding and poor living conditions favour disease spread. Infection with diphtheria usually manifests within 2 – 4 days. During outbreaks and epidemics infected people may spread the disease without even showing any signs or symptoms. In the type of the disease affecting the skin, the lesions may be painful, reddened and swollen (WHO, 2012, FGN/NPI, 2004).

The diphtheria that affects the throat can cause infection of the nasopharynx, which may lead to breathing difficulty and death. It is spread in droplets and secretions from the nose, throat and eyes. Sore throat, loss of appetite, slight fever and formation of a bluish-white or grey membrane in the throat at the early stages accompanies diphtheria affecting throat and tonsils. The patient may recover at this stage of the throat disease or develop severe forms of the disease. Patients with severe disease or complications may die.

In 2010 global figures indicated, 4,187 reported cases of diphtheria which increased to 4,887 cases in 2011. Year 2010 also indicated about 5,000 deaths and 85% estimated DPT coverage. Countries that reached at least 80% DPT3 coverage in all districts were 29% globally (WHO, 2012).

The most effective way of preventing diphtheria is to maintain a high level of immunization in the community. Diphtheria toxoid is given in combination with pertussis vaccine and tetanus toxoid as DPT vaccine and is given intramuscularly in three doses starting at 6weeks of age with an interval of 4weeks between doses (6wecks, 10weeks and 14weeks).

2.4.2 Hepatitis B

Hepatitis B is a disease caused by the Hepatitis B virus (HBV) present in the blood, saliva, semen, vaginal fluid and other body fluids. It is usually spread by contact with blood through injection, parturition (birth process), contact with cuts, etc. Symptoms may last several weeks and include general weakness, fatigue, loss of appetite, jaundice, dark urine, pale stools, etc. A laboratory blood test is required to distinguish a carrier from a person that has the disease (FGN/NPI, 2004).

Hepatitis B can remain infectious even in dried blood for several weeks (Alter, 2006). The screening of blood for transfusion and use of sterile medical and injecting equipment are of particular importance to the prevention of hepatitis B as well as other infections in healthcare settings (Lavanchy, 2008). The majority, at least 90%, of the morbidity and mortality associated with hepatitis B are manifested in conditions, particularly primary liver cancer and cirrhosis that develop slowly during chronic infection. More than one in every forty deaths worldwide is caused by these two conditions, and the great majority of these result from hepatitis B or C infection (Perz, 2006). Complications associated with HBV include: chronic hepatitis, cirrhosis, liver failure, liver cancer and death.

More than 2000 million people alive today have been infected with HBV at some time in their lives. Of these, about 350 million remain infected chronically and become carriers of the virus. Three quarters of the world's population live in areas where there are high levels of infection. Every year there are over 4 million acute clinical cases of HBV, and about 25% of carriers, 1 million people a year, die from chronic active hepatitis, cirrhosis or primary liver cancer (WHO/GAR, 2012).

In 2002, there was an estimate of 600,000 deaths due to Hep B while 2010 experienced 75% HepB3 coverage. About 92% of countries worldwide have successfully integrated Hep B in their routine immunization programme.

The most effective method of prevention for hepatitis B is vaccination using recombinant DNA or plasma derived hepatitis B vaccine. Three doses are given by the intramuscular route into upper thigh of infant starting at birth or as soon as possible after birth (At birth, 6weeks and 14weeks). The vaccine can also be delivered into deltoid muscle of adult in three doses (WHO, 2012). Vaccines for hepatitis B have been available for almost thirty years. Although

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2.4.2 Hepatitis B

Hepatitis B is a disease caused by the Hepatitis B virus (HBV) present in the blood, saliva, semen, vaginal fluid and other body fluids. It is usually spread by contact with blood through injection, parturition (birth process), contact with cuts, etc. Symptoms may last several weeks and include general weakness, fatigue, loss of appetite, jaundice, dark urine, pale stools, etc. A laboratory blood test is required to distinguish a carrier from a person that has the disease (FGN/NPI, 2004).

Hepatitis B can remain infectious even in dried blood for several weeks (Alter, 2006). The screening of blood for transfusion and use of sterile medical and injecting equipment are of particular importance to the prevention of hepatitis B as well as other infections in healthcare settings (Lavanchy, 2008). The majority, at least 90%, of the morbidity and mortality associated with hepatitis B are manifested in conditions, particularly primary liver cancer and cirrhosis that develop slowly during chronic infection. More than one in every forty deaths worldwide is caused by these two conditions, and the great majority of these result from hepatitis B or C infection (Perz, 2006). Complications associated with HBV include: chronic hepatitis, cirrhosis, liver failure, liver cancer and death.

More than 2000 million people alive today have been infected with HBV at some time in their lives. Of these, about 350 million remain infected chronically and become carriers of the virus. Three quarters of the world's population live in areas where there are high levels of infection. Every year there are over 4 million acute clinical cases of HBV, and about 25% of carriers, 1 million people a year, die from chronic active hepatitis, cirrhosis or primary liver cancer (WHO/GAR, 2012).

In 2002, there was an estimate of 600,000 deaths due to Hep B while 2010 experienced 75% HepB3 coverage. About 92% of countries worldwide have successfully integrated Hep B in their routine immunization programme.

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initially these were expensive and adoption was slow, to date 88% of WHO Member States have introduced the vaccine for some of their population (WHO, 2009).

2.4.3 Measles

Measles is caused by the measles virus a member of the *Morbilli* virus in the genus family *paramyxoviridae* and is highly infectious. It kills more children than any other of the EPI target diseases. It is one of the most readily transmitted communicable diseases and probably the best known and most deadly of childhood rash/fever illnesses. The virus weakens the immune system (WHO, 2009).

Measles virus is spread by droplets and direct contact with nasal or throat secretions of infected persons when they sneeze or cough, less commonly by airborne spread or by articles freshly soiled with nose and throat secretions (FGN/NPI, 2004).

Incubation period of the disease ranges from 7 – 18days. The first sign of infection is a high fever lasting 1 – 7days which may be accompanied by running nose, cough, red and watery eyes. This is usually followed by a slightly raised rash from the face and upper neck to the body, hands and feet over a period of 3 days. The rash lasts for 5 – 6days and fades away. Complications occur in children less than 5years and adults over 20years and include severe diarrhoea, dehydration, inflammation of ear and respiratory tract, encephalitis and blindness. The other complication is pneumonia, which is the commonest cause of death associated with measles (FGN/NPI, 2004). In 1990, measles was the eighth leading cause of death. In 1997, it was the sixth leading cause. This is analyzed to represents a greater loss of life than that caused by AIDS and almost as great a loss as that caused by malaria. The majority of deaths occur among young children. In developing countries, measles accounts for 10 percent of all deaths in children under age of 5 years.

In 2008, there was an estimate of 164,000 deaths due to measles while 2010 experienced 299,201 reported cases and an estimated MCV coverage of 85% globally. Also, 65% of the countries in the world have reached at least 90% MCV coverage (WHO, 2012).

Prevention of measles involves immunization with life attenuated viral measles vaccine as a single dose by the intramuscular or subcutaneous route at 9months or before the age of 1year (WHO, 2009).

2.4.4 Pertussis

Pertussis also known as whooping cough is a disease of the respiratory tract caused by the bacteria *Bordetella pertussis* which lives in the mouth, nose and throat. This disease is most dangerous in children less than 1 year (FGN/NPI, 2004).

Pertussis is spread from person to person through droplets produced during coughing or sneezing. The disease usually has 3 stages. Stage 1 shows the child with signs and symptoms of common cold with cough bouts of four to eight weeks. In stage 2, cough worsens with numerous bouts of rapid coughing followed by frequent vomiting and exhaustion usually at night. Stage 3 is the recovery phase when coughing becomes less intense and stops in two to three weeks (FGN/NPI, 2004).

However, complications most probable in young infants may include convulsions and seizures, dehydration, etc. The commonest complication and cause of most deaths is bacterial pneumonia.

Worldwide, it is estimated that there are 30-50 million pertussis cases and about 300,000 deaths per year (CDC, 2006). In 2008, there was an estimate of 195,000 deaths due to pertussis while 2010 experienced 91,689 reported cases and an estimated DPT3 coverage of 85% globally (WHO, 2009).

Prevention involves immunization with pertussis (Inactivated whole cell wP or acellular aP) vaccine usually given by the intramuscular route in combination with diphtheria and tetanus toxoid as DPT. It is given in 3 doses starting at 6 weeks with 4 weeks between doses (6weeks, 10weeks and 14weeks). A person infected with pertussis usually acquires lifelong immunity (FGN/NPI, 2004).

2.4.5 Poliomyelitis

Poliomyelitis also known as polio is caused by poliomyelitis virus. It is a crippling disease that can occur in adults but is commoner in children. The disease can be caused by any one of 3 related viruses, polio virus types 1, 2, or 3. The virus multiplies in the intestine, enters the blood stream and may invade certain types of nerve cells which it can damage or destroy (FGN/NPI, 2004).

Infection with the virus occurs through the mouth in food and drink contaminated by feaces mostly in area with poor sanitation. The virus can also be spread through coughing or sneezing when it occurs in nose and throat secretions. Infected persons without symptoms can also spread the disease (FGN/NPI, 2004).

People infected with polio may not feel ill or have influenza-like symptoms such as fever, stomach ache, headache, etc. Paralytic polio begins with the milder forms causing severe muscle pain and fever. Paralysis usually develops during the first week of illness. The use of one or both legs or arms may be lost. About 1 in 200 infected children become paralyzed and mostly permanently. Death may occur if muscles used for breathing are paralyzed and there is no access to a respirator (FGN/NPI, 2004).

In Nigeria, polio incidence has dropped more than 99 percent since the launch of global polio eradication efforts in 1988. According to global polio surveillance data from August 28, 2012, 128 polio cases were reported from four countries, the bulk of which (96 percent or 123 of the 128 cases) are from the three remaining endemic countries - Pakistan, Afghanistan and Nigeria. This figure is the lowest number of cases globally to have been recorded during a seven-month period in the last 10 years. Nigeria remains the most polio endemic country with over 70 cases of new infections by the end of August 2012. Although the country has reached an estimated 90 percent of all children at risk in the country with polio vaccinations, difficulty now is in reaching the final 5-8 percent of the missed children that are required to reach a herd immunity level sufficient to eradicate the virus (Ogundipe, 2012).

In 2004, there was a global estimate of less than 1,000 deaths due to polio while 2010 experienced 1,348 deaths. Year 2011 experienced 716 reported cases and an estimated OPV coverage of 86% (WHO, 2012).

Polio prevention is obtained by immunization with live oral polio vaccine (OPV) given in four doses starting at birth with an interval of at least 4weeks between doses (0, 6weeks, 10weeks and 14weeks). Polio can also be prevented with Inactivated polio vaccine (IPV) given by injection in two – three doses depending on country schedule. Infected people who recover can develop natural immunity that protects them against the particular polio strain that infected them (FGN/NPI, 2004).

2.4.6 Tetanus

Tetanus or 'lock jaw' is caused by exposure to the spores of *Clostridium tetani* which are universally present in the soil and found growing in damaged tissues. The bacteria produce potent neurotoxins in dead tissue that poison nerves that control muscles thus causing stiffness. This disease is particularly common and serious in newborn babies, when it is known as neonatal tetanus. Almost all babies who contract tetanus die (FGN/NPI, 2004).

Tetanus is a worldwide disease whose incidence is highest in developing countries. In most Western nations, however, the incidence is less than one case per million-population per year (WHO, 1995).

Infection with tetanus may occur if soil or animal dung comes in contact with a wound or cut and in deep wounds caused by dirty nails, needles, thorns and animal bites. A new born may be infected if dirty knife or razor (contaminated with soil which is a reservoir of the organism) is used to cut the umbilical cord or skin. In new born babies, symptoms usually appear 4 – 14days after infection and include muscular stiffness, difficulty in swallowing, muscle spasms, sweating and fever. Complications observed with tetanus include fractures, abnormal heartbeat, coma and eventual death in the very young (FGN/NPI, 2004).

In 2008, there was a global estimate of 61,000 deaths due to tetanus in children less than 5 years of age while 2010 experienced 9,683 reported cases and an estimated DPT3 coverage of 85% (WHO, 2009).

Tetanus toxoid is administered by the intramuscular route to children for protection against tetanus in combination or single component products such as DPT, DT, TT or Td which is given in 3 doses starting at 6 weeks of age with 4 weeks between doses (6weeks, 10weeks and 14weeks). Persons who recover from tetanus still need vaccination to acquire immunity against the disease (FGN/NPI, 2004).

2.4.7 Tuberculosis

Tuberculosis (TB) is caused by bacterium *Mycobacterium tuberculosis*. The bacteria attack the lungs and other parts of the body including the bones, joints and brain. Tuberculosis affects people of all ages with the highest risk in children under 3 years of age and very old people (WHO, 2009).

TB is spread through air when an affected person coughs or sneezes and the bacteria are released into air. Inhaling air containing TB bacteria may cause a person to be infected and TB spreads rapidly where people live in crowded conditions, have poor access to healthcare and are malnourished. In some areas, consumption of unpasteurized milk from infected cattle may cause bovine TB. People who have weakened immune system (eg., people living with HIV/AIDS) are more likely to develop the disease than those with normal immune system (FGN/NPI, 2004).

General symptoms of TB include weakness, weight loss, fever, night sweats, persistent cough, chest pain and coughing up of blood. However in children, the only sign of pulmonary tuberculosis may be failure to thrive and stunted growth. People who fail to take their medication as prescribed or to complete their course of therapy may develop multi-drug-resistant TB which can be spread to other people. An infected person can infect others for several weeks even after beginning treatment. Not everyone who is infected with TB bacteria develops the disease itself. People who are infected but do not develop the disease do not spread the infection to others (FGN/NPI, 2004).

TB is second only to HIV/AIDS as the greatest killer worldwide due to a single infectious agent. In 2010, 8.8 million people fell ill with TB and 1.4 million died from TB. Over 95% of TB deaths occur in low- and middle-income countries, and it is among the top three causes of death for women aged 15 to 44. TB is a leading killer of people living with HIV causing one quarter of all deaths. Multi-drug resistant TB (MDR-TB) is present in virtually all countries surveyed. TB death rate dropped by 40% between 1990 and 2010 (WHO, 2012). The Incidence of tuberculosis (per 100,000 people) in Nigeria was last reported at 133.00 in 2010, 130.00 in 2009 and 145.00 in 2008 according to a World Bank report released in 2012.

The best protection available against TB meningitis and other severe forms of TB in children less than five years old is immunization of infants with BCG vaccine. BCG vaccine is given as a single dose at birth or as soon as possible after birth. BCG vaccine is not recommended after 12 months due to variable and less certain protection (WHO, 2009).

2.4.8 Yellow Fever

Yellow fever (YF) is caused by the yellow fever virus. It is an acute disease of high mortality. In epidemics, up to 50% of infected people may die. The virus is spread by mosquitoes of the *Aedes aegypti*. The mosquitoes are vectors of the disease and acquire the virus by biting infected animals or humans then incubate the virus before transferring it to another human. The illness may be mild and undiagnosed and may be confused with malaria, hepatitis or other diseases. Signs and symptoms include fever, chills, backache, stomach upset, bleeding gum, jaundice, black vomitus. Complications include convulsion, coma and death (FGN/NPI, 2004).

In 2002, there was an estimate of 30,000 deaths due to yellow fever while 2010 experienced 737 reported cases and an estimated YF coverage of 50% in the 45 countries at risk. In 2011, an incidence of 2,597 cases and 68 deaths were estimated (WHO, 2012).

The disease is prevented by immunization with live viral yellow fever vaccine using the subcutaneous route. It is given as a single dose at 9 months of age. Elimination of breeding space for the vectors is also an important factor in prevention of the disease (FGN/NPI, 2004).

2.5 Immunization Programmes

2.5.1 Expanded Programme on Immunization (EPI)

The Expanded Programme on Immunization (EPI) was established in 1974 through a World Health Assembly resolution (resolution WHA27.57) to build on the success of the global smallpox eradication programme, and to ensure that all children in all countries benefited from life-saving vaccines (WHO, 2010).

The first diseases targeted by the EPI were diphtheria, whooping cough, tetanus, measles, poliomyelitis and tuberculosis. Global policies for immunization and establishment of the goal of providing universal immunization for all children by 1990 were established in 1977, this goal was considered an essential element of the WHO strategy to achieve health for all by 2000.

When the EPI was initiated in 1974, fewer than 5% of children in developing countries were receiving a third dose of DPT and poliomyelitis vaccines in their first year of life. These

coverage levels have now surpassed 50% in developing countries, and millions of cases of the target disease have been prevented (Keja et al, 1988).

In 2010, an estimated 85% of children less than one year of age globally had received at least three doses of DPT vaccine (DPT3). Additional vaccines have now been added and most countries, including the majority of low-income countries have added hepatitis B and Haemophilus influenzae type b (Hib) to their routine infant immunization schedules and an increasing number are in the process of adding pneumococcal conjugate vaccine and rotavirus vaccines to their schedules(WHO,2010).

The Expanded Programme on Immunization remains committed to its goal of universal access to all relevant vaccines for all at risk. The programme aims to expand the targeted groups to include older children, adolescents and adults and work in synergy with other public health programmes in order to control disease and achieve better health for all populations, particularly the underserved populations. (WHO, 2011)

The vision of EPI in Nigeria is to improve the health of Nigerian children by eradicating all the identified six killer diseases, which are polio, measles, diphtheria, whooping cough, tuberculosis, and yellow fever. Between 1985 and 1990, as contained in the National health plan for that period, the objectives of EPI were to strengthen immunization, accelerating disease control and introducing new vaccines and relevant technologies, and tools (Obioha et al, 2010).

In 1998, Nigeria drew the core activities of her EPI policies which included the following:

(i) Monitoring of the performance, quality and safety of the immunization system;

(ii) Assessment of the current and "future" burden of vaccine preventable diseases in terms of sickness, death and disability, as well as the economic burden,

(iii) Assessment of the impact of vaccination strategies, through epidemiological surveillance and reliable laboratory confirmation,

(iv) Monitoring of the National immunization policies, particularly the vaccines used and the target population (immunization schedules), and

(v) Monitoring of the overall immunization coverage and ensuring that all districts of the country are well covered with vaccination (Obioha et al, 2010).

EPI was renamed National Programme on Immunization (NPI) and established as a Parastatal of the Federal Ministry of Health in 1997. Following the health sector Reform, NPI was merged with the National Primary Health Care Development Agency (NPHCDA) in May 2007. The NPHCDA is now charged with the responsibility of effectively controlling vaccine-preventable diseases through immunization and the provision of vaccines (NPCHCDA, 2009).

In Nigeria, all three levels of government (Federal, State and Local) are important partners, committed to the formulation of strategies and support for the implementation of an effective immunization programme (NPCHCDA, 2009).

Problems encountered by the Programme have included: lack of public and governmental awareness of the scope and seriousness of the target diseases; ineffective programme management; inadequate equipment and skills for vaccine storage and handling; and insufficient means for monitoring programme impact as reflected by increasing immunization coverage levels and decreasing incidence of the target diseases (Babalola and Adewuyi, 2005).

2.5.2 Global Immunization Vision and Strategy (GVIS)

In 2005, WHO and UNICEF worked with partners to create a Global Immunization Vision and Strategy (GIVS) for 2006 – 2015 (WHO, 2005). This strategy envisions a world in which every child, adolescent and adult has equal access to immunization services (RED Approach, WHO, 2008). GIVS articulates the WHO and UNICEF visions for global immunization in 2015 and is composed of four strategic areas:

(i) Protecting more persons in a changing world by improving routine immunization coverage, ensuring at least four immunization contacts per child, and expanding immunization programmes to all ages;

(ii) Introducing new vaccines and technologies;

(iii) Integrating immunization, other linked health interventions, and surveillance in the health systems context; and

(iv) Creating global partnerships to support and finance immunizations (CDC, 2006).

GIVS is the first ever strategic framework for immunization designed to respond to the challenges of a rapidly changing and increasingly interdependent world. It presents a wide range of initiatives which countries can choose from to address their own specific needs. UNICEF and the WHO say the objectives outlined in the strategy must be addressed if the world is to achieve the Millennium Development Goal of a two thirds reduction in mortality among children under five by 2015. GIVS proposes that between 2006 and 2015, all those working on immunization and related product development should strive to prevent morbidity and mortality by achieving the following goals and targets.

By 2010 or earlier

- Increase coverage. Countries will reach at least 90% national vaccination coverage and at least 80% vaccination coverage in every district or equivalent administrative unit
- Reduce measles mortality. Globally, mortality due to measles will have been reduced by 90% compared to the 2000 level.

By 2015 or earlier

- Sustain coverage
- Reduce morbidity and mortality
- Ensure access to vaccines of assured quality
- Introduce new vaccines
- Ensure capacity for surveillance and monitoring
- Strengthen systems
- Assure sustainability (WHO,2010)

2.5.3 Global Alliance for Vaccines and Immunization (GAVI)

In 2000, the GAVI Alliance, a global health partnership representing private and public stakeholders, was established to improve vaccination services in poor countries and to improve coverage with new and underutilized vaccines. By pulling the specialist skills of all the main players in immunization - WHO, UNICEF, the World Bank, the Bill & Melinda Gates Foundation, donor governments, developing countries, international development and

finance organizations and the pharmaceutical industry - into one, decision-making body, GAVI has brought a single-minded focus to the urgent task of closing three critical gaps in the provision of vaccines:

- between children for whom immunization is a given and the 19 million children worldwide with no access to vaccines;
- between the introduction of a new vaccine in rich countries and the average 10-15 years required for the same vaccine to reach low-income countries;
- between the need for new vaccines in developing countries and the lack of research and funds to provide them (GAVI Alliance, 2012).

Since 2000, $2.2 billion has been disbursed to approximately 70 countries to support vaccination services, injection safety, new vaccine introduction, and the strengthening of health service systems. Nonetheless, if the GIVS goal for global coverage is to be met, strategies known to be effective must be prioritized and implemented in all countries (CDC, 2009)

Nigeria obtained conditional approval for GAVI support funds for immunization support services and new and under – utilized vaccines in 2002. In October of same year, 37 GAVI consultants were appointed to give technical support to all states and the federal capital territory of the country. These consultants were expected to develop proposals for GAVI funding in the states and LGAs in line with the country's 5 – Year Strategic Plan for strengthening immunization service delivery. By May, 2003, the GAVI Award Review committee recommended 15 states and 187 LGAs for GAVI funding (WHO, 2005).

According to a recent report, Nigeria is highly strategic for GAVI which aims to reach the final 20% of the world's children who still do not have access to routine immunization. Nigeria accounts for an estimated 1.7 million of the 19.3 million children who did not receive routine immunization in 2010. GAVI Alliance, estimates that 72 GAVI-eligible countries will be using pentavalent vaccine by 2013 in their routine immunization systems (GAVI Alliance, 2012)

Pneumonia and diarrhoea account for nearly one-third of the deaths among children under five years of age globally – or more than 2 million lives each year. Nearly 90% of deaths from pneumonia and diarrhoea occur in sub-Saharan Africa and South Asia. The prevention

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and treatments for both diseases often overlap, and include among others steps as increasing vaccine coverage, and disseminating oral rehydration salts to children with diarrhoea and antibiotics to children with bacterial pneumonia (GAVI Alliance, 2012).

Appropriate care for children with pneumonia symptoms is haphazard, with less than one-third of affected children receiving antibiotics. Oral rehydration salts, a traditional, low-cost response for children with diarrhoea, are used by only one-third of sick children in developing countries – signaling a failure to deliver one of the tried and true child survival interventions. New vaccines against the major causes of pneumonia and diarrhoea are already available and low-income countries urgently need to introduce them into routine immunization programmes (GAVI Alliance, 2012).

In 2011 Nigeria received GAVI approval to introduce the Pentavalent vaccine in a phased manner, starting in May 2012. This 'five vaccines – in – one' protects children between 6 weeks and 11 months against five childhood killer diseases (Pertusis, Diphtheria, Tetanus, Hepatitis B, and Heamophilus Influezae B). WHO has provided technical support in the successful submission of proposal to GAVI for Pentavalent and Pneumococcal conjugate vaccine introduction in Nigeria (WHO, 2012).

With a view to improving child health, the Nigerian government introduced the first phase of pentavalent vaccine into her routine immunization schedule in June, 2012 (WHO, 2012). The thirteen states and FCT which were parts of the first phase of the introduction are: Jigawa, Kaduna, Adamawa, Bauchi, Kwara, Plateau, Enugu, Anambra, Rivers, Edo, Akwa-Ibom, Ekiti and Lagos States and FCT. The remaining parts of the country should be covered in the next few months (WHO, 2012).

In 2013, Nigeria is set to introduce pneumococcal vaccines, helping to protect against pneumonia, still the world's biggest killer of children under the age of five. When the pentavalent and pneumococcal vaccines are fully rolled out, Nigeria's child mortality rate is expected to drop by an estimated 17%, preventing some 30,000 child deaths every year (Ogundipe, 2012).

2.6 Immunization Delivery Activities / Strategies

No single strategy is likely to be appropriate for all circumstances and all diseases. The choice of strategy should depend upon the epidemiology of the disease, the characteristics of the vaccine, the facilities available, the accessibility of the population, their cultural attitudes and practices and the socio-economic level and health systems context of the country. (Cutt, 1998)

There are four basic elements common to any public health intervention of which immunization is one. These elements are:

- Sustainable financing; involves reliable and sustainable multi – year financing strategies including costing, budgeting, mobilization and efficient use of resources.
- Strengthening Human and Institutional Resources; is systematic national institution and system strengthening of staff.
- Management; involves management, monitoring and evaluation of immunization services
- Operational components

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- Operational components

FIGURE 2: Basic Elements of Intervention Systems

These elements are all linked one to the other with operations occupying the center thus coordinating all the elements as seen in Fig 2 above.

The operational components of immunization services can further be divided into five (Fig 3), these include

- Vaccine supply and Quality
- Logistics
- Service Delivery
- Surveillance
- Advocacy and Communication

(Technet, 2001)

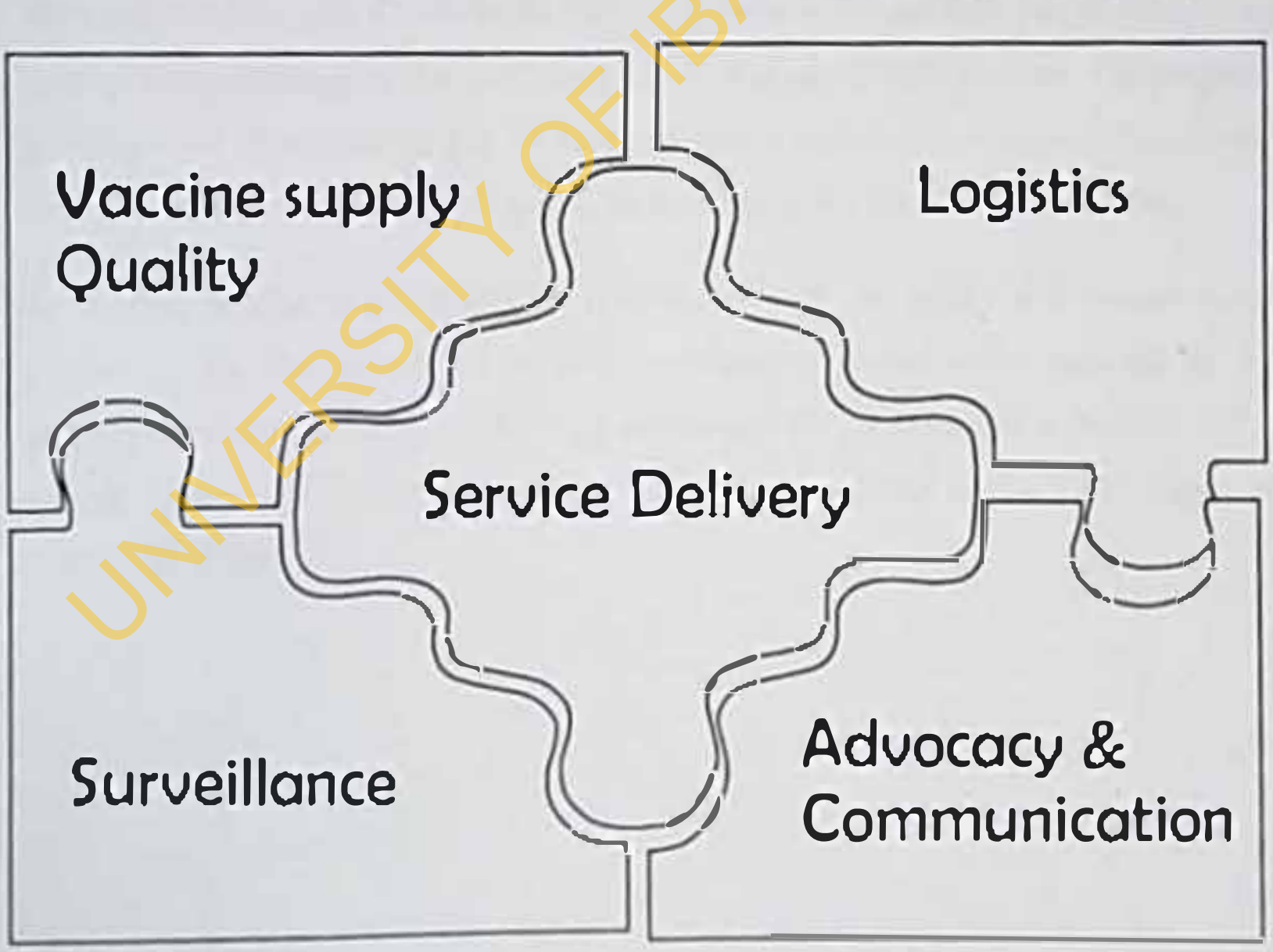

FIGURE 3: 5 Components of Immunization Services

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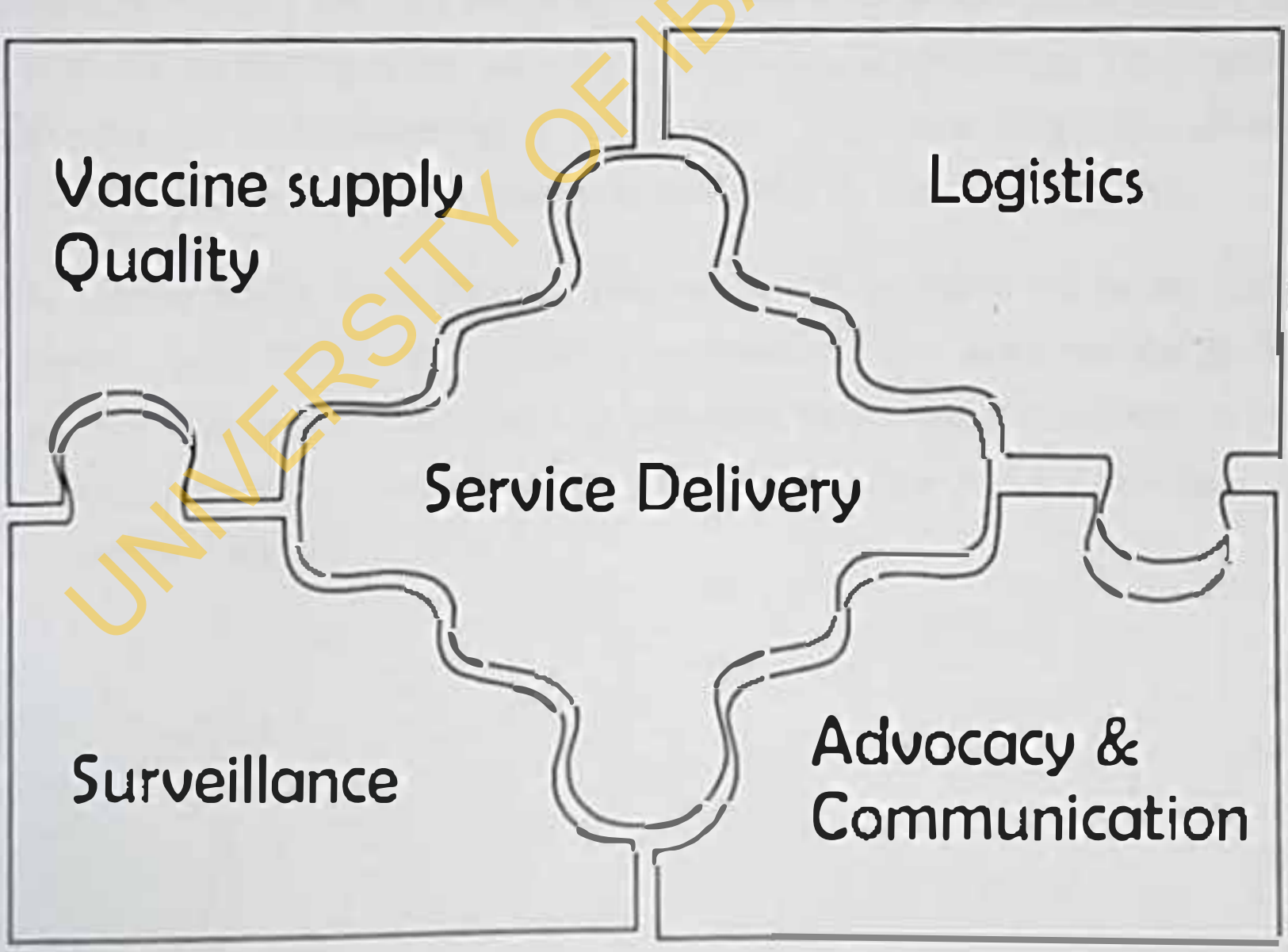

FIGURE 3: 5 Components of Immunization Services

2.6.1 Routine Immunization

Routine immunization (RI) involves the provision and administration of potent vaccines against childhood killer diseases to young children and tetanus toxoid to women of childbearing age using an approved national immunization schedule (Babalola and Aina, 2009). In Nigeria, the schedule is designed to include all children 0-1 years who shall receive one dose of BCG, 3 doses of DPT vaccine, 3 doses of Hep B vaccine, 4 doses of OPV and one dose each of Measles and Yellow Fever vaccines (NPCHCDA, 2009).

Routine immunization gradually figured in the priority list of national public health programmes and World Health Organization endorsed the process with advocacy for Expanded Programme on Immunization. As the national commitments materialized into action, results were evident. Globally, Measles Containing Vaccine (MCV) coverage rose from 16% in 1980 to 82% in 2007 (UNICEF, 2009).

Routine immunization is often an entry point into primary health care. However, in four PRRINN-MNCH (Partnership for Reviving Routine Immunization in Northern Nigeria; Maternal Newborn and Child Health Initiative) states in the northern part of Nigeria, routine immunization coverage is low, indicating a lack of access to PHC services. The programme is working with all stakeholders at all levels to ensure that routine immunization services are available and that vaccines arrive safely, on time and to the people that need them.

In Nigeria, routine immunization is provided through the public and private healthcare centres, NGOs also provide RI in some communities. Public sector provides RI through primary healthcare facilities run by LGA authorities. This is headed by a Director of Primary Health centre who is assisted by an Immunization officer and a Cold Chain officer (FGN/NPI, 2004).

2.6.2 Reach Every Ward (REW)

The World Health Organization (WHO) and partners designed the Reaching Every District (RED) approach in 2002 as an innovative method to increase and sustain high levels of routine immunization (RI), particularly in the Africa region. This approach has a number of unique characteristics, including:

- targeting unimmunized children;
- prioritizing limited resources by basing planning on weaker performing areas,
- decentralizing with focus on the district or Local Government Area (LGA) level downward,
- aiming at flexibility and adaptation to include integration and strengthening of other primary health care interventions.

The RED approach, which supports the Global Immunization Vision and Strategy 2006-2015, was developed by WHO and UNICEF for setting a vision for equal access to immunization services. Specifically, RED calls for "At least 90% national vaccination coverage and at least 80% (average required for herd immunity against vaccine preventable diseases) vaccination coverage in every district by 2010 or sooner" (FMOH/NPI,2004).

Nigeria adopted the RED approach in December 2004 to its country context for "Reaching Every Ward"(REW). In Nigeria, a ward represents the lowest administrative and political level (USAID, 2009). The REW Field Guide defines "Reaching Every Ward approach as a strategy aimed at provision of regular, effective, quality and sustainable routine immunization activities in every ward, so as to improve immunization coverage. It focuses at improving the organization of immunization services so as to guarantee equitable immunization for every child.

Based on most common barriers to achieving immunization goals, the REW approach has the following five operational components needed for planning to Reach Every Ward:

(i) Planning and management of resources — better management of human and financial resources.

(ii) Improving access to immunization services — establishing or re-establishing fixed immunization sites as well as outreach or mobile immunization sites.

(iii) Supportive supervision — regular visits with on-the-job training by supervisors, feedback and follow-up with health staff, promotion of use of data.

(iv) Monitoring for action — using tools and providing feedback for continuous self assessment and improvement, including review meetings to promote use of data, charting of doses, and participatory mapping of the population in each health facility catchment area.

(v) Linking services with communities — community participation in health services, planning and jointly identifying a role for the community; involving village development committees (VDCs), ward development committees and(WDCs) traditional birth attendants (FGN/NPI, 2007).

In 2006, Nigeria developed and disseminated nationwide its REW guide and tools. Comprehensive training was then provided to all States and LGAs in 2007. In October 2006, IMMUNIZATIONbasics Nigeria, a USAID-funded project, embarked on a two – and – a half year effort in two States to put REW into action, and thereby strengthen routine immunization services (USAID, 2007). In April 2009, a project review team concluded that IMMUNIZATIONbasics (IMMbasics) had developed a practical and affiordable way to make REW operational in the context of the weak Primary Health Care (PHC) system in Nigeria (USAID, 2009).

A total of 53 countries have implemented the reaching every district (RED) strategy, key strategy for increasing routine immunization coverage by WHO. The RED strategy encourages supportive supervision, regular outreach services, community links with service delivery, monitoring and use of data for action, and better planning and management of human and financial resources (WHO, 2012).

2.6.3 Supplementary Immunization Activities

Supplementary immunization activities are conducted in addition to the provision of routine immunization services (WHO, 2005) and are used to reach children who have not been vaccinated or have not developed sufficient immunity after previous vaccinations It can be conducted either nationally or sub-nationally in selected areas It also aims at strengthening routine immunization and other child survival interventions like deworming, vitamin A supplementation, ITN distribution and anti – malarial drugs.

2.6.3.1 National Immunization Days (NIDs)

National immunization days (NIDs) are mass campaigns during which supplemental doses of oral poliovirus vaccine (OPV) are given to all children in a country to interrupt the transmission of wild polioviruses. NIDs are one of the four critical strategies recommended by the World Health Organization (WHO) for global poliomyelitis eradication and should be conducted in all countries where there is evidence that poliovirus is widespread or where acute flaccid paralysis (AFP) surveillance is unreliable. As of June 1996, 67 countries had conducted NIDs and 30 were planning to. WHO recommends that NIDs consist of two rounds, 4-6 weeks apart, during the season of low poliovirus transmission; that each round be conducted over as short a time period as possible; and that OPV be administered to all children <5 years of age, regardless of immunization status. NIDs were advocated by the Pan American Health Organization (PAHO) and implemented by countries in the Americas during the 1980s Effective implementation of NIDs has led to the eradication of wild polioviruses in the Region of the Americas and progress toward its eradication from several countries of other regions. Although most countries in which polio is endemic have adopted the WHO-recommended approach to NIDs, some variations exist, largely a result of operational limitations or inadequate resources to procure sufficient vaccine (Maureen et al, 1997).

To achieve polio eradication, National Immunization Days (NIDs) are recommended, in which all children in the target age, usually under 5 years, receive OPV during a short period with the aim of displacing the wild virus from communities by the mass circulation of the vaccine virus (Quadxos et al, 1992)

National Immunization Days (NIDs) is a special programme of supplemental immunization that aims to improve the coverage of polio vaccine nationwide and particularly in States where the wild poliovirus is prevalent. Although the oral polio vaccine is also provided through RI, the main rationale for the continuing implementation of NIDs is the persistently low coverage of OPV3 in the last few years. In Nigeria, "National Immunization Days" (NIDs) were conducted in 1988 with the purpose of promoting public understanding of immunization and to increase level of coverage. Again in 1989, the EPI was revised including immunization policy, strategies, and schedules "State Immunization Days" (SIDs) were instituted. For the period 1990-92, the objective is to immunize children up to two years of age, although the priority target is children below one year (NICS, 2003).

2.6.3.2 Mop up Campaign

Once polio transmission is reduced only to focal areas after NIDs, 'mopping up' operations, consisting of door to door vaccination are conducted in areas at risk. Focal areas include those where cases have been found over the previous three years, usually in areas with high population density and mobility, poor sanitation and low routine immunization. Every case of acute flaccid paralysis (AFP) is investigated, and stool specimens are collected from cases and contacts for viral isolation (Quadros et al, 1992)

As a result of efforts embarked on by the Nigerian Government to eliminate and eradicate particular vaccine preventable diseases with particular attention on achieving the global goal of stopping poliovirus transmission and control of deaths due to measles, by 2002, many states in the south of Nigeria were largely polio free (FMOH,2004). The picture today however portray that poliovirus is still present in Nigeria especially in the Northern part of the country where some resistance to the uptake of vaccines was recorded for a period of time.

2.6.3.3 Catch up Campaign

In the measles eradication strategy, initial mass 'catch-up' campaigns, targeting the age group where most susceptibles have accumulated (1-15 years in the Americas), are used. To prevent resurgence of measles, programmes must sustain high routine vaccination coverage of infants, and conduct periodic supplemental campaigns when susceptibles (comprising unvaccinated persons and vaccine failures) accumulate. Surveillance of suspected measles cases with laboratory confirmation of cases is another key element of this strategy (de Quadxos et al, 1996)

In an attempt to reduce morbidity and mortality due to measles, Nigeria conducted a measles catch-up campaign in two phases: December 2005 (three zones) and July 2006 (three zones). The northern zone was selected for the first phase due to high disease burden and relatively lower measles vaccine coverage. The campaign targeted children 9 months to 14 years with the objective of providing a second opportunity for children who had received as well as those who missed routine vaccination (FMOH, 2008).

2.7 Immunization Coverage in Nigeria

Inadequate levels of immunization against childhood diseases remain a significant public health problem in resource-poor areas of Nigeria (Abdulraheem et al.,2011). In 2004, the country included hepatitis B and yellow fever vaccines in its national schedule, recommending the receipt of three doses of hepatitis B at birth, at six weeks of age, and at 14 weeks of age while yellow fever should be given at nine months of age, along with measles vaccine (FGN/NPI, 2004).

Nigeria like many countries in the African region is making efforts to strengthen its health system in general and routine immunization services in particular to reduce disease burden from vaccine preventable diseases (VPDs). This is against a backdrop of poor routine immunization coverage: 12.7% National Average (NICS, 2003)

With a population of approximately 140 million, Nigeria remains Africa's most populous nation and vaccine preventable diseases account for approximately 22% of child deaths in the country, amounting to over 200,000 deaths per year. The Expanded Programme on Immunization (EPI), responsible for routinely delivering immunization, started in the late

1970s In 1990, reported DPT3 coverage in infants (<12 months of age) reached an estimated 56% During the years following the global Universal Childhood Immunization efforts that culminated in 1990, immunization coverage rates in Nigeria declined significantly. Preliminary results of a 2006 national coverage survey reported 36% DPT3 coverage and only 18% of children fully immunized (aged 12-23 months at survey time). The survey results reveal significant differences across zones ranging from 0%-40% fully immunized children (FMOH, 2006).

Despite obvious political will, government efforts and the contribution of international non-governmental organizations (NGOs) and donor agencies, the immunization coverage rates in Nigeria are among the lowest in the world. The 2003 Demographic Health Survey (DHS) showed that only 13 percent of children aged 12-23 months received full immunization. In addition, Nigeria is one of the last reservoirs of poliovirus and is now considered the greatest threat to the global eradication of polio (Babalola and Adewuyi, 2005).

UNICEF estimates of coverage per antigen provide information on only four antigens in Nigeria, these are BCG (TB), DPT (Diphtheria, Pertusis and Tetanus), Polio and Measles. According to UNICEF data, between 1995 and 2005, BCG coverage in Nigeria witnessed a decline from 80% in 1990 to 42% in 1995 and from 1995 to 2003, the coverage oscillated between 43% in 1996 and 60% in 2003. In 1997, BCG recorded 53% (UNICEF, 2004). BCG coverage between 2004 and 2011 experienced a lift but not enough to meet the target of at least 80% coverage as indicated in EPI policy in Nigeria with 65%, 77% and 64% in 2008,2010 and 2011 respectively (WHO, 2012). EPI policy in Nigeria stipulated that by 2004 no community should have or report cases of Diphtheria in the country. The results show that the vision is not yet realized. In 1990, DPT had 56% coverage, dropped to 31% in 1995 and 26% in 1996. The peak between 1995 and 2005 was 45% as recorded in1997. DPT3 recorded a coverage range of40% - 69% between 2006 and 2011with 69% in 2010 and 47% in 2011 (WHO, 2012). In 1990, Polio coverage was 55%, which dropped to 31.5% in 1995, and between 1996 and 1999 it ridiculously dropped to between 26% and 19%. In 2000, it picked up to 26% and continued to rise up to 45% in 2005 (UNICEF, 2007). OPV3 coverage was 54%, 75% and 73% in 2007, 2010 and 2011 respectively. With these results, it shows that the country's target of eradicating Polio in Nigeria by the year 2004, through 95% coverage vision was not met. Measles coverage recorded 54% in 1990 and dropped to 44% in 1995 with further drop to 38% in 1996. The peak coverage was 69% in 1997, which later dropped to 40% in 1998 and to 55% in 1999. Since 1999, it has not changed over the years

except in 2004 and 2005 when the coverage further dropped to 32% in 2004. However, there was an increase in coverage of MCV from 44% (2006) to 64% (2009) and a constant value of 71% in 2010 and 2011 (WHO, 2012).

From the figures above there is a notable trend of a relative increase in coverage of most of the considered antigens from 2003 to 2010 while in all of the antigens except MCV which remained constant, a decline in coverage was experienced in 2011.

2.8 Local Vaccination Cultures

Public opinions about vaccination include varied and deep-seated beliefs, a result of the tension between divergent cultural viewpoints and value systems. Several key cultural perspectives on vaccination stem from individual rights and public health stances toward vaccination, various religious standpoints and vaccine objections, and suspicion and mistrust of vaccines among different global cultures and communities (USAID, 2010).

2.8.1 Knowledge and Perception about Immunization

It is an established fact that although, many parents have knowledge about the efficacy of immunizing their children, culture overrides such knowledge in some cases (Ojikutu, 2012).

A study commissioned by the National Programme on Immunization (NPI) looked to examine knowledge, attitude and perceptions regarding vaccination in 11 states in Northern Nigeria. The parameters examined included awareness of the protective properties of vaccines, reasons for acceptance of poliomyelitis immunization, reasons for rejection of polio vaccines, and reasons for poor uptake or rejection of immunization in general. Based on findings, investigators concluded that: the majority of respondents were aware of common childhood illnesses and their preventative measures; the attitude of most mothers/caregivers towards immunization services is positive and relies on the efficacy of the vaccine to protect against disease (Siddiqi, 2006).

A study in Pakistan also demonstrated that providing vaccine-related targeted education to mothers at home is an effective and practical strategy to improve childhood immunization rates in low literacy settings (Owais et al., 2011).

Knowledge about the number of times a child should receive vaccines for the vaccine-preventable diseases is also a very important factor to consider when assessing immunization compliance. Babalola and Adewuyi found that knowledge about the number of times a child should receive vaccines is generally poor, even among the participants that were most knowledgeable about immunization (Babalola and Lawan, 2009). Also, increased knowledge about immunization and belief in the efficacy of vaccines were associated with higher levels of immunization (Babalola and Olabisi, 2004).

In general, increased knowledge about immunization and belief in the efficacy of vaccines were associated with higher levels of immunization. It was also found out that knowledge of vaccine-preventable diseases is usually higher in the urban communities compared to the rural communities.

2.8.2 Sources of Information and Advice

The popular sources of information on immunization include the electronic media, newspapers, health facilities and local sources – town criers, village heads, religious heads, and community exchanges. However, the prevalence of these sources of information varies by community and type of place of residence (rural or urban). In urban communities, information on immunization is more often than not received through the electronic media and health facilities. These two sources are considered credible and reliable since they are perceived to originate directly from the government in collaboration with the United Nations agencies (WHO and UNICEF) believed to be genuinely interested in the health of children. Rural communities on the other hand make use of sources like: town criers, village heads, religious heads, and community exchanges (Babalola and Aina, 2004).

2.8.3 Sources of Immunization

The main sources of immunization available are public and private health facilities, schools, faith clinics or mission houses, and home visitations during the NIDs. The patronage of these immunization sources by mothers vary by rural and urban locations (Babalola and Olabisi, 2004). Many respondents are discouraged from immunizing children because of the lack of access to health facilities, the perceived (and real) lack of availability of vaccines, the lack of respect and lack of skill from immunization service providers and long waiting times (Fernandez et al., 2011).

Mobile strategy usually describe trips of more than one day by district or regional health workers for the purpose of delivering services to people living in remote areas. Mobile teams may spend several days travelling to reach the people. In Nepal, it can take up to ten days of walking from the district center to reach some villages. In general, the cost per vaccination is higher when services are provided through outreach and mobile strategies than through fixed services, because health workers spend more time to reach each child and because there are transportation costs involved. However, some people cannot be reached in any other way (USAID, 2003).

2.8.4 Vaccination Experiences

Personal experiences with past infection events, or perceived vaccine failures and complications, are known to determine vaccine uptake. Certain aspects of personal experience can significantly impact behaviour – incidence dynamics. For instance, longer term memory of past events had a strong stabilizing effect on vaccine coverage. Although it could either increase or decrease average immunization coverage depending on whether it is the memory of past infections or past vaccine failures. Public health interventions that focus on reminding individuals about their previous infections, as well as communicating facts about vaccine efficacy, may be an effective way to increase vaccine coverage and prevent unexpected drops in coverage (Wells and Bauch, 2012).

Both positive and negative experiences with children immunization, and especially reactions to the vaccines, were of concern when considering immunization. Although negative experiences appear rare, they tend to have serious and sometimes life threatening health

implications when they occur. Reports from both urban and rural communities indicate that vaccines are generally well tolerated in children. While side effects such as fever, tenderness and loss of appetite are common after immunization is administered, these usually subside within two to three days. According to some service providers, these minor side effects are actually positive indications that the child is reacting to the antigen as expected (CDC, 2006).

2.9 Factors Influencing Immunization Uptake

Many studies have looked at factors that affect immunization completion rates. Low parental, specifically maternal literacy and knowledge regarding vaccines and immunization schedule, poor socioeconomic status, and residence in rural areas are associated with low immunization coverage. Health provider factors that have been associated with increased immunization drop-out rates include parental difficulty of access to healthcare services and inadequate supervision of healthcare staff at health facilities. Retention of proof of immunization by the infants' families has been associated with improved immunization coverage and facilitates documentation of vaccination status (Owais et al., 2011).

Partial immunization coverage against vaccine preventable diseases is a significant public health problem especially in rural areas in Nigeria. Missed opportunities for immunization and partial immunization need to be avoided in order to enhance percentage of fully immunized children who reach the health facility, especially in rural areas where the immunization coverage is below the expected national coverage (minimum 80%). Babalola and Adewuyi designed a model to identify the determinants of immunization practices. The influence of wider contexts are mediated through a set of proximate determinants. These are divided into three categories:

- ideational (or psychosocial factors)
- community factors and
- systemic factors.

The ideational factors include knowledge about vaccine preventable diseases, knowledge about what vaccine do, knowledge about the relationship between NIDs and routine

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- ideational (or psychosocial factors)
- community factors and
- systemic factors

The ideational factors include knowledge about vaccine preventable diseases, knowledge about what vaccine do, knowledge about the relationship between NIDs and routine

immunization, perceived vaccine efficacy, specific beliefs about vaccines, self-efficacy to practice immunization, discussion about immunization and personal advocacy in favour of immunization

Community factors include perceptions about the prevalence of immunization practices among couples in a community and perceptions about the prevalence of attitudes favourable to immunization among men and women in the community

Systemic factors include those that may influence the uptake of immunization, including use of health facilities, perceived accessibility to health facilities, perceived availability of vaccines, and quality of service at immunization sites (Babalola and Adewuyi, 2005).

2.9.1 Socio-demographic Factors

In general, people who have been through the formal education system and with higher socio-economic status had greater awareness of immunization activities and benefits and socio-economic status was an important predictor of use of immunization services. Also, there was limited media exposure and access to public health facilities among lower income residents. When people were exposed to child health information through the media, this was associated with improved immunization practices (Babalola and Adewuyi, 2005).

The NDHS, 2003 revealed that immunization rate varied with location of residence, mother's educational level and household wealth. It also revealed that one in four urban children were fully immunized compared to one in fourteen rural children. About 40% of economically advantaged household children were fully immunized as against only 4% of children from less advantaged households (NPC, 2004).

Another study carried out in Turkey revealed that a higher socio-economic status was associated with a higher rate of full vaccination and private vaccination for children under 5 years of age (Topuzoglu et al., 2003). Brugha and Kevany, from Ghana found that complete immunization status of child was associated with mother having given birth to less than five children (Brugha and Kevany, 1995)

Result had shown that gender of parents does not significantly affect their belief about immunization and their willingness to present children for routine immunization. However, marital status, education and religion significantly influence such belief (Ojikutu, 2012). In a

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study on determinants of immunization coverage in children aged 12-23 months in urban slums of Lucknow district, India, it was reported that unimmunized status of the children were associated with low socio-economic status which constrained the poor parents to take their children for repeated visits to complete immunization schedules (Nath et al 2007)

2.9.2 Access to Health Services and Information

A study to assess the impact of decentralization of health services in Uganda revealed that routine immunization coverage in infants below one year for Polio, DPT, Measles and BCG was high following the decentralization. The study found that the community members hailed the decentralization of services as instrumental in improving accessibility to health services. Hence the existence of decentralized health services could be important in explaining factors associated with immunization coverage in Kawempe division (Baluka, 2003).

Easy access to health services is one factor that came out strongly from a study in Nigeria as fostering the uptake of immunization. This was a major reason given by some mothers of fully immunized children that facilitated their ability to obtain immunization for their children. It was also the regret proffered by some parents of partially immunized children who were otherwise motivated to immunize their children (Babalola and Adewuyi, 2005).

In another survey among children under five years of age in Khartoum State Sudan, it was found that children in urban and rural areas differed significantly in their reported vaccination coverage. In urban areas, accessibility to immunization centers is high compared to rural areas where amidst the few centers immunization is schedule based (Ibnouf et al., 2007).

In a related study in a district of Istanbul, Turkey to investigate the reasons for non-vaccination and the effects of socio-demographic factors on vaccinations, it was revealed that distance from the health centre and internal migration from less developed parts to more developed parts of the country, were significantly related to the level of immunization coverage. The study also revealed that immunization coverage was associated with educational level of the father and the mother (Sebahat and Nadi, 2006).

2.9.3 Availability of Equipment and Amenities

In a study on health infrastructure and immunization coverage in rural India, it was found that the availability of health infrastructure significantly improved immunization coverage for non Polio Vaccines. The study further revealed that larger and better equipped facilities such as hospitals and health centres had bigger effects on immunization coverage. The findings of this study suggest that the nature of health infrastructure: hospitals and health centres play an important role in increasing immunization coverage (Datar et al.,2005).

A study conducted in rural Nigeria indicated that most of the study communities are served by health facilities characterized by inadequate infrastructural amenities. Service providers in most of the study communities often work under very challenging conditions. Interruption of power supply is frequent and many health facilities do not have refrigerators to store vaccines. This, in turn, affects the availability of vaccines and may discourage mothers that are otherwise willing to immunize their children (Babalola and Adewuyi, 2005).

2.9.4 Availability of Vaccines

Vaccines may not be readily available due to: lack of supply, failure of the healthcare system, social barriers – hard-to-reach groups can result from cultural, language, ethnic, or geographic circumstances (WHO, 2011)

Prior to 2003, there was shortage of vaccines in Nigeria due to late or non – release of funds for procurement (Battersby, 2001). In 2003, UNICEF assumed the duty of international procurement to provide adequate vaccines in the country, in 2004 logistic and vaccine security officers were introduced into the system. Despite these, vaccines were only available in Abuja while states and LGAs lack necessary supply due to cumbersome and impractical procedures (WHO, 2005).

The availability of vaccines when needed is a factor that can help to sustain the interest of parents in obtaining immunization for their infants. For routine immunization in particular, the consistency of availability of vaccine is of prime importance. Indeed, one important expectation of parents regarding immunization is that the vaccines are available when needed. Vaccination coverage problems largely reflect interactions between supply and

demand. Mothers are put off by walking long distances only to find no vaccines available, or by being berated by frontline workers for late or missed appointments (Kamara, 2005).

2.9.5 Perceived efficacy of Vaccines

If parents do not perceive vaccine-preventable diseases as severe enough to warrant preventive action or if they do not perceive any particular benefit to their child's health from vaccination, then they will more likely not complete immunization/vaccination doses for their children or oppose any law or policy that mandates such behavior (Mojoyinola and Olaleye, 2012).

Mothers who had negative attitude about health facility were two times more likely to have defaulter children than mothers who had positive attitude. Similar finding was obtained from another study which showed that the barriers of completion of child immunization were poor knowledge, attitude and perception of health facility support (Coreil et al., 1989).

This study showed that parental belief about immunization safety is the major reason for incompleteimmunization among Nigerian children (Abdulraheem et al., 2011).

Public health literature abounds with theoretical reflections and empirical evidence in support of the important role of the perceived efficacy of a prescribed behaviour in the adoption of the behaviour. People are more likely to adopt a practice if they believe that the practice is effective in preventing the relevant undesired outcomes. In general data showed that the belief that immunization protects the child against diseases was an important factor that made parents to practice immunization. Furthermore, the data revealed a difference in perceptions about the efficacy of vaccines between the parents of fully immunized children and those of partially and never-immunized children. For example in Borno State Nigeria, while parents of fully immunized children felt that the vaccines were effective, the parents of partially or never immunized generally doubted its efficacy (Babalola and Adewuyi, 2005).

2.9.6 Provider attitudes and competence

The way immunization providers relate to their clients may either encourage or discourage the latter from patronizing the services. The study revealed a lack of consensus on the part of the participants about provider attitudes. While some believed that the providers generally demonstrated good interpersonal relations towards their clients, others were of the opinion that provider attitudes leave a lot to be desired. Of note however, is the finding that many groups of parents of partially and never-immunized children complained about the poor attitudes of provider.

2.9.7 Social Support and Network

Strong social demand for vaccination is manifested in group clinic attendance, social networking and singing. Yet some poorer, immigrant mothers feel excluded (Kamara, 2005).

A study on Reasons for incomplete vaccination and factors for missed opportunities among rural Nigerian children found that maternal reasons for missed opportunities included sickness, social engagement, traveling, long distance walking, and complications from previous injections (Abdulraheem et al., 2011).

A study on attendance at National Immunization days and routine immunization involving mothers and fathers in Uganda revealed in terms of social influence that, while it was the woman who decides the issue of routine immunization, the man was regarded as the one who makes the very important decision not to immunize in exceptional situation when immunization strengthens disease. The authors recommend the involvement of men and women in health education/promotion activities for immunization (Nuwaha et al., 2001).

There is a general reasoning that lack of support from the community and family members may constitute an obstacle to the uptake of child immunization. For example, male and female opinion leaders in Lagos State contended that where support for immunization is obvious, mothers enjoy and derive full satisfaction from participating in immunization activities. In the absence of such support, women are likely to treat the issues of immunization with levity. This attitude may favour high dropout rates. It is therefore important for the entire community to play very active role in child immunization to ensure a very high coverage for all antigens.

The data also suggest that support from the family level is equally crucial. Extended family members, grandmothers, heads of households are quite influential on issues that affect the health of children. For this reason they need to be educated and informed on the main issues surrounding childhood killer-diseases (Babalola and Adewuyi, 2005).

2.9.8 Myths and Rumours

Public trust is essential in promoting public health. Such trust plays an important role in the public's compliance with public health interventions, especially compliance with vaccination programmes, which target mainly healthy people. Where public trust is eroded, rumours can spread and this can lead to rejection of health interventions. In northern Nigeria in 2003, the political and religious leaders of Kano, Zamfara, and Kaduna states brought the immunization campaign to a halt by calling on parents not to allow their children to be immunized. These leaders argued that the vaccine could be contaminated with anti-fertility agents (estradiol hormone), HIV, and cancerous agents (Jegede, 2007).

Bablola and Aina in a Nigerian study found that ignorance and suspicion (based primarily on rumours) are factors found to hinder immunization, across the study states (although this appeared more pronounced in the northern states).

There was a poor attitude towards polio immunization among respondents who believe that it contains anti-fertility agents; decision-making on immunization of a child lies predominantly on the father; and, if polio vaccination was rejected it was because of rumours, frequency of rounds, non-payment of charges, and the priority accorded to it in preference to more severe diseases (Siddiqi, 2006).

In urban Enugu State, a mother in the partially immunized group said she did not immunize her child because she was afraid the child could lose the use of his hand or leg if given complete immunization dosage. This was a view she derived from casual conversation with other women in the neighbourhood. In many cases, negative rumours peddled around concerning immunization led to many parents making decisions to avoid the practice. For example, there are rumours that certain vaccines (especially the oral polio) could cause paralysis in children hence, many parents avoid them. In Kano and Jigawa States, rural Lagos state (a predominantly Muslim community), and some parts of Maiduguri, rumour had it that oral polio vaccine was intended to reduce fertility among Muslim communities. Hence, most

Muslim religious leaders, and fathers are in the forefront of the battle against oral polio vaccine for infants in these communities (Babalola and Lawan, 2009).

Writing-off rumours as illegitimate misconceptions, or attempting to vanquish them through education, will be ineffective unless their root causes in cultural and political dynamics are understood and addressed (Kamara, 2005).

In addition to the factors mentioned above, stakeholders and partner agencies working in the field of immunization report that the six most important negative factors to routine immunization services are:

- insufficient ownership by states, LGAs and communities
- lack of commitment by all tiers of Government, particularly the state and LGA authorities
- lack of year-round availability of all vaccines at health facility level
- lack of monthly imprest account to support operational costs
- lack of planned supervision and feedback
- lack of data-driven monitoring
- low staff motivation, especially for conducting outreach service

(However, an outreach is expensive and trying to do it without putting in place all the necessary immunization and PHC service management and infra-structure will be a waste of resources).

In summary, much as the literature reveals several factors affecting immunization coverage in children aged 12 to 18 months, the main demographic and socio-economic factors associated with vaccine coverage are: distance from health centre facility, family migrations, place of delivery, the role of the mass media, availability of health infrastructure or facilities, mother's education, age, knowledge, attitudes, weather conditions, decentralized health services and community awareness (Bataringaya, 2010).

CHAPTER THREE

METHODOLOGY

3.1 Study Area

Odeda Local Government Area (LGA) is one of the 20 LGAs in Ogun state. The LGA is bounded by Abeokuta South and Obafemi-Owode Local Government Areas in the South, Oyo State in the North and East and by Abeokuta North LGA in the West. Its headquarters, Odeda town lies to the North of Abeokuta, about 25 kilometers along Abeokuta – Ibadan road. The LGA has an extensive landmass with savannah vegetation mixed with forest. There are about 25 semi-urban settlements and 860 hamlets that are divided into 3 geopolitical zones of Odeda, Ilugun and Opeji. The LGA is further divided into 10 wards, namely, Odeda, Obantoko, Ilugun, Alabata, Olodo, Itesi, Obete, Opeji, Alagbagba and Osiele.

The LGA has an estimated population of 120,646 in 2009 by extrapolation of 2006 National population census data. The people are predominantly Yorubas and mainly farmers. People of other tribes such as the Hausas, Ibos, Efiks, Igede (from Benue State) and a few Igbos are found engaged in commercial and farming activities. The major religions of the people include Christianity, Islam and African traditional religion. The LGA is a semi – urban area. Their major means of transport include cars, motorcycles, bicycles and foot.

The LGA has 24 health facilities which comprise of 1 Secondary health facility located at the headquarters and 23 Primary health facilities (PHC) spread across the 10 wards. The PHC facilities are being run by qualified mid-wives and community health workers (CHEWs and CHOs) who are all supervised by a Medical Officer of Health (MOH). There exist private clinics and maternity centers in the LGA. Immunization services are provided in all the PHC facilities once a week (usually every Tuesday).

A typical immunization session starts at 8a.m. till around 1:30p.m. depending on the availability of vaccines and turn out of mothers with their children. The session starts with health talk followed by weighing of the children and food demonstration session where mothers are taught how to prepare cheap and nourishing food for the proper growth and development of their children. All available vaccines are then administered following the

national schedule (Appendix I) and the date and name of such vaccines recorded in the children's health card

3.2 Study Design

The study was a community based cross – sectional descriptive survey

3.3 Unit of enquiry

Mother/care giver of children between 12 – 23 months old by commencement of survey.

3.4 Eligibility

To be eligible for this survey, mother/care giver were required to have a child between 12 – 23 months old by commencement of survey, give consent and live in Odeda LGA. In the presence of two eligible children to a caregiver, the younger child is chosen.

3.5 Sample size determination

Using the sample size calculation method in the WHO Immunization Coverage Cluster Survey Reference Manual (WHO, 2005), it is taken that immunization coverage in Odeda LGA is 80% (80% coverage is the goal for every community in Nigeria to confer herd immunity for polio), the desired precision is ±5% with 95% confidence interval, and 30 clusters will be surveyed

national schedule (Appendix I) and the date and name of such vaccines recorded in the children's health card

3.2 Study Design

The study was a community based cross – sectional descriptive survey

3.3 Unit of enquiry

Mother/care giver of children between 12 – 23 months old by commencement of survey.

3.4 Eligibility

To be eligible for this survey, mother/care giver were required to have a child between 12 – 23 months old by commencement of survey, give consent and live in Odeda LGA. In the presence of two eligible children to a caregiver, the younger child is chosen.

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Equation for sample size determination: $$n_{min} = \frac{DE \times Z^2_{1-\alpha/2} \times p \times (1-p)}{d^2}$$

n_{min} = Minimum total number of children to be sampled

DE = design effect = 2

α = Significance level = 5% = 0.05

For α = 0.05, $Z_{1-\alpha/2}$ = 1.96

p = Expected coverage = 80% = 0.8

Confidence Interval is ±5% (d =0.05)

$$n_{min} = \frac{2 \times (1.96)^2 \times 0.8 \times (1-0.8)}{(0.05)^2}$$

$$n_{min} = \frac{1.229312}{0.0025}$$

n_{min} = 491.7248 ≈ 492

492 is the minimum number of children to be surveyed

3.6 Sampling Technique

Using the standardized WHO cluster sampling technique, 17 children aged 12-23 months old were selected in each of the 30 clusters to give a total of 510 children from the LGA.

3.6.1 Identification of clusters

The identification and selection of clusters involved identifying the natural clusters of communities in the LGA. The sampling frame consists of the ten wards in the LGA listed in alphabetical order together with their population sizes. The cluster probability sampling technique was employed in selecting 30 clusters from the 10 wards of the LGA following the procedure in the WHO reference manual for immunization coverage. The estimated total population of the LGA was 120,646.

The following steps were taken

1. An alphabetical list of all the wards in the LGA with the available population of each ward was made.
2. A cumulative frequency population size of each ward was calculated and recorded.
3. A sampling interval was calculated to obtain 4,022.

$$\text{SAMPLING INTERVAL} = \frac{\text{Total population of the LGA}}{\text{Number of clusters}} = \frac{120,646}{30} = 4,021.53$$

Sampling interval = 4,022

4. A random number (3632) less than the sampling interval but with same number of digits was obtained using a table of random numbers.
5. The first cluster (Cluster 1) was identified by locating the random number in the cumulative population.
6. The sampling interval was then sequentially added to the random number and the running total of the random number plus sampling interval to identify subsequent clusters i.e.

Cluster 1 population = random number

Cluster 2 population = random number + sampling interval

Cluster 3 population = Cluster 2 population + sampling interval

Cluster 4 population = Cluster 3 population + sampling interval, etc

A list of selected clusters is shown in table 1 below.

Table 1: CLUSTER SELECTION TABLE

WARDS	TOTAL POPULATION	CUMMULATIVE TOTAL POPULATION	CLUSTER NUMBERS
ALABATA	10,124	10,124	1, 2
ALAGBAGBA	12,105	22.229	3, 4, 5
ILUGUN	14,005	36,234	6, 7, 8, 9
ITESI	11,408	47,642	10, 11
OBANTOKO	16,005	63, 647	12, 13, 14, 15
OBETE	7,336	70, 983	16, 17
ODEDA	18.940	89,923	18, 19, 20, 21, 22
OLODO	13,219	103,142	23, 24,25
OPEJI	7,721	110,863	26,27
OSIELE	9.783	120,646	28, 29, 30
TOTAL	120,646		

$$\text{SAMPLE INTERVAL} = \frac{120,646}{30} = 4,021.53 \simeq 4,022$$

Selection of Random Number:

Right Direction

(0 – 9) Col. - 5

(01 – 25) Row - 17

} 3,632

Informed LGA staffs assisted with community/area identification using the map (Appendix II) of the LGA which had detailed information about ward distinct boundaries. A list of wards, clusters and community/areas used in this study is presented in table 2 below.

Table 2: LIST OF WARDS, CLUSTERS AND THE COMMUNITY/AREA

WARDS	CLUSTER NUMBER	COMMUNITY / AREA
ALABATA	1	Omitogun
	2	Ogunmola
ALAGBAGBA	3	Owu
	4	Wasimi
	5	Akinlolu
ILUGUN	6	Olokemeji
	7	Ilugun
	8	Olofin
	9	Onireke
ITESI	10	Aderupoko
	11	Toba
OBANTOKO	12	Arokoje
	13	Elewetan
	14	Obantoko
	15	Lakiri
OBETE	16	Obete
	17	Onilete
ODEDA	18	Bada Idera
	19	Ode Egba
	20	Odeda
	21	Bale Ogunbayo
	22	Akuisi
OLODO	23	Adepegba
	24	Bagben
	25	Samda
OPEJI	26	Lamloko
	27	Bode Olude
OSIELE	28	Idera
	29	Osiele
	30	Apakila

3.6.2 Selection of households to be surveyed

Selection of household may vary depending on the nature of the dwellings, whether they are single or multifamily, scattered or clustered

- Single Family Dwellings

  Once in the identified community, the starting household was selected by identifying a central location, choosing a random direction to follow, counting all the houses in that direction and selecting a random number between 1 and the total number of houses. Second household to be visited was the one nearest to the first, this is defined as the household reachable in the shortest time on foot from the first household. Subsequent households were then similarly located till 17 respondents with eligible children were visited in the reference cluster.

- Multi – family Dwellings

  Here, more than one family live in a single house, such as apartment blocks. After randomly choosing a block, a floor was chosen at random and the households on that floor numbered. The first household was then randomly selected. Second household visited was the door nearest to the first till all households on the floor were visited. A direction (up or down) was then randomly chosen to locate the next floor where all the households will be visited as was done on the initial floor. After the whole building had been visited, the nearest building to the just completed one is chosen next (WHO, 2005).

3.7 Data collection instrument

The study instrument was a semi structured questionnaire (Appendix III). Almost all the questions were closed ended with just a few open ended questions. The questionnaire was translated to Yoruba and back translated to English to ensure consistency in meaning. The questionnaire was divided into the following sections

Section A: Demography, with information about sex and date of birth of child, educational status and marital status of mother and so on

Section B: Knowledge about immunization, this had to do with mother/caregivers level of knowledge about immunization, source of information, observance of side effect after immunization and so on

Section C: Immunization status of child, dealt with status of child's routine immunization considering all 8 antigens (BCG, OPV, DPT, HBV, Measles and Yellow fever) with number of times each vaccine was given, age at which immunization was given, source of information (from card or recall by care giver) and source of immunization (the PHC facility, outreach or private hospital)

Section D: Reason for incomplete/no immunization, this section listed possible reasons for non-compliance with immunization schedule from which respondents were to pick the most applicable options and had the space to indicate any other reason that was not listed.

3.8 Variable definition

Fully immunized child: is a child under one year old who had received a dose of BCG (within the first two weeks of life), three doses each of OPV, DPT, HBV and one dose each of measles and yellow fever vaccines verified by card and recall.

Partially immunized child: is a child who received at least one of the recommended vaccines irrespective of time taken but was not exposed to all antigens before one year of age.

Non – immunized child: is a child that did not receive any immunization at all.

Drop – out rate: is the rate difference between the first and the last dose or the rate difference between the initial vaccine and the last vaccine calculated as follows:

Drop – out rate between BCG/Measles is calculated as

$$\frac{\text{(BCG – Measles) coverage}}{\text{BCG coverage}} \times 100$$

Drop – out rate between DPT1/DPT3 is given as

$$\frac{\text{(DPT1 – DPT3) coverage}}{\text{DPT1 coverage}} \times 100$$

3.9 Data collection

The process of data collection involved the principal investigator and four trained research assistants to assist with data collection. There were two males and two females trained for one day by the principal investigator on important aspects of the questionnaire such as the cluster number, date of interview, availability of card and very importantly, calculation of acceptable birth range. The earliest acceptable birth date is date obtained by subtracting 24 months from interview date while subtracting 12 months from interview date gave the latest acceptable birth date. They were also trained on the importance of explaining the purpose of the study to the respondents to facilitate obtaining informed oral consent from them before they were interviewed.

3.10 Approval for Study

Approval for the study was obtained from the officer-in-charge of the heahh facility and Director of the Local Government Primary Health Care Department. Participation was voluntary and each respondent received detailed information on the purpose of the study following which informed consent was obtained from participants before questionnaires were administered. They were assured that their responses will be kept confidential. Serial number was used and name was made optional. Overall, confidentiality was maintained.

3.11 Data management and analysis

The data was collected, cleaned and analyzed using statistical package for social sciences (SPSS) version 15. Frequencies and proportions were used to summarize variables of interest. Chi square test was used to test for association at 5%. Logistic regression analysis was used to assess significant variables and the model fitted to evaluate predictors of immunization status of child.

Knowledge score: a 7 - point rating scale was used to assess respondents' knowledge about immunization. Questions 13, 15 and 16 were used to assess knowledge about immunization

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Correct response to questions on definition (question 13) and the reason for immunization (question 15) attracted 2 marks each while an incorrect response attracted 0. Also, correct response to examples of diseases that can be prevented by immunization (question 16) attracted a maximum of 3 while an incorrect response attracted 0. This gave a maximum score of 7. The mean knowledge score was 5.1 ± 2.1. Respondents with overall score of 5 or more were classified as having adequate knowledge and those that scored less than 5 as having inadequate knowledge about immunization.

Knowledge of example of vaccine preventable diseases: a respondent that could spontaneously and correctly name 5 – 6 and 3 – 4 vaccine preventable diseases were considered to have good and fair knowledge about immunization respectively while those that could name at most 2 were considered as having poor knowledge.

3.12 Limitations

This study used the modified cluster sampling method which is an example of probability sampling, it is therefore faced with the issue of existence of a sampling error where there is an assumption that clusters are similar to one another, and the variability across the total population is reflected in the clusters. This assumption is however not always true.

CHAPTER FOUR

RESULTS

4.1 DEMOGRAPHIC CHARACTERISTICS

4.1.1 Demographic Characteristics of respondents

A total of 510 respondents were interviewed in this study. However, only 508 provided complete response giving a response rate of 99.6%. All respondents were mothers, with a mean age of 28.8 ± 5.4 years.

Most (88.2%) of the mothers were married, while 6.7% were single and 5.1% previously married (separated, divorced, or widowed). More than half (68%) of the mothers had formal education with 33.9% and 25.4% having primary and secondary education respectively. However, only 8.7% of the mothers obtained tertiary education. Mothers that were working were more (57.3%) than those that were not working (42.7%). More (59.3%) of the mothers practiced Christianity with 39.4% Muslims and 1.3% practicing other religions. Majority (76.6%) of the fathers were Yorubas, 10.4% were Ibos and 4.1% were Hausas, the remaining 8.9% came from other tribes such as Igede, Fulanis etc. Table 3 shows the demographic characteristics of respondents.

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TABLE 3: DEMOGRAPHIC CHARACTERISTICS OF RESPONDENTS

Characteristics	Frequency N=508	Percentages (%)
Mother's Marital Status		
Never married (single)	34	(6.7)
Married	448	(88.2)
Previously married (divorced/separated/widowed)	26	(5.1)
Age of Mother (years)		
≤ 19	12	(2.4)
20 – 24	81	(15.9)
25 – 29	170	(33)
30 – 34	127	(25.0)
35 – 39	55	(10.8)
40 – 44	32	(6.3)
≥ 45	31	(6.1)
Mother's Educational Level		
not educated	163	(32.1)
Primary	172	(33.9)
Secondary	129	(25.3)
post-secondary	44	(8.7)
Mother's Employment Status		
Working	291	(57.3)
Not working	217	(42.7)
Religion of father		
Christianity	294	(57.9)
Islam	205	(40.4)
Traditional and others	9	(1.7)
Religion of mother		
Christianity	301	(59.3)
Islam	200	(39.4)
Traditional and others	7	(1.3)
Tribe of father		
Yoruba	389	(76.6)
Ibo	53	(10.4)
Hausa	21	(4.1)
Others	45	(8.9)

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40 – 44	32	(6.3)
≥ 45	31	(6.1)
Mother's Educational Level		
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Primary	172	(339)
Secondary	129	(25.3)
post-secondary	44	(8.7)
Mother's Employment Status		
Working	291	(57.3)
Not working	217	(42.7)
Religion of father		
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Hausa	21	(4.1)
Others	45	(8.9)

4.1.2 Demographic Characteristics of Children

The mean age of children was 17.9 ± 3.9 months. There were slightly more (50.8%) females than males (49.2%). Table 4 shows the demographic characteristics of the children.

TABLE 4: DEMOGRAPHIC CHARACTERISTICS OF CHILDREN

Characteristics	Frequency N = 508	Percentage (%)
Age of child (months)		
12 – 18	272	(53.5)
19 – 24	236	(46.5)
Sex		
Male	250	(49.2)
Female	258	(50.8)

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19 – 24	236	(46.5)
Sex		
Male	250	(49.2)
Female	258	(50.8)

4.2 Immunization coverage by antigen type for children under 12 months old

Coverage rates for routine immunization in children less than 12 months of age revealed BCG coverage of 75.4%, DPT1 (54.4%), DPT2 (47.1%) and DPT3 coverage of 45.2%. DPT1: DPT3 drop – out rate observed was 16.9%. OPV3 and HBV3 had been received by 42.5% and 35.6% respectively. Measles coverage was 65.7% and Yellow Fever vaccine had been received by 63.8% (Figure 4).

BCG/Measles drop – out rate of 24.1% was observed while DPT1/DPT3 drop – out rate was 16.9%. BCG/DPT1 recorded a drop – out rate of 27.8%.

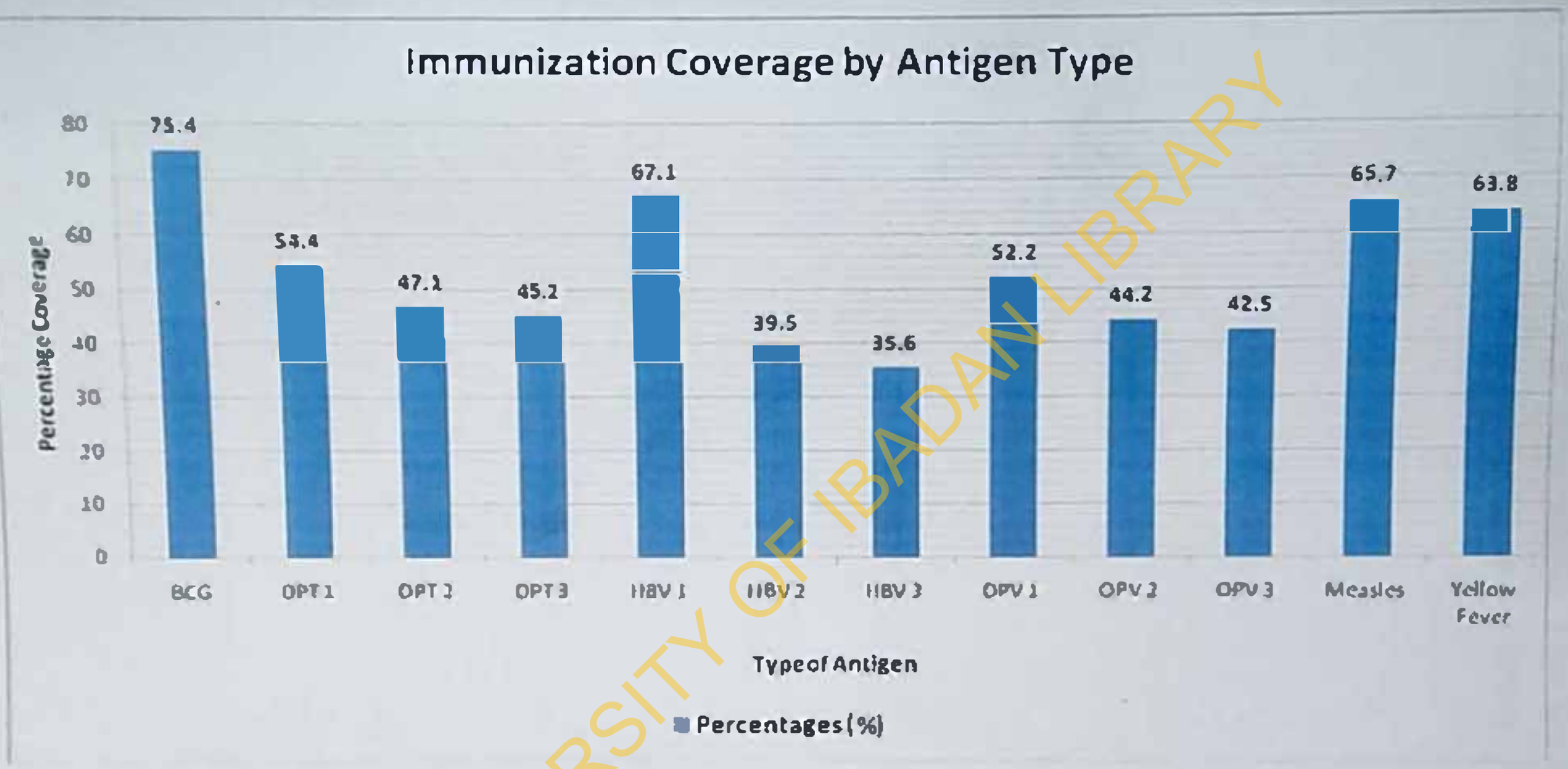

Figure 4: Immunization Coverage by Antigen Type

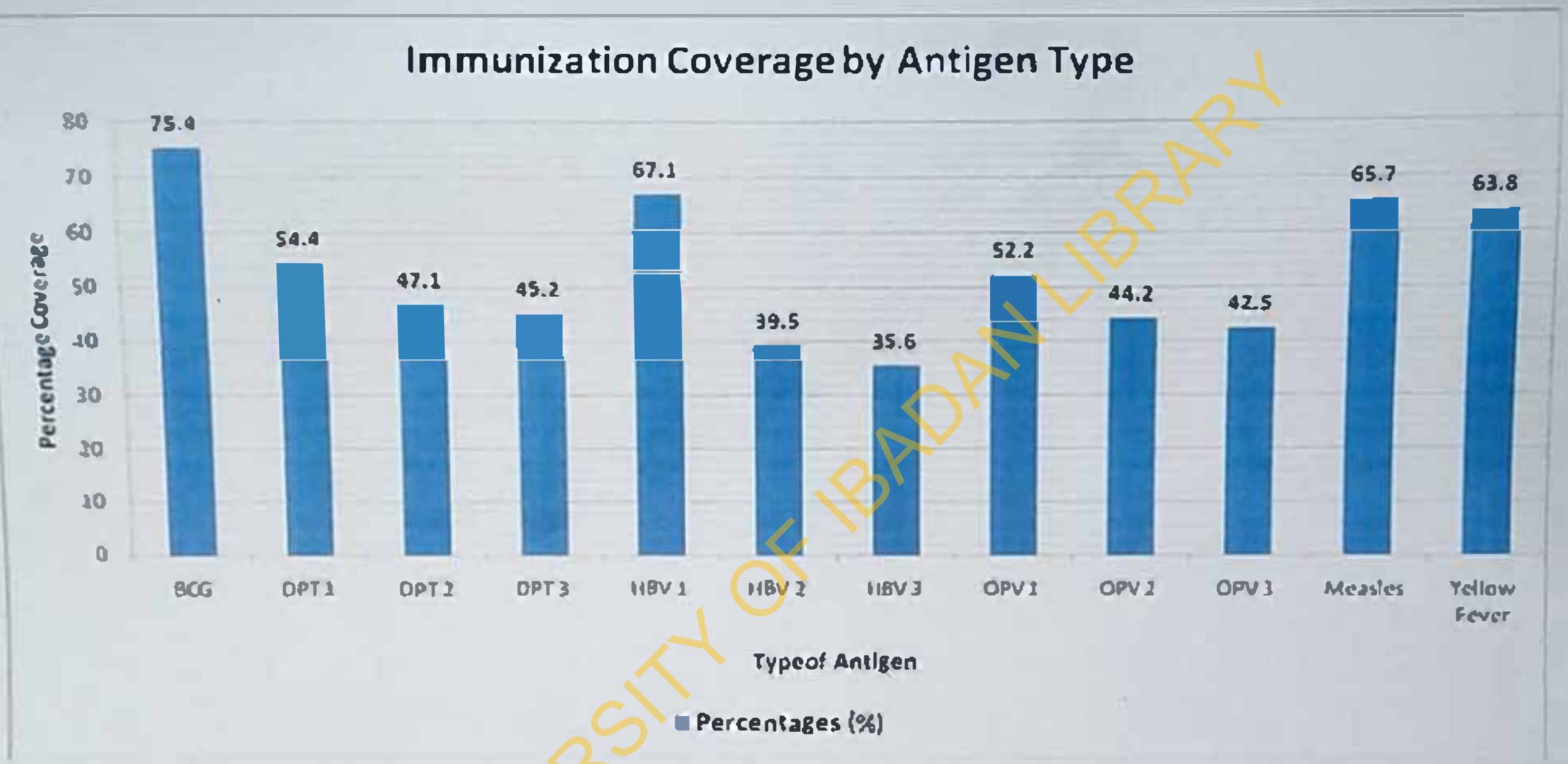

Figure 4: Immunization Coverage by Antigen Type

4.3 Immunization status of Children 12 – 23 months old

Partially immunized children constituted the majority (52%) while only 22% were fully immunized as recommended in the national schedule. About 26% had not received any immunization at all. Figure 5 shows immunization status of children.

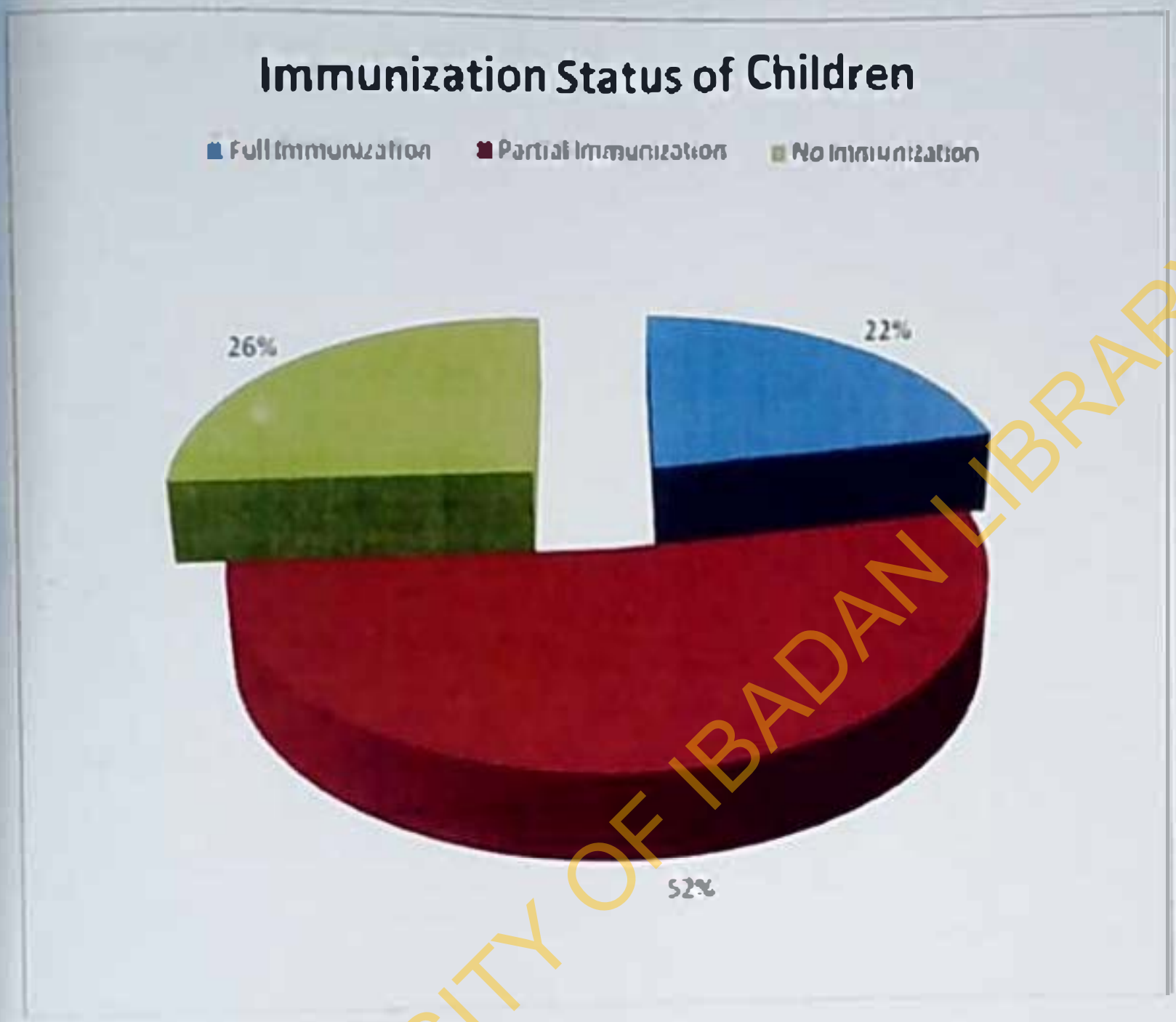

Figure 5: Immunization Status of Children

4.4 Respondent's Knowledge of examples of vaccine preventable diseases

The vaccine preventable diseases mostly mentioned by respondents were Measles (76.8%), Polio (69.1%), Tuberculosis (67.9%) and Tetanus (61.4%) while the least mentioned ones include Hepatitis (43.7%), Pertussis (51.6%) and Diphtheria (55.1%). Table 5 shows result of knowledge of vaccine preventable diseases.

TABLE 5: Respondent's Knowledge of examples of vaccine preventable diseases

Examples of vaccine preventable diseases	Frequency	Percentage (%)
Diphteria	280	55.1
Hepatitis B	222	43.7
Measles	390	76.8
Pertusis	262	51.6
Poliomyelitis	351	69.1
Tetanus	312	61.4
Tuberculosis	345	67.9
Yellow Fever	279	54.9

*multiple responses recorded

4.5 Level of Knowledge about Immunization

More than half (67.3%) of the respondents were able to appropriately define immunization while 67.9% could correctly state the reason for immunization. Respondents with good knowledge of vaccine preventable diseases were 71.7% while 12.6% had poor knowledge. The mean knowledge score was 5.1 ± 2.1 out of 7 points. Majority (68.3%) of the respondents scored above 5 marks and was considered to have adequate knowledge while 31.7% had inadequate knowledge about immunization. Level of Knowledge about Immunization is presented in Table 6.

TABLE 6: Level of Knowledge About Immunization

Knowledge of immunization	Frequency N = 508	Percentage (%)
Definition of immunization		
Appropriate response	341	67.1
Inappropriate response	167	32.9
Reason for obtaining immunization		
Appropriate response	345	67.9
Inappropriate response	163	32.1
Knowledge of vaccine preventable diseases		
Good	364	71.7
Fair	80	15.7
Poor	64	12.6
Mother's Immunization Knowledge score category		
Adequate knowledge (≥ 5)	347	68.3
Inadequate knowledge (< 5)	161	31.7

4.6 Association between Level of Knowledge and immunization status of child

Table 7 below shows that 24.9% of mothers with adequate knowledge and only 16.7 % of those with inadequate knowledge fully immunized their children. There exists a relationship between immunization knowledge of respondent (p=0.039) and immunization status of children.

4.6 Association between Level of Knowledge and immunization status of child

Table 7 below shows that 24.9% of mothers with adequate knowledge and only 16.7 % of those with inadequate knowledge fully immunized their children. There exists a relationship between immunization knowledge of respondent (p=0.039) and immunization status of children.

Table 7: Association between Level of Knowledge and immunization status of child

Immunization knowledge	Fully immunized N (%)	Partially/ Not immunized N (%)	X^2	p value
Adequate knowledge	86 (24.9)	260 (75.1)	4.278	0.039*
Inadequate knowledge	27 (16.7)	135 (83.3)		

*Significant variables with p<0.05

4.7 Reasons for incomplete or no immunization

Lack of information, motivation and social support as well as health service factors all contributed to reasons for incomplete or not taking child for immunization at all. The most prominent reason was the health service factor which contributed 32.8% and included unavailability of vaccines, inconvenient scheduling and long waiting time. This was followed by lack of information (19.8%) on need for immunization, venue of immunization and type of conditions that can serve as contraindication. No faith in immunization was the major lack of motivation factor and nobody to take child was the factor that bordered on social support issues. Table 8 shows reasons for incomplete or no immunization.

TABLE 8: Reasons for Incomplete or No Immunization

Factors	Frequency N = 508	Percentage	Total (%)	
Lack of information				
unaware of need for immunization	33	6.5		
unaware of place/time of immunization	22	4.3	19.8	
wrong idea about contraindications	23	4.5		
fear of side reactions	23	4.5		
Lack of motivation				
no faith in immunization	26	5.1		
Rumours - will affect fertility of child	5	1.0		10.0
Previous bad experiences	20	3.9		
Health service factors				
place of immunization too far	44	8.6		
inconvenient day/time and venue	61	12.0		
vaccine not available	35	6.9		32.8
long waiting time	24	4.7		
service provider not friendly	3	0.6		
Lack of social support and others				
nobody to take child to centre	54	10.6		
father declined permission/absent	5	1.0		13.8
unaffordable cost	11	2.2		

multiple responses recorded

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multiple responses recorded

4.8 Association between Child and Mother's Demographic Characteristics and immunization status of the child

The bivariate association between demographic characteristics and immunization status of child classified into fully immunized and partially/not immunized is shown in tables 9A and 9B below.

A similar proportion was observed in the percentages of fully immunized and non – fully immunized children with respect to age and sex. Only 19.9% and 25.0% of children were fully immunized in the two age groups while 20.8% and 23.6% full immunization coverage was observed between males and females respectively. No significant association was found between both age and sex of the children and their immunization status.

Among mother in the 21 – 25 and 26 – 30 years age groups, 22.1% and 29.1% respectively fully immunized their children while, 20.2% was recorded in the 31 – 35 age group. Mothers that were aged 36 years and above and the 16 – 20 years group recorded 87.0% and 91.4% non compliance with routine immunization schedule respectively. Single mothers recorded 25.5 % fully immunized children while married mothers had 78.1% non – fully immunized children. Mothers who had secondary education had 30.2% while non educated mother had 17.8% fully immunized children and mothers with tertiary education recorded 22.7% compliance with immunization. Only the age of mother was found to be significantly associated (p=0.013) with complete immunization status of the children (Table 8A).

Mothers who were working had 28.2% fully immunized children while non working mothers did not comply with the immunization schedule of 85.7% of their children. Christian and Muslim mothers had 21.6% and 24% fully immunized children respectively while mothers practicing traditional religion recorded 100% non immunization. Religion of mother and that of father did not have a significant association with immunization status of child. Only the employment status of mother was found to be significantly associated (p=0.000) with complete immunization status of the children (Table 9B).

4.8 Association between Child and Mother's Demographic Characteristics and immunization status of the child

The bivariate association between demographic characteristics and immunization status of child classified into fully immunized and partially/not immunized is shown in tables 9A and 9B below.

A similar proportion was observed in the percentages of fully immunized and non – fully immunized children with respect to age and sex. Only 19.9% and 25.0% of children were fully immunized in the two age groups while 20.8% and 23.6% full immunization coverage was observed between males and females respectively. No significant association was found between both age and sex of the children and their immunization status.

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TABLE 9A: Association between Child and Mother's Demographic Characteristics and Immunization Status of the Child

Characteristics	Fully immunized N (%)	Partially/ Not immunized N (%)	X^2	p value
Age of child (months)				
12 – 18	54 (19.9)	218(80.1)	1.935	0.164
19 – 24	59 (25.0)	177 (75.0)		
Sex of child				
Male	52 (20.8)	198 (79.2)	0.594	0.441
Female	61 (23.6)	197 (76.4)		
Age of mother (years)				
16 – 20	3(8.6)	32(91.4)	12.712	0.013*
21 – 25	23(22.1)	81(77.9)		
26 – 30	57(29.1)	139(70.9)		
31 – 35	21(20.2)	83(79.8)		
36 and above	9(13.0)	60(87.0)		
Mother's marital status				
Never married	9 (26.5)	25 (73.5)	0.397	0.820
Married	98 (21.9)	350 (78.1)		
Previously Married	6 (23.1)	20 (76.9)		
Mother's educational level				
No education and others	29 (17.8)	134 (82.2)	6.99	0.72
Primary education	35 (20.3)	137 (79.7)		
Secondary education	39 (30.2)	90 (69.8)		
Post secondary education	10 (22.7)	34 (77.3)		

*Significant variables with p<0.05

TABLE 9B: Association between Child and Mother's Demographic Characteristics and immunization Status of the Child

Characteristics	Fully immunized N (%)	Partially/Not immunized N (%)	X^2	p value
Employment status of mother				
Working	82 (28.2)	209 (71.8)	13.872	0.000*
Not working	31 (14.3)	186 (85.7)		
Religion of Mother				
Christianity	65 (21.6)	236 (78.4)	2.432	0.296
Islam	48 (24.0)	152 (76.0)		
Traditional and others	0 (0.0)	7 (1000)		
Tribe of father				
Yoruba	86 (22.1%	303 (77.9)	3.681	0.298
Ibo	15 (28.3)	38 (71.7)		
Hausa	6 (28.6)	15 (71.4)		
Others	6 (133)	39 (86.7)		

*Signif.cant variables with p<0.05

4.9 Association between Maternal demographic characteristics and level of knowledge, about Immunization

Table 10 below shows that 67.3% of mothers in the 21 – 25 years age group had adequate knowledge about immunization while 60.9% of mothers 36 years and above exhibited adequate knowledge. Only 30% of married women had adequate knowledge while 73.5% of single mothers did not have adequate knowledge about immunization. Marital status ($p=0.003$) and employment status ($p=0.038$) of mothers showed a significant association with knowledge level.

Table 10: Association between Maternal Demographic Characteristics and Level of Knowledge about Immunization

Characteristics	Adequate Knowledge N (%)	Inadequate Knowledge N (%)	X^2	p value
Age of mother (years)				
16 – 20	21(60)	14(40)	4.909	0.297
21 – 25	70(67.3)	34(32.7)		
26 – 30	143(73)	53(27.0)		
31 – 35	70(67.3)	34(32.7)		
36 and above	42(60.9)	27(39.1)		
Mother's marital status				
Never married	9 (26.5)	25 (73.5)	11.336	0.003*
Married	137 (30.6)	311 (69.4)		
Previously Married	16 (61.5)	10(38.5)		
Mother's educational level				
No formal education	57(35.0)	106(65.0)	4.545	0.208
Primary education	55(32.0)	117(68.0)		
Secondary education	42(32.6)	87(67.4)		
Post secondary education	8(18.2)	36(81.8)		
Mother's Employment Status				
Working	82 (28.2)	209 (71.8)	4.319	0.038*
Not working	80 (36.9)	137 (63.1)		

4.10 Significnnt predictors of immuniznlion status on logistic regression

The logistic regression model of predictors of immunization status is presented in table 7 below. It showed employment status of mothers and mother's age group and mother's knowledge of immunization were significant predictors of immunization status. Employed mothers were twice more likely to fully immunize their children than unemployed mothers (OR=2.3, 95% CI= 1.4-3.8) while mothers in the 31 – 35 age group were over two times more likely to fully immunize their children than mothers in the other age groups (OR= 2.5 ,95% CI=1.1 – 5.3). Respondents with inadequate knowledge were twice more likely to have their children fully immunized than those with adequate knowledge (OR=0.5, 95% CI=0.3-0.9)

Table 11: Logistic regression of factors associated with immunization status

Variables	Odds Ratio(OR)	95% CI	p value
Employment status of mother			
Working	2.302	1.406 – 3.823	0.008*
Not working	1		
Mother's age group (years)			
16 – 20	1.00		0.079
21 – 25	0.776	0.193-3.121	0.721
26 – 30	1.894	0.809-4.435	0.141
31 – 35	2.466	1.137-5.350	0.022*
36 and above	1.603	0.680-3.777	0280
Knowledge of immunization			
Adequate	0.5	0.323 – 0.961	0.036*
Inadequate	1		

CHAPTER FIVE

DISCUSSION, CONCLUSION AND RECOMMENDATIONS

5.1 Discussion

This study was designed to assess the routine immunization coverage in children 12 – 23 months old and analyze the factors associated with coverage in Odeda LGA of Ogun state.

Routine immunization which is receipt of vaccines at recommended ages and intervals ensures that a child is adequately protected from target diseases at all times (Ayebo, 2009). Vaccination coverage is defined as the percentage of children who have received the requisite number of vaccine doses irrespective of the age at receipt of the vaccine (Luman, 2005).

Monitoring immunization coverage allows us identify areas where disease outbreaks are likely to occur, and possibly help keep immunization coverage high. One of the main aims of public health services throughout the world is therefore to obtain reliable data about the level of immunization with a view to supporting the implementation and monitoring of vaccination programmes (Murray et al., 2003). The factors that influence immunization coverage vary, these include prevalence of vaccine-preventable diseases, availability of vaccination centres, level of knowledge and information about vaccination, and different methods used to measure immunization status (Angelilio et al., 1999).

5.1.1 Immunization coverage rate

The Routine immunization coverage estimated in this study for children 12 – 23 months in Odeda LGA was 22.2% and about 25.9% had not received any immunization at all. In all, eight antigens considered were BCG, DPT, OPV, HBV, measles and yellow fever. This estimated value is low compared to the recommended target of 80% minimum coverage in every LGA or equivalent administrative unit in the country for herd immunity. In a study conducted by UNICEF in its 'B' zone in Nigeria (made up of the south western states of Lagos, Edo, Ekiti, Ondo, Ogun and Oyo) in 2003, Odeda LGA had a coverage rate of 5.7% for all antigens though six antigens were considered at that time. In the UNICEF study, Odeda had the lowest number of doses of all the antigens but also reported the highest rates

of timeliness (Alagh, 2003). Another study in a South Western state of Nigeria (Benin) reported 44.3% full immunization rate (Ayebo, 2009) while yet another study in North Central Nigeria (Nasarawa state) revealed 37.2% routine immunization coverage (Abdulraheem et al., 2011).

Generally, in this study, the coverage for individual antigen revealed much higher values than the 2003 study. For instance, BCG, DPT, OPV and measles coverage increased by 42.6%, 56.5%, 47.2% and 52.4% respectively. These figures showed that there had been a marked improvement in immunization coverage in Odeda LGA over the 2003 results even though it is still below target. This low coverage reported in country is an indication of a general poor performance of Nigeria's EPI in terms of all the factors influencing immunization coverage.

Drop – out rate which is the rate difference between the first and the last dose or between an initial vaccine and a later vaccine usually yield a value to indicate a decline in the proportion of those who received the latter antigen compared with the earlier antigen. The result obtained from this study showed BCG/Measles drop – out rate of 24.1% while DPT1/DPT3 drop – out rate was 16.9%. BCG/DPT1 recorded a drop – out rate of 27.8% with drop-out being the highest between DPT3 and measles vaccine (45.3%). This finding of a higher DPT3/measles drop-out rate had been previously documented (Ibagere, 1997, Onyiriuka, 2005 and Ayebo et al, 2009). Probably, the longer interval between DPT3 and measles vaccine (three and a half months) compared to that between the earlier vaccines in the schedule (four weeks) could be responsible for this. It is also suggested that, as postpartum time increases, mothers begin to be engaged in other activities and may forget and/or may not have time to make scheduled visits for immunizations as seen when children do not return for measles vaccine (Odusanya et al., 2008, Ayebo et al, 2009).

5.1.2 Level of Knowledge about Immunization

Most (60.2%) of the respondents were able to appropriately define immunization and correctly state the reason for immunization. Specifically, 40.2% of the respondents defined immunization correctly as giving injection to prevent childhood killer diseases. This can be considered as much knowledge compared with a study in North Central Nigeria (Nasarawa) where only 20.1% of the study participants defined immunization as a means of prevention against childhood killer diseases (Abdulraheem et al, 2011).

A national study sponsored by PATHS in Nigeria found that the respondents were only moderately aware of vaccine-preventable diseases and more than half were able to correctly name at least one vaccine-preventable childhood disease while less than half could name up to two. The observed knowledge of vaccine – preventable diseases in this study showed 87.4% could name at least three diseases. Thus, the respondents in this study had better awareness of vaccine preventable childhood diseases than the PATH study participants. It was discovered that knowledge was a major predictor of immunization practices (OR = 0.5) in this study, respondents with inadequate knowledge were twice more likely to fully immunize their children than those with adequate knowledge. A study in Jigawa state supported this finding when it was revealed that the erroneous belief that immunization is an antidote for all childhood diseases was correlated with increased immunization (Babalola and Adewuyi, 2005).

The vaccine preventable diseases mostly mentioned by over two thirds of respondents were measles, polio, tuberculosis and tetanus while the least mentioned ones include hepatitis, pertussis and diphtheria. This is in agreement with the PATH study that found awareness to be highest for polio and measles while few respondents demonstrated awareness of diphtheria (Babalola and Adewuyi, 2005). Another study found that measles is the commonest and certainly the most severe of the acute infections of childhood encountered (Familusi, 1981).

The findings of this study observed a lot of awareness about vaccine preventable diseases in this study area. Overall, more than half of the respondents in this study were considered to have adequate knowledge about immunization. Despite this knowledge, a low level of coverage was recorded as opposed by a study in India where it was found that low maternal literacy and knowledge regarding vaccines and immunization schedule was associated with

low immunization coverage (Phukan et al, 2009). Other studies also had identified that low maternal knowledge about immunization was one of the major reasons for defaulting and that educating parents about vaccine preventable diseases, as well as the vaccines themselves, may be one way to impact the importance of vaccines to the health of their child (Onyiriuka, 2005; Abdulraheem et al, 2011) The findings of this study showed that there are a lot of other factors associated with compliance with immunization schedule apart from knowledge and these other factors should be identified and appropriately addressed to improve coverage

5.1.3 Socio – Demographic Factors

The sex of child was found to have no impact on vaccine uptake in this study. This was supported by another study in Northern Nigeria (Abdulraheem et al., 2011). On the contrary, it was found that in some societies with cultural discrimination against female children, boys have a greater chance to be vaccinated (Akesode, 1982)

This study revealed that educational level of mother does not have any effect on the completion of routine immunization in variance with the findings of other studies that discovered that education of mother increases the vaccination chance of a child (Salmon et al, 2005, Abdulraheem, 2011, Eva, 2009). A study in Nigeria also revealed that education (primary or above) increased the odds of full immunization almost threefold (Babalola and Adewuyi, 2005) while on the contrary, a German study found that children of university-educated parents had less probability of being vaccinated than children of parents with lower educational levels (Hak et al, 2005). However, it was observed in this study that children of mothers with higher levels of education had higher coverage, the low number of respondents included in this group may explain why the differences were not statistically significant since the study was conducted in a largely rural area where formal education is not well established. It however seem difficult to improve vaccination coverage without taking into account women's education because more educated mothers care more for the welfare of their children.

Older women (31 – 35 years) were found to comply better (OR = 2.5) with immunization schedule than the younger women. In agreement with this was a study that revealed that higher vaccination coverage is associated with older maternal age (Eva et al, 2009). This may

be because older mothers have more experience and are more likely to appreciate the benefits of vaccination than younger mothers.

Marital status of the mother did not have an association with immunization status of children. This finding was supported by a study that observed that factors such as mothers' age, marital status, schooling level and gender of the child showed no significant differences with respect to vaccination completeness in northern central Nigeria (Abdulraheem et al., 2011). Contrary to this, another study in Uganda found that marital status had a significant relationship with parents taking their children for immunization stating in essence that married parents are in position to complete immunization schedules than their unmarried counterparts (Balatingaya, 2010).

Religion is a key factor in health service utilization and religious leaders play a role in encouraging or discouraging immunization. As revealed in this study, religion was not related to immunization completion. It was however noticed that all respondents that practised traditional religion did not immunize their children at all. This could be explained by likely increased belief in natural or alternative therapies by this group of people. On the contrary, a study in Borno state (about 88% Muslim community), Nigeria revealed that Muslims were less likely to be fully immunized when compared to Christians (Yahya, 2007).

5.1.4 Factors influencing immunization status

In this study, lack of information, lack of motivation, lack of social support and health service factors were the reasons for incomplete or not receiving immunization at all.

Health service factors were the most prominent and included inconvenient day/time and venue, place of immunization too far, vaccine not available and long waiting time. To support this finding, another study revealed that non availability of vaccines resulting in need for repeated visits is a significant reason for incomplete immunization of children (Abdulraheem et al., 2011). This could often lead to the dampening of the enthusiasm of parents from immunizing their children leading to incomplete immunization of children in the communities that have no easy access to a primary health centers. Inconvenient day, time and venue suggested that immunization appointments coincided with another appointment the mother does not want to miss or a crucial time that could impact negatively on her business

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As such, the immunization appointment may be postponed or neglected altogether leading to incomplete immunization.

Lack of information was another important factor revealed in this study and included unaware of need for immunization, misconceptions about contraindication and fear of side reactions. Misconceptions about contraindication address the fact that some mothers prevent their children from being immunized due to a very mild ill health which is actually not a contraindication to immunization and by the time the child gets well, the mother would then take the child late for the expected antigen. Fear of side reaction is another factor in this category when mothers exercise reluctance and actual denial in immunizing their children because of possible side effects. These side effects are usually mild and transient and can be easily treated. When properly informed, such mothers would confidently present their children for immunization.

Someone that offers support to another person as a friend, family member or spouse is called a significant other. Lack of social support was discovered by this study as a hindrance to completion of immunization schedule. This included nobody to take child to centre and father declining permission. Significant others around mothers when available should help take child for immunization or take care of other engagements on behalf of the mother while she attends to immunization needs of the child. This could help ensure compliance with full immunization of child (Odusanya, 2008).

Lack of motivation was another factor identified. It included having no faith in immunization, believing in rumors that vaccines can affect fertility of child or cause autism and dwelling on previous bad experiences. In another study which agreed with this study, various reasons were adduced by the mothers for incomplete vaccination of their children. Disagreement or concern about immunization safety and complications from previous injections was one of such reasons (Abdulraheem et al, 2011). Believing in rumors was exhibited when religious and political leaders of some of the states in Northern Nigeria stopped the Global Polio Eradication Initiative in 2003. The people were urged not to receive Polio vaccines due to the belief that a hidden agenda lies behind immunization efforts, child immunization campaigns are sponsored by enemy foreign agents and that the polio vaccine can cause infertility. These beliefs were found to be considerably more common in the northern states (Kano, Jigawa and Yobe) than the southern states (Lagos and Enugu) of the country (Olufowote, 2011). By

2009, the stoppage had resulted in an epidemic in Nigeria as well as polio importations in 20 previously polio-free countries. In fact, Nigeria went from being one of the seven countries with endemic polio to reporting the highest number of polio cases in the world (WHO, 2003).

Industrialized countries experienced pressure from organized groups who oppose the practice of vaccination and spread alarmist and inaccurate information. For example, there is absolutely no scientific evidence that link vaccines (anti-measles) to the increase in autism as is presently being spread (Verstraeten et, al 2003). The factors discussed above can cause lack of motivation to partake of immunization.

For control or elimination of vaccine preventable diseases, it is mandatory to increase the number of vaccinated people in the community. It is believed that most of these reasons for non-vaccination can be overcome by informing the general public about the importance of vaccination through the media, improving accessibility to functional PHC, spontaneous dismissal of rumours and misconceptions.

5.2 Conclusion

This study was aimed to determine factors affecting immunization coverage among children 12 – 23 months old in Odeda LGA, Ogun state, Nigeria. All respondents were mothers who were mostly (88.2%) married. More than half (67.9%) of the mothers had formal education and a slightly higher (68.1%) number had adequate knowledge of immunization. About half (57.3%) of the mothers were working.

Immunization coverage in Odeda LGA was low, only 22% of children eligible for immunization were fully immunized the remaining 78% were partially or not immunized at all. This situation shows an improvement in the coverage over 5.7% that was obtained in 2003 in the LGA (Alagh et al, 2003), though it is still lower than the national coverage of 23% reported for Nigeria in 2008 (NDHS, 2008). Varying degrees of compliance was recorded for the different antigens with BCG coverage of 75.4%, DPT3coverage was 45.2% while DPT1/ DPT3 drop-out rate was 16.9%.

The most prominent factors identified for non compliance were inconvenient scheduling, lack of social support, poor accessibility to immunization center and unaware of need for additional doses. Significant predictor of immunization status was employment status, of mother, age of mother and level of knowledge about immunization.

Despite the improvements noticed over the years in Odeda LGA, the full immunization coverage is still low and there is need to explore ways of improving the coverage to the national target. This will improve health status of our county and the world as a whole. we must remember that 95% immunization coverage is necessary for the sustained control of vaccine preventable diseases and must be achieved and maintained to prevent outbreak of vaccine preventable diseases (Glenda et al., 2004).

5.3 Recommendations

- Appropriate campaign which should be one that focuses on educating the public on the advantages of immunization, clarifies the diseases that are vaccine-preventable, explains appropriate immunization schedule and possible side effects should be intensified. Care should be taken to avoid general messages that reinforce the false belief that vaccination protects against all serious illnesses.

- Government should ensure that vaccines are available in sufficient quantities and under appropriate storage condition at all times during NIDs and for routine immunization. To do this effectively, it is important for government to partner with international agencies, community-based organizations and the private sector.

- Government should provide health care facilities at close proximity to the majority of the people by resuscitating existing non-functional facilities, increasing the hours of operation of functional clinics and constructing. staffing and equipping additional health facilities. Also, government should explore investing in specially equipped vehicles that facilitate the transportation of providers and helps to maintain the cold chain for vaccines for use in locations and on days where people congregate in large numbers e.g. market places and rural market days.

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- It is important to put in place a system for ensuring adequate training and retraining specific to immunization for immunization providers especially in the area of vaccine dispensing to reduce unpleasant experience of abscess formation and similar side effects after vaccination

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APPENDIX I: NATIONAL IMMUNIZATION SCHEDULE

Contact	Minimum Target Age Of Child	Type Of Vaccine	Dosage	Rout of administration	Site
1st	At birth	BCG	0.05ml	intradermal	Rt. Upper Arm
		*OPV0	2 drops	Oral	Mouth
2nd	6 weeks of age	Pentavalent1 (DPT, HBV and Hib)	0.5ml	intra muscular	Antero- lateral aspect of thigh
		OPV1	2 drops	Oral	Mouth
3rd	10 weeks of age	Pentavalent2 (DPT, HBV and Hib)	0.5ml	intra muscular	Antero-lateral aspect of thigh
		OPV2	2 drops	Oral	Mouth
4th	14 weeks of age	Pentavalent1 (DPT, HBV and Hib)	0.5ml	Intra- muscular	Antero-lateral aspect of thigh
		OPV3	2 drops	Oral	Mouth
5th	9months	Measles	0.5ml	Subcutaneous	Left upper arm
		Yellow Fever	0.5ml	Subcutaneous	Left upper arm

*OPV0 must be given before the age of two weeks; **Monovalent vaccine

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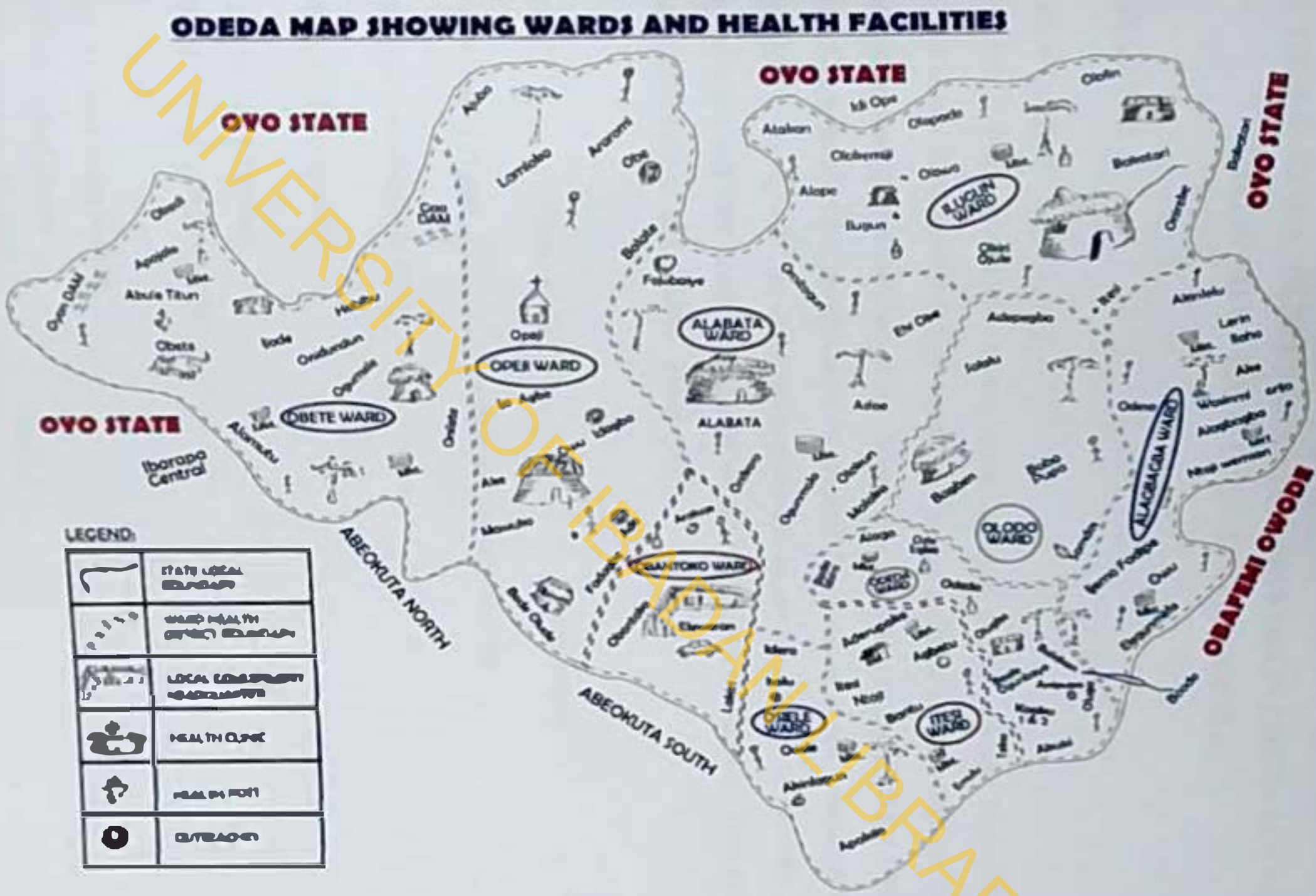
3rd	10 weeks of age	Pentavalent2 (DPT, HBV and Hib)	0.5ml	intra muscular	Antero-lateral aspect of thigh
		OPV2	2 drops	Oral	Mouth
4th	14 weeks of age	Pentavalent3 (DPT, HBV and Hib)	0.5ml	Intra- muscular	Antero-lateral aspect of thigh
		OPV3	2 drops	Oral	Mouth
5th	9months	Measles	0.5ml	Subcutaneous	Left upper arm
		Yellow Fever	0.5ml	Subcutaneous	Left upper arm

*OPV0 must be given before the age of two weeks, **Monovalent vaccine

APPENDIX II: MAP OF ODEDA LOCAL GOVERNMENT AREA



APPENDIX III: QUESTIONNAIRE IN ENGLISH AND YORUBA

QUESTIONNAIRE ON ROUTINE IMMUNIZATION COVERAGE ANDASSOCIATED FACTORS AMONG CHILDREN AGED 12-23 MONTHS IN ODEDA LOCAL GOVERNMENT AREA, OGUN STATE, NIGERIA

INTRODUCTION:

Dear Mother/ Caregiver,

This research is being conducted in your environment to enable us know how well our children are immunized against deadly diseases. We want to know whether they are able to complete the immunization schedule or not. Where they are unable to complete the schedule, we would like to know what reasons were responsible. The purpose of this research is not to apportion blame on anybody; no information given will be used against anyone as well. Your sincere responses will help us understand how we can improve on our immunization services to promote the health of our children. Thank you.

Serial No: ..... Date of visit: ..... Cluster Number: .....

Child's number in the Cluster: ..... Relationship of respondent to child: .....

Address (ward / community & street): .....

SECTION A: (Demography)

1. Name of child (Optional) .....
2. Date of birth of child (dd/mm/yy) .....
3. Sex of child .....
4. Age of mother at last birthday .....
5. Mothers Marital Status

   1. Single (Never Married) 2. Married
   3. Divorced / Separated 4. Widowed
6. Number of other children by the same mother .....
7. Maximum level of education attained by mother

   Not educated = 1, Primary = 2, Secondary = 3, Post – Secondary = 4

   others = 5 .....
8. Employment Status of Mother

   1. Working 2. Not working

9. If working, what is your monthly income? ₦.....

10. Religion of Father

1. Christianity 2. Islam

3. Traditional 4. Others Pls Specify .....

11. Religion of Mother

1. Christianity 2. Islam

3. Traditional 4. Others Pls. Specify .....

12. Tribe of Father

Yoruba = 1, Ibo = 2, Hausa = 3, Others = 4 (Specify .....)

SECTION B: (Awareness about immunization)

13. What is immunization .....

.....

14. How did you hear about immunization?

1. Radio 2. Television 3. Friends/Family 4. Books 5. Internet

6. Health worker 7. Never heard 8. Others (Pls specify).....

15. Why do we give children immunization?

.....

.....

.....

16. Please name 6 childhood diseases you know are preventable by immunization

.....

.....

17. Why will you take your child for immunization?

.....

.....

18. Why will you not take your child for immunization?

.....

.....

19. Did your child experience any of the following after been given immunization? Please tick the correct option.

-Fever	1. Yes	2. No	-Irritability	1. Yes	2. No
-Pain	1. Yes	2. No	-Swelling at injection site(s)	1. Yes	2. No

20. Did you discuss immunization with someone during the last 12 months?

1. Yes 2. No

21. Did you encourage someone to practice / partake of immunization during the last 12 months?

1. Yes 2. No

SECTION C: (Immunization status of child)

22. Has this child received any routine immunization from any health facility?

1. Yes 2. No

23. Is there any immunization card or document for this child?

1. Yes 2. No

24. If Yes, may I see it please?

1. Yes card seen 2. Card seen with no entry 3. No card not seen

••• The following antigens are covered in routine immunization. BCG (one dose), DPT (3 doses), OPV (4 doses), HEPATITIS B (3 doses) and one dose each of measles and yellow fever. For each of the antigens, we want to know, whether the child received the vaccine and at what age he received it and where.

••• For the following immunization. If the card is available, use it to calculate the age of the child at which he/she received it and mention yes for the corresponding question. Do confirm the age with the mother / primary caretaker of the child. Please note that even the card entries need to be reconfirmed with the mother/primary caretaker.

••• Source of immunization should be recorded as: Hospital = 1, Health centre = 2, Outreach = 3, Private = 4.

25. Has this child ever been given a BCG vaccination against tuberculosis – That is, an injection in the left shoulder or left forearm that caused a scar soon after birth?

1. Yes, scar seen 2. Yes, but scar not seen
3. Yes, scar not verified (Child not there) 4. No, BCG not given

26. Record source of information

1. Card (Please indicate date of administration .....)
2. Recall

27. Record source of immunization .....

28. Has this child ever been given "vaccination injections" - that is, an injection in the outer part of the left thigh – to prevent him/her from getting tetanus, whooping cough, diphtheria DPT)?

1. Yes 2. No

29. If yes, how many times was this child given these injections

1. One 2. Two 3. Three

30. At what age was this child given DPT 1 (write in completed weeks)

31. Record source of information

1. Card (Please indicate date of administration .....)
2. Recall

32. Record source of immunization .....

33. At what age was this child given DPT 2 (write in completed weeks) [ ]

34. Record source of information

1. Card (Please indicate date of administration .....) [ ]
2. Recall

35. Record source of immunization .....

36. At what age was this child given DPT 3 (write in completed weeks) [ ]

37. Record source of information

1. Card (Please indicate date of administration .....) [ ]
2. Recall

38. Record source of immunization .....

39. Has this child ever been given "vaccination injections" in the upper right thigh to prevent him/her from getting Hepatitis B? 1. Yes 2. No [ ]

40. If yes, how many times was this child given this injection?

1. One 2. Two 3. Three [ ]

41. At what age was this child given HBV 1? (write in completed weeks) [ ]

42. Record source of information

1. Card (Please indicate date of administration .....) [ ]
2. Recall

43. Record source of immunization .....

44. At what age was this child given HBV 2? (write in completed weeks) [ ]

45. Record source of information

1. Card (Please indicate date of administration .....) [ ]
2. Recall

46. Record source of immunization .....

47. At what age was this child given HBV 3? (write in completed weeks) [ ]

48. Record source of information

1. Card (Please indicate date of administration .....) [ ]
2. Recall

49. Record source of immunization .....

50. Has this child ever been given routine "vaccination drops in the mouth" in the health centre (Not in the house to house campaign) to protect him/her from getting Polio? [ ]

1. Yes 2. No

51. At what age was this child given OPV 0? (write in completed weeks) [ ]

1. At birth [ ]
2. Within 1 week
3. Between 1 week and 4 weeks (1 month)

52. Record source of information

1. Card (Please indicate date of administration .....) ☐

2. Recall

53 Record source of immunization .....

54 At what age was this child given OPV 1? (write in completed weeks) ☐

55 Record source of information

1. Card (Please indicate date of administration .....) ☐

2. Recall

56 Record source of immunization .....

57 At what age was this child given OPV 2? (write in completed weeks) ☐

58 Record source of information

1. Card (Please indicate date of administration .....) ☐

2. Recall

59. Record source of immunization .....

60 At what age was this child given OPV 3? (write in completed weeks) ☐

61 Record source of information

1. Card (Please indicate date of administration .....) ☐

2. Recall

62 Record source of immunization .....

63. Has this child ever been given "vaccination injections" in the upper left arm at the age of 9 months or older – to prevent him/her from getting Measles? ☐

1. Yes 2. No

64 At what age was this child given measles vaccine? (write in completed months) ☐

65 Record source of information

1. Card (Please indicate date of administration .....) ☐

2. Recall

66 Record source of immunization .....

67 Has this child ever been given "vaccination injections" in the upper right arm at the age of 9 months or older – to prevent him/her from getting Yellow fever? ☐

1. Yes 2. No

68 At what age was this child given Yellow fever injection? ☐

(Write in completed months)

69 Record source of information

1. Card (Please indicate date of administration .....) ☐

2. Recall

70 Record source of immunization .....

71. Did you pay for this child to receive any of the above immunizations?

1. Yes 2. No ☐

72. If yes, how much on average did you pay per visit (write in Naira) ₦.....

73. You have mentioned that this child has not been immunized / fully immunized yet. What are the reasons?

(Please indicate by ticking as MANY options as are applicable):

- Unaware of need for immunization
- Unaware of need for additional doses
- Unaware of place and / time of immunization
- Fear of side reactions
- Wrong idea about contraindications
- No faith in immunization
- Will affect fertility of child
- Previous experience
- Place of immunization too far
- Inconvenient day / time and venue
- Vaccine not available
- Nobody to take child to centre
- Long waiting time
- Father declined permission / absent
- Unaffordable cost
- Service provider not friendly
- Service provider does not know job well.
- Others (Pls. specify) .....

Thank the respondent

Name of Interviewer_____ Signature/ Date_____

Name of Supervisor_____ Signature / Date _____

IBEERE LORI AWON IWADI TI O NIISE PELU GBIGBA ABERE AJESARA NI AARIN AWON OMODE TI OJO ORI WON TO OSU MEJILA – OSU METALELOGUN NI IJOBA IBILE ODEDA, IPINLE OGUN, NIGERIA.

IFAARA :

Iya/ Alagbato owon,

A n se iwadi yii niagbegbe yin lati mo bi awon omo wa se n gba abere ajesara si lati de'na awon arun oko se iku pa'ni. A fe mo boya won gba gbogbo abere ajesara to o ye lasiko tabi beeko Bi o ba se pe won ko gba gbogbo abere won tan, a fe mo idi ti eyi fi n bee Akon iwadi yi ki se lati da enikeni lebi tabi lati fi iya je enikeni Didahun awon ibeere wa lotito ati lododo yio ran wa lowo lati tun eto fifunni ni abere ajesara se lati le mu ilesiwaju ba alaafia awon omo wa E se pupo

Nomba Ibeere..... Nomba akojo ..... Ojo Ibewo .....

Nomba omo ni akojo.....

Ipo Oludahun si omo .....

Adiresi ile (woodu/abgegbe/opopona).....

APA KINI :

1. Onakoomo _____
2. Ojo ibi omo (dd/mm/yy) _____
3. Ako tabi Abo _____
4. Ojo on iya omo (odun) _____
5. Ipo iya ni igbeyawo
   1. Ko ti se igbeyawo
   2. O ti se igbeyawo
   3. O ti ko oko / kuro lodo oko
   4. O je opo
6. Iye awon omo miran ti iya omo bi_____
7. Ibi ti iya omo ka iwe de
   1. Ko lo si ile iwe rara
   2. Ile iwe alakobere (iwe mefa)
   3. Ile iwe girama
   4. Ile iwe giga
   5. Ile iwe miran (so ni pato)_____
8. Iya omo n se ise bi?
   1. On se ise
   2. Ko se ise
9. Elo ni omo oya iya omo l'osu? _____
10. Esin Baba Omo
    1. Kristiani
    2. Musulumi
    3. Esin Ibile
    4. Iru esin miran (so ni pato) _____
11. Esin Iya Omo
    1. Kristiani
    2. Musulumi
    3. Esin Ibile
    4. Iru esin miran (so ni pato) _____

12 Eya Baba omo 1. Yoruba 2. Ibo 3. Hausa 4. Eya miran (jowo, so ni pato) ☐

APA KEJI: (ohun ti o mo nipa abere ajesara)

13 Kini abere ajesara? _____

_____

14 Bawo ni o se gbo nipa abere ajesara?

1. Ero radio 2. Ero amohunmaworan 3. Ore / ebi 4. Iwe kika
5. Ero ayaraabi asa 6. Osise eto ilera 7. Ona miran (jowo, so ni pato) ☐

15 Kini idi re ti a fi n fun omode ni abere ajesara? _____

_____

16 Jowo da oruko arun omode mefa ti o mo pe abere ajesara lee de'na

_____ _____ _____

_____ _____ _____

17 Kini idi ti oo f. gba abere ajesara fun omo re? _____

_____

18 Kini idi to o ko fi ni gba abere ajesara fun omo re? _____

_____

19 Nje omo re ni eyikeyi ninu awon ami wonyii leyin ti o gba abere ajesara tan? Jowo, mu eyi ti o ba omu

1. igbona (1. Beem, 2. Beeko) 2. Ikanra (1. Beeni, 2. Beeko)
3. Aisimi (1. Beeni, 2. Beeko) 4. Oju abere ti o wu (1. Beeni, 2. Beeko)

20 Nje o ba enikeni s'oro nipa abere ajesara ni iwon osu mejila s'eyin ? ☐

1. Beeni 2. Beeko

21 Nje o gba enikeni ni iyanju lati gba abere ajesara ni iwon osu mejila s'eyin? ☐

1. Beeni 2. Beeko

APA KETA: (Ipo ti omo gba abere ajesara de)

22 Nje omo yii ti gba abere ajesara ni igba de igba ni ibudo eto ilera ni? ☐

1. Beeni 2. Beeko

23 Nje kaadi abere ajesara tabi iwe eri miran wa fun omo yii bi? ☐

1. Beeni 2. Beeko

24 Bi o ba je bee, nje mo le ri kaadi naa bi? ☐

1. Beeni mo ri kaadi 2. Mo ri kaadi, sugbo ko si akosile ninu re
3. Beeko, a ko ri kaadi

Akosile ibi ti a ti gba obere gbodo wa bayii. Ibi ti a ti gba abere yioje: Ile Iwosan = 1, Ile eto Ilera = 2, Itagbangba = 3, Ile iwosan Aduni = 4.

25 Nje omo yii gba abere lati dena iko fere (iyen abere u a gba si cjika apa osi. cleyi ti o maa n ni apa) (BCG) laipe lehin ti a bii?

1. Beeni. mo ri apa 2. Beeni, sugbon nko ri apa

3. Beeni. sugbon nko se ifimule apa naa (omo ko si ni ibi yii) ☐

26 Se akosile ibi ti o ti mo

1. Ninu kaadi abere ajesara (jowo se akosile ojo ti o gba abae) _____ ☐

2. Iranti

27. Ibi ti o ti gba abere _____

28. Nje omo yii "ti gba abere ajesara" iyen abere ti a fun ni nitan lati dena arun ipa, iko awubi ati gbofungbofun (DPT) ri?

1. Beeni 2. Beeko ☐

29 Bi o ba je beeni. eemelo ni omo yii ti gba abere yii?

1. eekan 2. eemeji 3. eemeta ☐

30 Ki ni ojo ori omo yii ni igba ti o gba abere arun Ipa, iko awubi ati gbofun gbofun akoko? (osu ti omo je)_____

31. Se akosile ibi ti o ti mo

1. Kaadi abere ajesara (jowo se akosile ojo u o gba abere) _____ ☐

2. Iranti

32. Ibi ti o ti gba abere _____

33. Ki ni ojo ori omo yii ni igba ti o gba abere arun Ipa, iko awubi ati gbofun gbofun keji? (osu u omoje)_____

34. Se akosile ibi ti o ti mo

1. Kaadi abere ajesara (jowo se akosile ojo ti o gba abere) _____ ☐

2. Iranti

35. Ibi ti o ti gba abere _____

36. Ki ni ojo ori omo yii ni igba ti o gba abere arun Ipa, iko awubi ati gbofun gbofun keta? (osu ti omo je)_____

37. Se akosile ibi ti o ti mo

1. Kaadi abere ajesara (jowo se akosile ojo ti o gba abere) _____ ☐

2. Iranti

38. Ibi ti o ti gba abere _____

39. Nje omo yii "ti gba abere ajesara" ti a fun ni ni itan lati dena arun j'edo j'edo ri? ☐

1. Beeni 2. Beeko

40. Bi o je beeni. eemelo ni omo ti gba abere yii?

1. eekan 2. eemeji 3. eemeta ☐

41. Ki ni ojo ori omo yii ni igba ti o gba abere j'edo j'edo akoko? (osu ti omo je)_____

42. Se akosile ibi ti o ti mo

1. Kaadi abere ajesara (jowo se akosile ojo ti o gba abere) _____ ☐

2. Iranti

43. Ibi ti o ti gbaa _____

33. Ki ni ojo ori omo yii ni gba ti o gba abere j'edo j'edo keji? (osu ti omo je) _____

34. Se akosile ibi ti o ti mo

1. Kaadi abere ajesara (jowo se akosile ojo ti o gba abere)_____ ☐

2. Iranti ☐

46. Ibi ti o ti gbaa _____

35. Ki ni ojo ori omo yii ni gba ti o gba abere j'edo j'edo keta (osu ti omo je)? _____

36. Se akosile ibi ti o ti mo

1. Kaadi abere ajesara (jowo se akosile ojo ti o gba abere _____ ☐

2. Iranti

49. Ibi ti o ti gbaa _____

50. Nje ati fun omo yii ni abere ajesara igbadegba eyi ti a n kan si omo l'enu ibi de'na aran ro'mo lapa ro'molese ni ibudo eto ilera (yato si eyi ti a ngbe kiri lati ojule de ojule) ☐

1. Beeni 2. Beeko

51. Ki ni ojo ori omo yii ni igbati o gba atola ro'mo lapa, ro'mo lese akoko?

1. Ni kete ti a bi 2. Laarin ose kan ti a bii ☐

3. Laarin ose kan ati merin (osu kan)

52. Se akosile ibi ti o ti mo

1. Nimu kaadi abere ajesara (jowo se akosile ojo ti o gba abere) _____ ☐

2. Iranti

53. Ibi ti o ti gba abere _____

54. Ki ni ojo ori omo yii ni igbati o gba atola ro'mo lapa, ro'mo lese keji? (osu ti omo je)_____

55. Se akosile ibi ti o ti mo

1. Nimu kaadi abere ajesara (jowo se akosile ojo ti o gba abere) _____ ☐

2. Iranti ☐

56. Ibi ti o ti gba abere _____

57. Ki ni ojo ori omo yii ni igbati o gba atola ro'mo lapa, ro'mo lese keta? (osu ti omo je)_____

43. Se akosile ibi ti o ti mo

1. Ninu kaadi abere ajesara (jowo se akosile ojo ti ogba abere) _____

2. Iranti

59. Ibi ti o ti gba abere _____

60. Ki ni ojo ori omo yii ni igbati o gba atola ro'mo lapa. ro'mo lese keriin? (osu ti omo je)_____

61. Se akosile ibi ti o ti mo

1. Ninu kaadi abere ajesara (jowo se akosile ojo ti o gba abere) ☐

2. Iranti

62. Ibi ti o ti gba abere _____

63. Nje omo yii ti gba abere ajesara si apa osi ni igbati o pe omo osu mesan tabi ju beelo – lati dena arun eyi? 1. Beeni 2. Beeko ☐

64. Ki ni ojo ori omo yii ni igbati o gba abere ajesara lati dena arun eyi? (osu ti omo je)_____

65. Se akosile ibi ti o ti mo

1. Ninu kaadi abere ajesara (jowo se akosile ojo ti o gba abere) _____ ☐

2. Iranti

66. Ibi ti o ti gba abere _____

67. Nje omo yii ti gba abere ajesara si apa osi ni igbati o pe omo osu mesan tabi ju beelo – lati dena arun iba aponju?

1. Beeni 2. Beeko ☐

68. Ki ni ojo ori omo yii ni igbati o gba abere ajesara lati de'na iba aponju?

(osu ti omo je) _____

69. Se akosile ibi ti o ti mo

1. Ninu kaadi abere ajesara (jowo se akosile ojo ti o gba abere) _____

2. Iranti ☐

70. Ibi ti o ti gba abere _____

71. Nje o san owo kankan ohon omo yii lati gba eyikeyi ninu awon abere ajesara ti a so siwaju yi?

1. Beeni 2. Beeko ☐

72. Bi o ba je beeni. elo ni o nas n san ni igba kookan ti e ba lo lati gba abere ajesara wonyi? (so iye ti o je ni owo Naira) ₦ _____

73. O ti so wipe omo yii ko gba abere ajesara re pe. Ki ni idi re?

(jowo fi ami si gbogbo awon idi ti o je idena)

1. N ko mo nipa eto abere ajesara
2. N ko mo pe o ye ki omo tun gba abere ajesara sii
3. N ko mo ibi / akoko fun abere ajesara.
4. Mo beru ohun ti ko dara ti o le sele leyin abere
5. Imo ti ko tona nipa ohun ti o le da abere gbigba duro

6. N ko ni igbagbo ninu abere ajesara
7. Abere le se idiwo fun omo lati bi omo lehin ola
8. Irin atchinwa
9. Ile eto ilera lati gba abere yii jinna ju
10. ojo/akoko/ ibudo lati gba abere ajesara ko bo si
11. ko si abere ajesara ni ile eto ilera
12. ko si eni ti yio nu omo lo ile eto ilera
13. diduro pe ni ile eto ilera
14. baba omo ko si ni ile tabi ko li ase sii
15. Abere ti won ju
16. Awon osise eto ilera ko fa ni mo'ra
17. Awon osise eto ilera ko mo ise daradara
18. Idi miran (jowo se alaye) _____

E se pupo

Oruko Olubeere: _____ ami owo/ojo _____

Oruko Olubewo: _____ ami owo/ojo: _____

APPENDIX IV: APPROVAL OF STUDY LETTER

ODEDA LOCAL GOVERNMENT

Tel 08081770733
08081770734
Odeda Local Government
P M B 1.
Odeda, Ogun State

Our Ref No. _____

Your Ref No. _____ 20 _____

Date: 17th November, 2009

The Principal Investigator
Pharmacy Department
Federal Neuro-Psychiatric Hospital
Yaba, Lagos
Attention: Okwemi, Bolanle E

APPROVAL OF STUDY

In response to your letter dated 28th October 2009 requesting for ethical clearance on a proposed research study titled: Assessment of Routine Immunization coverage among children aged 12-23 months in Odeda LGA Ogun State I am pleased to inform you that after due consideration the study has been approved for implementation as designed

A copy of your final research should be sent to the LGA for record purposes as well as reference material in future policy making

Dr. Yemi O.A
Director (PHC)
Odeda Local Government.