DETERMINANTS OF ROUTINE IMMUNIZATION COVERAGE AMONG 12-23 MONTHS OLD CHILDREN OF NOMADIC POPULATION IN AKWANGA LOCAL GOVERNMENT AREA, NASARAWA STATE, NIGERIA

BY

PETER OMBUGADU ATTAH
MPH/N-FELTP/MED/15778/2011-2012

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DECLARATION

I declare that this thesis was carried out by me and that it is solely a product of my research work under the supervision of Dr A.A. Aliyu of the Department of Community Medicine, Faculty of Medicine, Ahmadu Bello University. Source of literature and other information were duly acknowledged in the references.

Peter Ombugadu Attah	Date

CERTIFICATION

This thesis titled "DETERMINANTS OF ROUTINE IMMUNIZATION COVERAGE AMONG 12-23 MONTHS OLD CHILDREN OF NOMADIC POPULATION IN AKWANGA LOCAL GOVERNMENT AREA, NASARAWA STATE, NIGERIA. SEPTEMBER, 2015" by Peter Ombugadu, ATTAH meets regulations governing the award of the degree of master in Public Health of Ahmadu Bello University, and is Approved for its contribution to knowledge and literary presentation.

_____ _____

Dr. A.A. Aliyu Date
MBBS, MPH, FMCPH
Chairman, Supervisory committee

_____ _____

Dr. S.H. Idris Date
MBBS, FWACP, DMLD
Member, Supervisory committee

_____ _____

Dr. A.A. Abubakar Date
FWACP, MPH-Epid
Head of Department,

_____ _____

Prof. Kabir Bala Date
Dean, School of Postgraduate studies

DEDICATION

This project is dedicated to God almighty for sparing me from a road traffic accident while going down to Zaria as a result of this project.

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All glory and praises be unto God for seeing me through this training and dissertation work. I wish to express my sincere gratitude to my academic supervisors, Dr A.A. Aliyu and Dr S.H. Idris, for their patience, guidance and academic support towards the successful completion of this work. I am also grateful to the entire NFELTP program especially Dr Patrick Nguku who was my program advisor and having faith in me, Prof K. Sabitu who is my field supervisor and mentor, for mentorship and having faith in me, and Drs O. Biya, S. Gidado and N. Waziri for their professional guidance, critical reviews, continuous encouragement and motivation throughout my program.

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ABBREVIATIONS

ANC	-	Antenatal Care
AEFI	-	Adverse Events Following Immunization
AFP	-	Acute Flaccid Paralysis
BCG	-	Bacille Calmette Guerin
BASICS-II	-	Basic Support for Institutionalizing Child Survival
CDC	-	Centers for Disease Control and Prevention
CSM	-	Cerebro Spinal Meningitis
DHS	-	Demographic and Health Survey
DFID	-	Department For International Development, UK
DPHC	-	Director, Primary Health Care (at LGA)
DPT	-	Diphtheria-Pertusis-Tetanus
EPI	-	Expanded Program on Immunization
FIC	-	Fully Immunized Child/Children
FMOH	-	Federal Ministry of Health
GAVI	-	Global Alliance for Vaccine and Immunization
GPEI	-	Global Polio Eradication Initiative
HF	-	Health Facility
HBV	-	Hepatitis B Virus
IPDs	-	Immunization Plus Days
LGAs	-	Local Government Area(s)
MCH	-	Maternal and Child Health
M and E	-	Monitoring and Evaluation

NDHS	-	National Demographic and Health Survey
NC	-	North-Central
NE	-	North-East
NGO	-	Non-governmental Organization
NICS	-	Nigeria Immunization Coverage Survey
NID	-	National Immunization Day/s
NPHCDA	-	National Primary Health Care Development Agency
NPI	-	National Programme on Immunization
OPV	-	Oral Polio Vaccine
PEI	-	Polio Eradication Initiative
PHC	-	Primary Health Care
RI	-	Routine Immunization
SE	-	South East
SIA	-	Supplemental Immunization Activities
TB	-	Tuberculosis
TT	-	Tetanus Toxoid
UN	-	United Nations
UNICEF	-	United Nations' Children Fund
UCI	-	Universal Child Immunization
USAID	-	United States' Agency for International Development
U-5	-	Under five years
VPD	-	Vaccine Preventable Disease
WHO	-	World Health Organization
YF	-	Yellow Fever

SUMMARY

Routine Immunization coverage is generally low in several parts of Nigeria especially the northern region. It is even lower among people who live in hard to reach areas including nomads. Although the exact figures of RI coverage amongst the nomads are not available. There are many cultural/religious beliefs and also physical barriers such as distance to the health facility and migration which negatively affect immunization services. This study was carried out to assess the knowledge, attitude and practice of routine immunization among mothers of children 12-23 months in nomadic population of Akwanga, Nasarawa state, Nigeria.

A cross-sectional descriptive study was conducted in April 2014. A sample of mothers of 501 children of nomads, 12-23 months of age, was selected using the WHO/EPI 30 by 7 cluster sampling technique and data were obtained through a structured interviewer administered questionnaire containing both open and close ended questions.

Majority (89.0%) of the caregivers were aware of at least one vaccine preventable disease (polio) in the LGA. More than a fifth (21.8%) believed immunization is for preventive services and 70.1% believed immunization is safe and can be accepted for their children. Despite this, only 6.0% of the children were fully immunized, with 28.1% partially immunized and 65.9% not immunized at all. The BCG coverage was 23.2%, DPT3 24.0%), OPV3 24.2%, Measles 29.7%, HBV3 12.0% and Yellow fever 27.3%. The DPT drop-out rate was 15%. Factors associated with failure to immunize children include caregivers' family movement (nomadic) from one place to another (48.5%), distance to health facility (38.2%), lack of knowledge on routine immunization (23.6%), discouragement against immunization mainly by the husbands/child's father (6.7%) and

personal disapproval by the caregivers (4.8%). The factors affecting routine immunization uptake among the study population are caregivers' age (OR=97.47, C.I=13.12-723.87), the sex of the child (OR=0.05,C.I=0.01-0.19), place of delivery (OR=0.03, C.I=0.01-0.09), distance to the nearest HF (OR=0.002, C.I=0.0003-0.015), and the duration of stay in the current location (OR=21.22, C.I=2.87-157.01).The significant predictors for the routine immunization uptake were caregivers' age (AOR=14.8,p-Value=0.02), the sex of the child (AOR=0.035,p-Value=0.002), and mother's utilization of ANC services during the index pregnancy (AOR=5.2, p-Value=0.005). Others were the place of delivery (AOR=0.14,p-Value=0.001), the duration of stay in the current location (AOR=20.06,p-Value=0.01), distance to the nearest HF (AOR=0.0006, p-Value=0.0000), and the awareness of the number of visits to HF to complete the RI (AOR=4.77, p-Value=0.004).

There is urgent need for sustained awareness campaigns of the importance of immunization and the use of mobile and outreach strategies on migration routes.

CHAPTER ONE: INTRODUCTION

1.1 Background

Immunization is one aspect of preventive medicine which gives protection to susceptible individuals from vaccine preventable infectious disease by administration of a modified infectious agent. The modified infectious agent can either be a suspension of a killed organism or an inactive product of the agent, which shall lead to development of immunity against the disease immunized against and which in turn result in reduction of morbidity and mortality due to this disease. Immunization is one of the most successful and cost-effective public health interventions.[1]

In 1796, Edward Jenner a Briton developed smallpox vaccine and this marked the beginning of vaccine era for prevention of diseases. The early part of 19th century saw widespread but not organized use of Jenner's vaccine and the first attempt to use it on a global scale began in 1956 when the WHO and others selected smallpox for eradication in the world.[2,3] The eradication of smallpox in 1980 through smallpox vaccination is the greatest success in preventive medicine. The successes or triumphs motivated the World Health Organization (WHO) to adopt the Expanded Program on Immunization (EPI) which is aimed at reduction, elimination, or total eradication of EPI targeted childhood killer diseases by the year 2000 and beyond.[3]

Immunization prevents childhood morbidity and mortality from vaccine preventable diseases (VPD_S) with disproportionate number of these children living in developing world[4]. Before the introduction of global immunization, of the estimated 125 million children born worldwide every year, approximately 12 million or nearly 10% die before the age of one, 97% of the deaths happening in developing countries.[5] It was also

estimated that 67 million cases of measles occurred yearly in developing countries causing over 2 million deaths. Fifty-one (51) million cases of pertussis occurred yearly with 600,000 deaths. Furthermore, over 800,000 new born babies died from neonatal tetanus and yearly, in most cases before the age of 3 years. Tuberculosis had as many as 10 million cases annually; of these about 2 million are children under the age five.[6]

Current global estimates suggest that approximately 34 million children are not completely immunized, with almost 98% of these children living in developing countries.[7] Almost 30 million of the 130 million children born every year are not receiving basic immunization.[8] The majority of unreached children, or 28million, live in developing countries, and of those, 25 million are in the poorest countries, defined as countries that have less than 1,000USD per capita. Vaccine preventable diseases are responsible for a significant proportion of approximately 11 million deaths that occur annually among children under 5 years of age. Achieving 80% immunization coverage, a global target to reduce morbidity and mortality associated with VPDs requires concerted efforts by government, partners, and private sectors and the communities.

Routine immunization (RI) is a cornerstone among primary healthcare efforts and is considered one of the most cost-effective public health interventions. Immunization against the major infectious killer diseases is one of the eight (8) components of primary healthcare whose concept came into being in 1986 based on the realization that conventional curative health services had failed to meet the health needs of the majority of the people particularly in underdeveloped countries.[9,10] Towards the end of the world campaign to eradicate smallpox in the 1970s, the world health organization (WHO) launched the expanded program on immunization (EPI), because the vaccination

coverage for basic vaccines at the time was estimated to be 5% in developing countries. At establishment, EPI goals were to ensure that every child received protection against childhood tuberculosis, poliomyelitis, pertussis, tetanus and measles by the time he / she was one year of age to give tetanus toxoid vaccination to pregnant women to protect them and their new born against tetanus.[11]

In 1979, Nigeria launched expanded program on immunization (EPI) with emphasis on reduction of morbidity and mortality arising from vaccine preventable diseases[3, 12]. But due to poor national immunization coverage of vaccination and minimal impact on vaccine preventable target diseases, it was re-launched in 1984. In spite of this, not much was achieved until Nigeria became a signatory to the declaration of 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. This Declaration established challenges for global immunization[12]. Therefore in 1988, the Federal Ministry of Health (FMOH) with the assistance of United Nations, International and National Agencies, introduced the concept of mass campaign as a means to boost immunization coverage nationawide[3]. With this Nigeria reported immunization coverage of 60% by 1989, and attained the Universal Child Immunization (UCI) target coverage of 80% by 1990. This land mark achievement of 80% coverage was made possible by the government and health personnel commitment, intensive social mobilization, involvement of the private sector and intersectoral collaboration with Ministries of Agriculture, Education, and Information as well as police and the military[13].

Furthermore, between1993-1998 however, National Immunization Coverage reports showed a decline ranging between 20-46% for DPT3.[14] This was due to inadequate service delivery, funding, low political will, low social support, poor community involvement and participation with resultant shortage in vaccines, unavailability of syringes and needles, centralization of vaccine storage, and attendant poor distribution and none maintenance of cold chain as well as limited number of health facilities conducting routine immunization services. With poor performance, the federal government, recognizing that maintaining high immunization coverage is a vital diseases control strategy, in 1997, promulgated decree 12 of 1997 renaming EPI as National Program for Immunization (NPI). This was to demonstrate national consciousness, participation and ownership of immunization[15]. The NPI then became a parastatal of the FMOH by this decree, distinct from National Primary Healthcare Development Agency (NPHCDA). The activities of NPI were fully reverted to NPHCDA in May, 2007 by the Federal Government.

While the NPI was still a parastatal under the FMOH, it had the mandate to effectively control, through immunization and the provision of vaccines for the prevention of morbidity and mortality associated with 6 common childhood deadly preventable infectious diseases while yellow fever, Hepatitis B and Vitamin A were later included in the routine immunization package schedule; thus, a total of five (5) separate visits to the health facility are required with the administration of a total of 13 doses of vaccine antigens by a health worker to a child to complete successfully the primary immunization series. Nigeria's immunization schedule contains tetanus toxoid, BCG, HBV, OPV, DPT, measles, cerebrospinal meningitis and yellow fever vaccines.

Table 1: Immunization schedule currently practiced in Nigeria (NPI guidelines):

Age of child	Vaccine
At Birth	BCG, OPV0, HepB0
6 weeks	OPVI, Pentavalent 1, PCV1
10 weeks	OPV2, Pentavalent 2, PCV2
14 weeks	OPV3, Pentavalent 3, PCV3
9 months	Measles, Yellow fever

KEY: BCG = Bacillus Calmitte Guerin; OPV = Oral polio Vaccine; HepB0 = Hepatitis B Vaccine; "Pentavalent" or five-in-one vaccine combines 5 different vaccines in one injection to protect against five diseases:

1. Hib diseases,
2. Diphtheria,
3. Pertussis,
4. Tetanus and
5. Hepatitis B.

OPV0 and HepB0 must be given within 2 weeks of delivery.

PCV=Pneumococcal Conjugal Vaccine.

Despite the effectiveness of vaccines in the prevention of vaccine preventable infectious diseases (VPDs) in childhood diseases, compliance of parents with immunization schedule continues to be challenge in many places. For example, in Guinea, findings in studies showed poor access to immunization due to difficult terrain has been said to be the reason for poor immunization coverage in riverine communities, difference in immunization coverage in other studies have been shown to be due to certain socio-demographic factors.[16]

Nigeria has been holding yearly National immunization days (NIDs) since 1996, using the fixed post strategy. After a global review of the progress towards the attainment of the global goal in February 1999, Nigeria was identified by the international community as one of the remaining 8 major reservoirs of wild poliovirus. It was the recommendation that Nigeria adopt the house to house strategy to accelerate coverage. Thus, Nigeria became the first country in Africa to adopt the house to house strategy beginning with the 1999 sub-NIDs which were held in 15 states of the federation.[17]

Today, surveillance activities have been introduced to check pockets of low coverage in order to avoid disease transmission. In Nigeria, surveillance especially for acute flaccid paralysis to detect and interrupt wild poliovirus transmission is ongoing with house to house strategy and coupled with implementation of National and sub- national immunization days.

This study shall be undertaken to assess the determinants of routine immunization coverage among 12-23 months aged children of nomadic population in Akwanga local government area (LGA) and any factors which may be influencing it. It is hoped that

exploration of the determinants that influence positively with immunization status will enhance routine immunization coverage among this group of population in LGA. No similar study has been done in this LGA in the past or at the moment.

Definition of Terms

Vaccination status**:** This will be defined using the terms 1-3 below:-

1. Fully immunized Child (FIC): a child who has received complete doses of standard six (6) antigens- BCG, DPT (3 doses), OPV (3 doses), and measles by 12months of age.
2. Partially immunized child (PIC): a child who has received some of the "standard six" antigens- BCG, DPT (3 doses), OPV (3 doses), and measles by 12months of age.
3. Unimmunized child (UIC): a child who has received none of the standard six antigens- BCG, DPT (3 doses), OPV (3 doses) and measles vaccines by 12months age.
4. Immunization coverage: population of individuals in the target area who are immunized.
5. Target population: Group of individuals who are included in the immunization program based on their age and the area in which they live.
6. Immunization coverage target: a goal that is defined for a health facility/district/LGA/state/federal Government that states what proportion of individuals in the jurisdiction population will be immunized with specific vaccines in a given period.

7. Missed opportunities: a missed opportunity is a health care encounter in which a person is eligible to receive a vaccination, but is not vaccinated completely. This indicator measures missed opportunity for immunizing a child who comes to the Health facility with vaccination services and does not receive any or all of vaccine doses that should have been given.
8. Immunization "by history": immunization history of a child reported to have been given by child's mother or caregiver, but was not recorded on an immunization care or card got missing.
9. Immunization "by card": immunization history of a child copied from an immunization card.
10. Immunization by "card plus history": immunization history of a child measure "by card" and "by history".
11. Immunization card retention: is a direct measurement of immunization services quality since immunization card provides recorded details of services given to the child.

1.2 Problem Statement

A basic concept of public health is that every individual who is protected from a disease as a result of an immunization is one less individual capable of transmitting the disease to others. Individuals who have been immunized serve as a protective barrier for other individuals who have not been immunized, provided that the number immunized has reached a certain level; reaching and maintaining that level which varies by vaccine preventable infectious diseases, provide, "herd immunity" to un-immunized individuals.

There are about 10 million children in the developing countries that die annually for lack of access to effective public health interventions. Most of these deaths are caused by

vaccine preventable infectious diseases. Incomplete (partial) and non-vaccinations (un-immunize) are obstacles to raising immunization coverage which are the major factors; causing resurgences of childhood vaccine preventable infectious diseases, high infant mortality rates and frequent health facility admissions and increased demand on available health facilities.

In Nigeria, vaccine preventable infectious diseases currently account for 22% of deaths for under-five years children (U-5).[51] In 2002, deaths in Nigeria children U-5 were estimated to have been 872,000 of which close to 200,000 were due to VPDs.[45] Neonatal tetanus alone accounted for over 800,000 new born babies deaths yearly in developing countries.[18]

1.3 Justification

Immunizations have a greater impact on reducing childhood deaths and disabilities than any public health interventions. Globally, about 2.5 million deaths have been averted due to immunization annually. Nigeria's universal childhood immunization coverage is generally poor in several parts of the country, although exact figures are not available. In 2003, 2008 and 2013, the national full immunization coverage (FIC) was 12.9%, 28.9% and 20.1% respectively[79,80,81] with variations from 12.4% to 26.9% in the north-central Nigeria. In 2013, Nasarawa state recorded 20.1% of the targeted children were fully vaccinated below the WHO recommended target of 80%.[79]

In spite of the effectiveness of vaccines against VPDs, compliance of parents with immunization schedules continues to be a problem in many places. There are conflicting and lack of credible database at the community on routine immunization to guide health

managers in planning healthcare delivery in these places. Akwanga LGA have significant number of nomadic population in Nasarawa state because of communal crises that ravaged the neighboring local government areas with the resultant mass movement of nomadic population into the LGA from these neighboring LGAs boundary it, and thus making the population vulnerable to VPDs outbreaks. In fact, the LGA had outbreaks of measles and cholera in May and August, 2013 respectively[78]. The rationale of this study is for better understanding of routine immunization coverage situation among the children of nomadic population in the LGA; identify determinant associated with uptake of routine immunization. This study will also serve as the basis for implementation of effective interventions to improve routine immunization coverage among 12-23 months aged children of nomadic population in the LGA; reduce the high morbidity and mortality due to vaccine infectious disease.

Research Questions

1. What are the routine immunization status and antigens coverage of nomadic population' children aged 12-23 months old in Akwanga LGA?
2. What is the level of knowledge on routine immunization among the caregivers of children aged 12-23 months of nomadic population in Akwanga LGA?
3. What are the attitude and practice of childhood routine immunization by the mothers/caregivers of target children in Akwanga LGA?
4. What are the factors affecting routine immunization coverage uptake in children aged 12-23 months old children among nomadic population in Akwanga LGA?

1.4 General Objective

To identify the determinants associated with routine immunization coverage in children aged 12-23 months among nomadic population in Akwanga LGA, Nasarawa state.

1.5 Specific Objectives

1. To determine the routine immunization status and antigens coverage of nomadic population' children aged 12-23 months old in Akwanga LGA.
2. Assess the level of knowledge on routine immunization among the caregivers of children aged 12-23 months old of nomadic population in Akwanga LGA.
3. To determine the attitude and practice of childhood routine immunization by the mothers/caregivers of target children in Akwanga LGA.
4. To determine the factors affecting routine immunization coverage uptake in children aged 12-23 months old children among nomadic population in Akwanga LGA.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

The Centre for Disease Control and prevention (CDC) ranked immunization first out of ten public health interventions in the past 100 years. Routine Immunizations (RI) against Diphtheria, Pertusis, Tetanus, Measles, Poliomyelitis and Tuberculosis is proven to be one of the most cost – effective interventions for reducing and controlling childhood illness and mortality. Routine immunization of children is an important tool for the control of these infections and promotion of child health.[2,19,20]

It was estimated that the VPDs account for over 3 million mortality annually. Measles alone accounting for about 50%, pertusis about 600,000 deaths annually, neonatal Tetanus 800,000 cases annually with case – fatality rate of about 85% and Poliomyelitis about 250, 000 occurring every year with few deaths but significant disability. Tuberculosis affects about 2 million children yearly with a mortality of 50 – 100%[21]. It was reported that one death in every three in the world is the death of a child less than 5 years of age[22]. Out of every 1000 Nigerian children born, about 187 will die before their fifth birthday while 80 will die before their twelfth month of life.[23]

The first attempt to use immunization on a global scale began in 1956 when the World Health Organization (WHO) and others selected smallpox for eradication from the world.[2,3] The eradication of smallpox in 1980 through smallpox vaccination is one of the greatest successes in preventive medicine. This success motivated the WHO to adopt the Expanded Program on Immunization (EPI) aimed at reduction, elimination or total eradication of targeted childhood killer diseases by the year 2000 and beyond.[3] Another notable attempt at large scale vaccination was reported by Forge, W.H. in 1971. Between

1967 and 1970, he and his team administered measles vaccine in a mass countrywide campaign in Gambia which resulted in the absence of indigenous measles from Gambia until 1972.[26]

The expanded program on immunization (EPI), a global initiative aims at reducing morbidity and mortality due to vaccine preventable diseases (VPDs) to improve the quality of life and mitigate disability associated with VPDs especially in the first 5 years of life[21]. When the EPI, was launched in Nigeria in 1979 with emphasis on reduction of morbidity and mortality arising from vaccine preventable diseases (VPDs) and assessed in 1983 in Nigeria, it revealed that coverage level was approximately 15%.[3,12,29]

As a result of the 1983 EPI assessment which clearly showed that the 1990 Universal Childhood Immunization (UCI) goal of 80% would not be attained, National Immunization days (NIDs) was launched as an accelerated program. Thus, the launch of NIDs in 1988 by the Federal Ministry of Health (FMOH), with the support of United Nations (UN), international and National Agencies resulted in some states in Nigeria to achieved over 80% coverage and national coverage rose to 60% in 1989 and 80% in 1990[30]. This achievement was credited to government and health personnel commitment, intensive social mobilization, involvement of the private sector and intersectoral collaboration and ministries of Agriculture, Education and Information.[13,31] However, immunization continues to be underutilized. According to a WHO report, in 1988 over 2 million children still die yearly from vaccine preventable diseases.[18] It is estimated that out of every 1000 Nigerian children born, 187 will die before their fifth birth day.[23]

It has been reported in many countries that the children of parents in the lowest socio-economic quintile is nearly 12 times, less likely to be immunized than children of parents in the highest quantile.[31] In most parts of the world, socioeconomic inequalities constitute a much more significant cause for concern than do gender inequalities. About one – third of the children in even the richest population quintile remained unimmunized.[32] In 1998, the Global Polio eradication initiative (GPEI), a partnership among UNICEF, WHO, Rotary international and the US CDC spearheaded an effort to support country governments to immunize all children against polio in order to halt transmission and free the world of Polio.[33]

In 1991, survey revealed that in 1990, Nigeria achieved universal childhood immunization (UCI) goal with under one year DPT coverage of 65%, measles 70% OPV3 65% and BCG 95.5% respectively.[31] There were also wide coverage disparities across the country by same report with coverage rate for south of 70% while that of the north was 55%. The same survey also showed that 88% of children born in the country have access to EPI through the network of static and outreach sites. The nationwide dropout rate then for DPT_1 to DPT_3 was 14% lower than the average of 20% found in the local government areas (LGAs) coverage survey or 1989.

The implementation of EPI in Nigeria started in 1979. Nigeria's performance on routine immunization has continued to decline since the high point achieved around 1990. Routine immunization also slowed down during the military rule that was characterized by underfunding and political instability.[32,33] This dwindling in immunization coverage continued to nosedived and led to Nigeria be named the country with lowest national immunization coverage in Africa.[21] Despite the measures taken at that period, there were

still low coverage with increased morbidity and mortality from the targeted vaccine preventable infectious diseases; thus, this led to the launched of NPI.[34,35]

2.2 Immunization in Nigeria

Following the formulation and launching of EPI by WHO in 1974, Nigeria officially launched the Expanded Programme on Immunization (EPI) in 1979 as one of the component of the Primary Health care with the following objectives:[9,31,47]

- To achieve 80% immunization coverage of the target population by the year 1990 and midterm goal of 60% by 1987.
- To reduce by 1990 by at least 50% the incidence of the target diseases i.e. Tuberculosis (TB), Diphtheria, Pertussis, Tetanus, Polio and Measles, through immunization and other preventive measures.
- To establish an efficient system of surveillance and program monitoring activities to ensure reliable and systematic procurement of vaccines.
- To foster intersectoral cooperation and community involvement and participation in these activities at all levels, and therefore enhance the ability of the program to sustain itself effectively.

The implementation of this program started in all states of the Federal Republic of Nigeria between 1979 and 1982. Initial components of the national EPI were TB, Diphtheria, Pertussis, Tetanus, and Poliomyelitis and Measles. Yellow fever and Hepatitis B were included several years later. The program recorded initial significant success but declines in uptake of the services were quickly observed. With concerted efforts of the Federal Government, state agencies and international Organization between 1983 and 1984, a new strategy was developed and pre- tested in 1984 in Owo Local

Government Area of Ondo State which led to Nigeria attaining UCI in 1991.[31,47] Based on the success at Owo, a national plan was developed which resulted in the launching of the revised EPI in 1986 with the following strategies adopted.[31,47,48,49]

- Decrease in the reliance on electricity to maintain the cold chain and increase use of cold boxes.
- Involvement of other sectors mobilizing local, political and religious leaders to mobilize community members.
- Use of ancillary facilities to increase accessibility.
- Intense health education using the media.

The general objective of the revised EPI in 1986 was to achieve 80% coverage of the target children population and reduce the mortality due to the vaccine preventable diseases by 50% by the end of 1990. But since the mid – 1990s, Nigeria has continued to witness fluctuations in immunization coverage for all vaccine – preventable diseases.

The Federal Ministry of Health set – up a technical committee with the aim of reversing the trend by developing a 5 year plan (1994 - 1998) with the aim of meeting the mid – decade goals, which included:

- Achieving 80% EPI coverage.
- Reducing in measles mortality by 95% and morbidity by 90%.
- Immunizing of 90% of women in reproductive age with Tetanus toxoid as an effort towards reaching elimination of Tetanus by 1995.
- Full integration of yellow fever immunization into EPI.

2.3 The National Programme on Immunization (NPI)

The NPI was launched in 1996 and became an agency having autonomy with its own chief executive under decree 12 of 1997.[50,51] The activities of the NPI would be implemented using the following strategies:[51]

- Strengthening of routine NPI.
- Active surveillance for the NPI target diseases.
- Supplemental immunization through NIDs, SIDs and LIDs towards polio eradication.
- Provision of vaccines to all static and outreach centers and the creation of temporary immunization sites at strategic points such as markets, mosques and churches.

In 2004, a major reorganization of the FMOH was developed, which included a department of community Health within the child Health and Immunization Division in located. This Division replaces the NPI Parastatal. The activities of NPI were fully reverted to NPHCDA in May, 2007 by the Federal Government.

2.4 The Expanded Program on Immunization Progress and Performance

The EPI in Nigeria experienced a slow and continuous start, remaining at low level (5 - 10%) for the first five years after it was launched. By 1984, most states had started implementing the revised program whose objectives were to ensure coverage of 60% of children 0 – 2 years by 1987 and 80% by 1990 as well as reduced mortality due to the 6 EPI target diseases by 60%.

In 1986, an immunization coverage survey was conducted in 19 capital LGAs, and Owo LGA, which yielded an aggregate result of 50% fully immunized children[49, 52]. A national coverage evaluation survey in November, 1988 showed that 38% of children had been fully immunized and 72.18% had received BCG, 57.8% DPT3, 57.02% OPV_3 and 59.2% Measles vaccine. Three (3) states with a population of 14 million (Ogun, Anambra, Kwara) achieved "Universal child coverage 1990" in 1988 i.e. a coverage of 80% or above. The EPI coverage survey done in 1991 in 16 geographically homogenously distributed LGAs showed coverage of DPT_3 of 65% of under one year.

However, the coverage rate declined steeply, showing that only about 29% of targeted children were immunized in 1993. In 1999, BCG coverage was down to about 13% and DPT coverage 19%. Also there was a decline in immunization coverage for each vaccine.[51,53]

The 1999 National Demographic and Health Survey (NDHS) shows that only 14% of the children were fully immunized by age 12 months and 17% by age 23 months. It also reveals that 38% of Nigerian children Survey had not received any vaccinations.[37] This revealed some states in the Northern part of the country to have coverage rates below 1% and average for the whole North West Zone (NWZ) was 4%.[54]

Ejembi et al, report that the percentage of children fully immunized in Zone C is 24.6% with range of 0.5% and 61.1% among the LGAs, a far cry from the UCI goal of 80%.[54,56]

Between the Demographic and Health Surveys (DHS) for 1999 and 2003, the percentage of children aged 12 – 23 months who receive at least one of the traditional vaccines by their first birthday rose from 60.9% to 69.4%, indicating that access and uptake had

improved, yet the percentage fully immunized with all doses before 12 months age fell from 14.3% in 1999 to 11.3% in 2003, and drop-out between first and third dose of DPT increased from 45.7% to 48.1%, indicating growing problems with the continuity of routine immunization services.[51] Despite much national attention being directed toward PEI, between 2000 and 2002, coverage for the routine third dose of OPV fell in three areas: Abia (2 LGAs), Kano (9 LGAs) and Lagos (9 LGAs), coverage by the BASIC II/ Nigeria project. In the 9 Kano LGAs, OPV_0 rose from 25% to 39% and OPV_1 rose from 30% to 35%, but OPV_3 coverage fell from 32% to 15% during this period.[51]

In 2003 national immunization coverage report, one of the most frequently cited reason for a child not being vaccinated was that the service was too "far", households living within 10km were 67%, 73%, 82%, 87% and 88% from Northwest, northeast, north central, southeast and south west Zones respectively.[15] The WHO recommended 5km of trekking distance of not more than one hour for location of health facilities in any given community.[48] Nigeria's performance on routine immunization has continued to decline since the high point achieved around 1990s.[51] Data from 2003 National immunization coverage survey reveal a very low immunization coverage with only 12.7% children aged 12 – 23 months receiving full immunization service.[51]

Nigeria has demonstrated improvement in RI coverage, achieving a DPT_3 coverage rate of 69% in 2010 from 29% in 2006, an almost 95% increase since 2006. However, RI is yet to reach the 90% coverage target and a large disparity in coverage rate exist among the country' six geopolitical zones, ranging from 46% in the northeast zone to 91% in the southeast zone (NPHCDA, Nigeria 2010 NICS). Another notable success of Nigeria's immunization effort is the measles vaccination program with significant contribution for

supplemental immunization activities resulting in an estimated 71% of target population vaccinated by 2011 as compared to 33% in 2000.[55]

Despite these successes, Nigeria still faces many challenges with regard to immunization coverage and disease control. Vaccine access in Nigeria is affected by several reasons including lack of awareness of the benefits of vaccination, week health systems in remote areas, lack of performance management, an ineffective accountability framework, and poor infrastructural support, including inadequate wild chain management and poor transport network.[55] There is also problem of relative paucity of locally generated data from clinical and health system research to guide efficient implementation of vaccine programs. Other barriers to vaccine uptake stem from insufficient numbers of skilled health care workers, cultural and religious misperceptions of vaccination, and very recently, the growing insecurity in certain communities especially the north east zone of the country. Also, NIDs take health staff away from their regular work, thus NIDs contribute to the continuing dysfunction of the primary health care system. Communities refused to cooperate with the vaccinators because they felt that other health needs like measles, cerebrospinal meningitis and malaria were not being adequately addressed including the use of under – age vaccinators. Polio immunization fatigue had lead to RI fatigue.[36]

The Polio Eradication initiative has absorbed almost all the attention of NPI for several years. Many negative attitudes towards RI in the north can be traced to what are widely perceived to be intrusive and culturally insensitive Polio SNIDs. These have led some northern decision – markers and caregivers to reject all RIs, for fear that all antigens

induce sterility and/or transmit HIV. Another frequently expressed views linked to the number of NIDs/SNIDs is that RI must be unimportant.[40,41]

2.5 Immunization Status

The immunization coverage of children 12 – 23 month's age group for Goa can be summarized as 85.35% children fully immunized, 11.87% children partially immunized and 2.76% children unimmunized. The coverage for individual vaccines was BCG (94.7%), OPV_1 (96.7%), OPV_2 (95.8%), OPV_3 (90.6%), DPT_1 (96.1%), DPT_2 (95%), DPT_3 (90.6%), measles (88%) and Hepatitis B (19%).[65] Among 12 23 months old children in urban slums of Lucknow district, India, it was observed that 47.2% of total number of children complete and partially immunized, had vaccination cards. Also, though the immunization reached to about 76% of the target children, only about 44.1% of the children received all the vaccines. The proportion of children with no immunization at all was about 2.4%. The overall drop – out was quite high, with one in three (1 in 3) children being not able to complete the course of vaccination.[66]

In Kargil, India, a total of 538 children between the ages of 12 and 23 months were evaluated for their immunization status. Coverage rates were similar in boys and girls.[67]

In a study carried out on immunization coverage among children below two years of age in Panshekara, Kano, Nigeria, it was found that the proportion of children who were fully immunized stood at 10%. This is far below the 80% required to give the herd immunity for the prevention of epidemics of these diseases. BCG coverage was 50%, OPV_0 0%, OPV_1 70%, OPV_2 24, and OPV_3 10%. DPT_1 DPT_2 and DPT_3 recorded 42% 14% and % coverage respectively. The DPT series drop-out rate was 86% and measles coverage was

32%. The high level of illiteracy among the mothers and some negative cultural practices inhibit the mothers from taking the children to health facilities for immunization.[62]

In a study on factors influencing immunization uptake in six states in Nigeria, the uptake of immunization was very low in the study states. Less than 66% of children aged 12 – 23 months received any kind of childhood vaccine with only 12% of children age 12 – 23 months were fully immunized.[63]

In Odusanya et al's study on evaluation of rural immunization in Nigeria, two (2) years after the program, showed immunization coverage rates were 94% for BCG, 88% for DPT_3 and 82% for measles. All antigens showed significant improvement from baseline values ($P<0.0001$). Eighty – four (84%) percent of children were fully immunized against all six (6) disease compared with 43% at the commencement ($P<0.0001$). Hepatitis B coverage (3 doses) was 58%. The vaccination program has significantly improved vaccination coverage and could be a model for underserved, non – industrialized communities.[64]

In the 1991 national coverage survey, immunization status of children 12 – 23 months old was BCG 93. 5%, BCG scar 87.5%, DPT_3 81.1% OPV_3 81.1%, Measles 84.7%, fully immunized 76.6% and card retention 90.6%.[31] The NICS states that nationally 7% of moral children and 25% of urban children have been fully immunized. Full immunization coverage in less than 13% nationally, and below 4% in the North West zone, NWZ.[51]

2.6 Factors Affecting Children Immunization Uptake/Coverage

In the Goa study, it was found that children with high birth order, Muslim religion, those residing in rural areas, children with low parent education and socio–economic status and those

from high household size had significantly low immunization coverage levels compared to children from other groups ($P<0.05$). Also a trend analysis showed improvement in immunization status with improvement in parent education, socio-economic status and decreasing family size.[65]

Similarly, Nath et al in a search for independent predictors of unimmunized status of the children in a district of India, found that low socio-economic status (OR = 10.8), Muslim religion (OR = 4.3), higher birth order (OR = 4.3), delivery at home (OR = 3.6) and belonging to a family (OR 2.1) increased the risk of non–immunization significantly. Surprisingly, the literacy status of the mother had no significant independent bearing on the unimmunized status of the child.[66]

According to the NICS 2003 report only 70% of Nigerians had access to health care of any description in 2001 this figure in lower in rural areas[51]. In the same survey, the second most frequently cited reason for a child not being immunized was that the service was "too far" in the North West Zone (NWZ) which the most often was given reason. Unfortunately, no data to show what people consider a reasonable distance to travel nor is there any indication whether "too far" refers to time or distance.[51]

In Nigeria, widespread inequities persist in immunization coverage. The child of parents in the lowest socio–economic quintiles is nearly 12 times less likely to be immunized than children of parents in the highest[51]. The findings on a study in six (6) states revealed that while more than 90% of the respondents from Borno reportedly use public health facilities, while less than half of their pears from Lagos use them. The use of traditional health practitioners was only significant in Jigawa and, to some limited extent, in Yobe and Kano. Overall, 48% reported

being able to overcome transport difficulties to obtain immunization services for their children while 44% reported being able to resist opposition to immunization from their spouses. The data showed that fewer than one out of six children aged 12 – 23 months were fully immunized in Kano state. The problem appeared to be more with obtaining complete DPT and complete Polio immunization than with obtaining the BCG or the measles vaccine.

In Jigawa and Kano States, inaccessibility and inadequacy of functional health facilities were also some of the major factors identified as influencing the decision of parents on whether or not to immunize their children. In these 2 states, participants also deplored the fact that some health facilities opened a few days a week and only for a few hours.[68]

Musa studied default among mothers attending childhood immunization clinics in Ilorin, Nigeria, and found out that the vaccines monthly defaulted include BCG and OPV_0 (33%), followed by measles vaccine (23 .1%). Some of the reason for missing clinic appointments given included forgetfulness (39%), travel to neighboring town (32%), child illness (10.4%) and lack of funds for transportation (9%).[69] Family environment, a mother's prenatal care usage and financial barriers are important factors related to vaccination receipt among socio–economically disadvantaged children less than 2 years according to findings of Bates and et al. These factors, however do not fully explain the variation in vaccination status. Out of 399 children with documented vaccination status, 47% had not received all recommended vaccinations.[70]

2.7 Knowledge on Immunization

In a study in India, 23.8% of the respondents lack knowledge about the vaccination.[66]

In Jena, Germany, 312 of 2500 patients between 4 – 98 years received intensive vaccination education based on their accompanying vaccination documentation. Five weeks after the consultation, the vaccination rate had increased significantly, this included diphtheria, which rose from 55.8% to 71.2% and Tetanus which rose from 73.1% to 86.5%.[71] This shows that well structured vaccination consultations help to raise vaccination rates. The 45-minute Penn state immunization project tutorial was pilot tested with pediatric and family medicine residents at 7 training programs in 4 states (Penn – Sylvania, New York, Maryland and Iowa). Knowledge was assessed and it was revealed that statistically and clinically significant improvements were seen in residents' general knowledge about parents' resistance to childhood immunization and knowledge of adverse. This reveals that a tutorial for primary care providers is effective in improving resident physicians' general knowledge and knowledge of adverse events.[72]

Parental lack of knowledge for the need for vaccines districts in Pittsburgh area was the reason most often identified by parents (58%) for their child's missing vaccines.

Contrary to previous reports, cost, access, illness, and mobility were not identified by parents as reasons for missing vaccines in their children.[73]

In a study on immunization coverage in Panshekara, Kano, Kano state, Kabir et al found out that among factors associated with failure to immunize children, was due to mother's ignorance (48% illiterates).[62] In another study, it was found out that 75% of mothers were aware of the existence of RI services in their village and 68% had poor knowledge of the immunization schedule as well as knowledge on diseases prevented by vaccine.[48]

There is a positive correlation between mother's education and fully immunized child; nationally 31% of children of mothers with secondary education are fully immunized and only 3.9% of those with no education. Immunization is erroneously believed to be a general preventive method for most childhood diseases, knowledge about vaccine – preventable disease is generally poor and among many caregivers. In a survey, Adamawa mothers demonstrate greater correct knowledge of both individual antigens and complete immunization schedule than Katsina State mothers. In addition, despite observably greater poverty in Adamawa communities, mothers evince more willinglyness, to incur both monetary and opportunity costs to ensure their children's immunization. The primary reasons for this greater knowledge and commitment appears to be the presence of the Garkida community – based health programs.[51] In contrast in urban kano, immunization, followed by the use of traditional herbs, was the most common as seen in a study.[68]

Knowledge about the number of times a child should receive vaccines for the vaccine – preventable diseases is also generally poor, even among the participants that were most knowledgeable about immunization.[68] In rural Kano, most of the groups did not know the frequency of obtaining any of the relevant vaccines. The results showed the unusual finding that educated women were less likely to immunize their children when compared to uneducated.[63] The data also surprisingly showed that respondents who reportedly heard any information on immunization from mass media or community sources were not more likely than other to report complete DPT coverage or full immunization for their children. While the reasons for this unexpected finding was not clear, it possibly related to the general wariness about immunization resulting from widespread unsubstantiated myths and rumors in the state in recent times.[63] In Kano and Enugu, participants expressed the belief that a child that has

been immunized may be affected by the same disease but the potency of the disease is greatly reduced.[68] In Nigeria study, it was found that in the study states about 66% of the respondents were able to spontaneously and correctly name at least one vaccine – preventable childhood disease while less than half (48%) could name at least two. In general, awareness was highest for polio and measles.[63] In Borno and Jigawa, only about a third (33%) of the respondents could name at least two vaccine preventable diseases. Knowledge about the number of times a child should receive the various childhood vaccines was generally poor.

2.8 Attitude towards Childhood Immunization

Data from the 2002 Health Styles survey shown that tutorial for primary care providers has the potential to enhance communication between parents and primary care provider and, more generally, improve clinicians' response to the growing resistance toward parents resistance to childhood immunizations, in a project where physicians' attitudes toward parents' resistance to childhood immunization was assessed.[72]

One study examined how immunization-related beliefs, attitudes, perceived control mediate up to – date immunization among various socio demographic groups and found that: Differences in immunization among socio-demographic groups were mediated by beliefs about objective barriers to immunization, protection, medical contraindication, safety concerns, distrust, and natural immunity. Protection beliefs contributed to positive attitudes towards immunization, belief in natural immunity and safety concerns contributed to negative attitudes. Beliefs about objective barriers, distrust, safety concerns, and medical contraindications influenced perceived control over immunization. Positive attitudes and a strong sense of control contributed to higher immunization rates.[74]

In a study to determine attitudes of parents towards possible future vaccination for their children and the behavioral determinants associated with a negatives attitude 123 (43%) reported a positive attitude towards all vaccinations, 129 (46%) reported to have a positive attitude to have their child vaccinated against some diseases and 31 (11%) had no intention to comply with any new vaccination. Determinants of a fully negative attitude were high education of the parents (OR = 3.3, 95% CI: 1.3 – 8.6), being a health care worker (OR = 4.2, 95% CI: 1.4 – 12.6), absence of religion (OR = 2.6, 95% CI: 1.0-6.7), perception of vaccine ineffectiveness (OR = 6.9, 95% CI: 2.5-18.9) and the perception that vaccinations cause asthma or allergies (OR = 82.4, 95% CI:8.9-766.8).[75]

About 16.4% of respondents in Lucknow district, India had lack of faith on the effectiveness of vaccination and 14.8% were apprehensive due to the sickness of elder sibling.[9,66]

In a Northern Nigeria village, 54% of mother's studied were against their children being immunized, 58.5% believe immunization offers protection against disease while 48% believe vaccines are safe.[48] A study on community and systemic factor influencing the uptake of immunization in Nigeria in five states: Borno, Enugu, Jigawa, Kano and Lagos showed that the most important parental expectations about their children revolve around good health and longevity.[51] A 2003 study in Kano state revealed that 9.2% of respondents evinced "no faith in immunization", while 6.7% expressed "fear of side reactions".[51] In rural and urban Kano, except for the polio vaccine, parents of fully immunized children rated vaccines as generally effective. The explanation proffered for the high rating is that after immunization, parents noticed that the children are healthier and go through childhood without any major diseases. Polio is believed to be problematic because of the perceived hidden agenda associated with the vaccine at that time.

Babalola and Adewuyi revealed that in six states in Nigeria, only 15% believed the BCG vaccine to be very effective while about 13% held a similar conviction of the Pertussis vaccine. The Polio vaccine and the measles vaccine were the most likely to be perceived as very effective. Jigawa state respondents were the least convinced about the efficacy of vaccines.[63] The majority of respondents in all states except Jigawa erroneously believed that immunization protects against all childhood diseases[63]. More than 25% mentioned at least one incorrect vaccine–preventable disease such as Malaria, diphtheria, convulsion and pneumonia. In the same study, only 37% encourage someone to immunize their child.

2.9 Practice of Childhood Immunization

In Lucknow district of India, the commonest reasons for partial immunization according to the respondents was unavailability of both parents (17.2%), followed by lack of necessary information regarding the details of vaccine administration (14.7%), carelessness (11.7%), sickness of older sibling as a result of the vaccine (11.7%) and lack of knowledge regarding the subsequent vaccine (10.4%).[66]

The immunization coverage among children below two years by Kabir et al reveals that 44% of the mothers had negative cultural practices and 30% were negligent.[62] Failure of service provision is primarily responsible for Nigeria's poor immunization coverage. The National immunization survey 2003 results show that it is the failure of service provision that is primarily responsible for Nigeria's poor immunization coverage.[51] Of 24,116 reasons accounted for, the most frequent by mentioned were: vaccines not available (4,360), place of immunization too far (2,919), unaware of the need for 2nd or 3rd doses (1, 858), fear of side reactions (1,383), mother too busy (1,049), place and or time of immunization unknown (862), no fate in immunization (704) and rumours (687).[51] Immunization status was ascertained for

1000 children, mean age of 1.5 years, 80% had been immunized at the appropriate age. 4.1% have missed a scheduled immunization because of their acute illness, or were due to a scheduled immunization shortly after discharge, 14.2% have missed the age appropriate immunization with no valid contraindications.[76]

Findings from a community pilot research indicate that where there has been dissemination of information tailored to community members needs, there is potential for greater engagement with routine immunization. Findings suggest that even where barriers to uptake persist, such as availability of vaccine and or informed caregivers will make more effort to gain access. In some states, 27% believed vaccines were always available in government health facilities, 30% believe immunization providers know their job well and perceptions about the waiting time in immunization sites indicated that many find the waiting time unnecessarily long, especially in Lagos, Kano, Borno, and Yobe.[63]

In urban and rural Kano, the prevalent belief is that fathers are responsible for making final decisions on whether a child is to be immunized or not, providing encouragement to mothers to have children immunized, and providing the necessary financial support. In the same vein, a woman is expected to seek clearance from her husband and to comply with his directives on matters concerning immunization. Apparently, with such important socially prescribed responsibilities a man can easily stand in the way of his wife's desire to immunize their children[68]. 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.[66]

CHAPTER THREE: METHODOLOGY

3.1 Study Area

The study area was the nomadic communities/settlements within Akwanga LGA, Nasarawa State, and North central Nigeria. The LGA is about 60km from Lafia Nasarawa State's capital. Predominant inhabitants of this LGA are Mada, Eggon, Hausa, Igbo, Yoruba and Fulani. It is bordered in the south by Nasarawa-Eggon, north by Sanga LGA (Kaduna) east by Wamba, and in the west by Kokona LGAs respectively. It is a transit route from most people travelling from the north east, north central, south-south and south-Eastern part of the country. It also serves as a transit route/camp for most nomadic population heading to the southern/northern directions of the country. The Fulani are the main nomads in the Local government because of the nature of their occupation, herdsmen. The nomads are found in all the 11 political wards of the LGA and their major religion is Islam. The under five nomadic population in this LGA is 5,878 (enumeration June, 2013 IPDs). The wards are namely:

Agyaga, Akwanga east, Akwanga west, Ancho, Andaha, Gudi, Gwange, Moroa, Ningha'an, Ningo-Boher and Nunku. There are 443 nomadic settlement based on June, 2013 Immunization plus Days (IPDs) micro-plan settlements profile of the LGA[78], with unequal population distribution in each settlement.

The supplemental immunization activities (SIAs) teams covering the nomadic population in this LGA are 48 teams/divisions spread across all the nomadic settlements. As at the time of this study in the LGA, pentavalent vaccine is not yet being administered but newly introduced in some parts Nasarawa state.

3.2 Study Design

This study was descriptive study, where both quantitative and qualitative variables were collected.

3.3 Study Period

The study was conducted between January-April, 2014. The data were collected from April 15th-22nd, 2014.

3.4 Respondents

The respondents were caregivers of the sampled children in the LGA. For a caregiver (who is not the mother) to be eligible for the interview, shall be living with the child for the least 12months prior to this study and consented to participate.

3.5 Eligibility Criteria

3.5.1 Inclusion criteria - A child between the ages of 12-23months. The age range of 12-23 months was chosen to reflect the births in a one-year period corresponding to an annual birth cohort. In addition, the 12months as the lowest age to minimize recall bias by respondent and it is expected that at this age, the child should have completed his/her routine immunization.

3.5.2 Exclusion criteria - Children of non nomads and whose ages are above 23months of age or whose caregivers declined giving consent for the study.

3.6 Sample Size Estimation

The minimum sample size required for this study was calculated based on WHO cluster sampling.[77]

The formula of Lwanga and Lemeshow (1991) below used in estimating the sample size.

$n = (Z\alpha^2 pq/d^2) \times DEFF$ …… Lwanga and Lemeshow (1991)

n = minimum sample size,

$Z\alpha$ = standard normal deviate corresponding to a 2-sided level of significance of 5% (1.96),

P = Prevalence which is the full immunization coverage is 16.1% of children between 12-23 months in Nasarawa State[80]

q =1-p (83.9%),

d = desired level of precision (5%)

DEFF= design effect of 2 in conformity with the standard recommended by **WHO**

n = (1.96x1.96x16.1x0.839/0.05x0.05)x2

n = (0.839/0.0025)x2

n = 207.568x2

n = 415.14

To add 10% non response rate, Q

$Q = 1 \div (1-f) \times n$

Q = minimum sample size with 10% non response rate

f = 10% non response rate (0.1),

n = sample size

$Q = 1 \div (1-0.1) \times 415.14$

$Q = 1 \div (0.9) \times 415.14$

Q = 461.27

Q = 462

Children sampled from 30 out of the 48 clusters available in accordance with the **WHO** recommendation for 2-stage cluster sampling technique. The number of Children required per cluster 462/30=15.4, rounded up to 16 children per cluster which a total of 16x30 of 480 children for the whole 30 clusters. The final calculated sample size estimated 480 children. This was rounded up to 500

3.7 Sampling Technique

The sampling techniques involve a 2-stage cluster sampling method.

3.7.1 Stage 1: selection of clusters

The 30 clusters were selected from the available 48 cluster based on probability proportionate to size (size of population of each ward). The steps below were followed:

1. All the 11 political wards were randomly listed i.e. the 11 political wards constitute sampling frame.
2. Population of each ward were indicated and cumulative population were then calculated by adding the population of the next ward on the list to the summation of the preceding ward i.e. population of second ward added to that of the first ward, third ward added to first second wards and on till the 11^{th} ward. In the end, cumulative population of the 11^{th} ward equaled to the total nomadic population in the entire LGA (13, 754 people).
3. Sampling interval were calculated by dividing total population in the LGA by the number of clusters selected i.e. 13754/30=458.47 round up to 459.

4. A random number less than or equal to the sampling interval, with same number of digits as the sampling interval were selected using tables of random numbers.
5. To choose the ward in which cluster one were located, the first village were listed in which the cumulative population was equal or same to or exceed the random number that were chosen and located. To choose the ward where cluster 2 was located, the sampling interval was added to the random number and the ward whose cumulative population contained this number was listed. To choose the ward where cluster three was located, the sampling interval was added to the running total of the sum of sampling intervals and random number and the ward whose cumulative population contains this number was located, the ward was listed. This procedure were continued and repeated (we kept on adding the sampling interval to the running total of the sum of the sampling interval and random number and locating the ward whose cumulative population contained in this number) until all the 30 clusters needed for the sampling survey.

Table 3.1: Showing location of study clusters in the different wards in Akwanga LGA

S/N	Wards	Population	Cumulative population	Clusters numbers
1.	Akwanga West	464	464	1
2.	Andaha	640	1104	2
3.	Gwange	1391	2495	3,4,5
4.	Ancho	949	3444	6,7
5.	Ningo-Boher’	1347	4791	8,9.10
6.	Gudi	2097	6888	11,12,13,14,15
7.	Moroa	861	7749	16,17
8.	Agyaga	1921	9670	18,19,20,21
9.	Akwanga East	1987	11657	22,23,24,25
10.	Ningha’an	839	12496	26,27
11.	Nunku	1258	13754	28,29,30

Sampling interval: 13754/30=458.5 = 459

Random number: 351

3.7.2 STAGE 2: SELECTION OF HOUSEHOLDS

In this second stage, 16 households were selected from each of the 30 clusters. The first household in every cluster were selected randomly. In selecting the first household in each cluster, we obtained a list of all the households in each cluster using the Akwanga LGA supplemental immunization plus day's settlements micro-plan. In nomadic communities, households (gidas) are often named after the head of the households (ruga). We then assigned a number to each household; then a number less than or equivalent to the highest household number was randomly selected using table of random numbers. The household number which corresponds to the selected number was chosen as the first household. This procedure was continued with each proceeding household's selection contiguously till the required number of the households for each cluster was completed or exhausted. Thereafter, in each selected household, one eligible child was selected at random. If a chosen household does have more than one eligible child, only one was selected at random. In the event that, a household has no eligible child, the next household was visited and one eligible child was chosen.

3.8 Data Collection Techniques

The data were collected using structured questionnaire. The research assistants (RAs), five were trained on how to collect the data on the field using the questionnaires. The questionnaire was designed to collect information on the following key areas:

- Socio-demographics characteristic,
- Knowledge of routine immunization and VPDs,

- Attitude towards routine immunizations,
- Vaccination history and reasons for non-vaccination/incomplete vaccination, and
- Factor associated with routine immunization uptake.

Data collection was obtained using pretested structured interviewed administered questionnaire.

3.9 Quality Control of Data

The five research assistants were trained on the data collection. The research questionnaire was pretested in another LGA (Wamba) similar in characteristic to Akwanga and the ambiguous questions were rephrased. The questionnaire were translated to Hausa Language, all caregivers spoke Hausa and then back-translated to English to retain original meaning.

3.10 Data Management

Data entry was performed using Epi-info (version 3.5.4) software. The consistency checks were carried out to clean the data on daily basis. The data was analyzed thus; univariate analysis for frequencies and proportions, bivariate analysis using Chi-square to determine factors associated with vaccination status and logistic regression was done to identify the predictors of vaccination status. All analysis was done at significant level $p<0.05$.

3.11 Measurement of Variables

Knowledge/Attitude of respondents was graded. The five questions were used for grading. For each, one point scored for correct response and zero for wrong response. Maximum score is five and minimum is Zero. Knowledge/Attitude grade: 0 to 1 poor

knowledge/Attitude, 2 to 3 fair knowledge/attitude and 4 to 5 points good knowledge/attitude.

3.12 Ethical Consideration

Ethical clearance was obtained from Nasarawa state ministry of health ethics committee (appendix 2). Informed consents were sought from respondents.

Questionnaires were serialized without name.

Participants were educated on implications of none or incomplete immunization.

Right to withdrawal from the study at any time by the participants was guaranteed.

Knowledge from this project shall be used for improving access to and utilization of routine immunization services among the nomadic population, which will lead to reduced child mortality and accelerated progress towards the eradication of vaccine preventable infectious diseases such as polio, measles and meningitis.

CHAPTER FOUR: RESULTS

A total 501 questionnaire were administered in this study. The result is presented in five sections:

- Socio-demographic characteristics
- Knowledge on Routine Immunization
- Attitude and practice of Caregivers towards Routine Immunization
- Immunization Status of the study population
- Factors affecting Routine Immunization uptake

4.1 Socio-demographic Characteristics

Table 4.1.1: Shows socio-demographic characteristics of Caregivers

Characteristic	Frequency (n=501)	Percent (%)
Age group (in years)		
15-19	190	37.9
20-24	108	21.6
25-29	66	13.2
30-34	91	18.2
35-39	35	7.0
40-44	11	2.2
Mean age	**24.2±6.8yrs**	
Educational status		
None	437	82.2
Koranic school	61	12.2
Primary school	3	0.6
Occupation		
Housewife	43	8.6
Farming	3	0.6
Trading	455	90.8
Duration of stay in the current Location		
Less than 1year	200	39.9
More than 1year	301	60.1
Number of wives of the Father		
1	315	62.9
2	133	26.5
3	47	9.4
4	6	1.2
Heads of Household of caregivers		
With cell phones/numbers	488	97.4
Without cell phones/numbers	13	2.6

Majority (59.5%) of the respondents were between the ages of 15-24 years with a mean age of 24.2±6.8 yrs, 82.2% had no formal education, 90.8% were traders and 39.9% had stayed in the current location for less than a year.

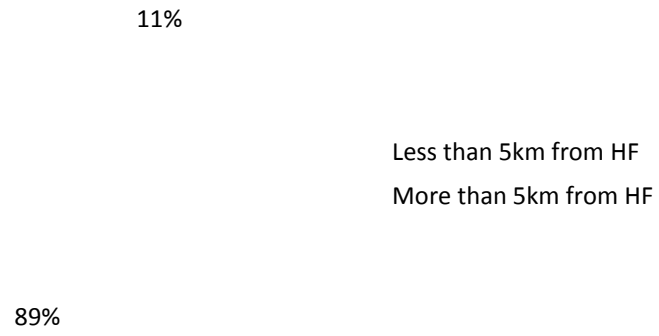


Figure 1: Shows the distance to the closest health facility (HF) that the caregiver may cover in order to access health services

Eighty-nine percent (89.0%) of the caregivers live beyond 5km from the HF where RI is being carried out and therefore HF is not easily reachable by the caregivers.

Table 4.1.2: Age distribution of sampled children of Nomadic population in Akwanga LGA, Nasarawa state

Age (in months)	Frequency (n=501)	Percent (%)
12-14	199	39.7
15-17	64	12.8
18-20	72	14.4
21-23	166	33.1

Mean age = 17.3±4.2months

More than half of the sampled children (52.5%) were between the 12 and 17 months of age with a mean age of 17.3±4.2months. More than half of the children were between the ages of 12 and 17months.

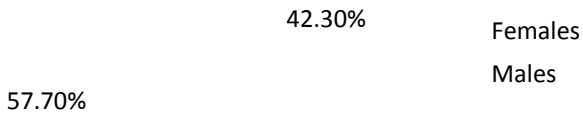


Figure 2: Gender distribution of sampled children of Nomadic population

In this survey, 289 (57.7%) of the children were males while 212 (42.3%) were females as shown.

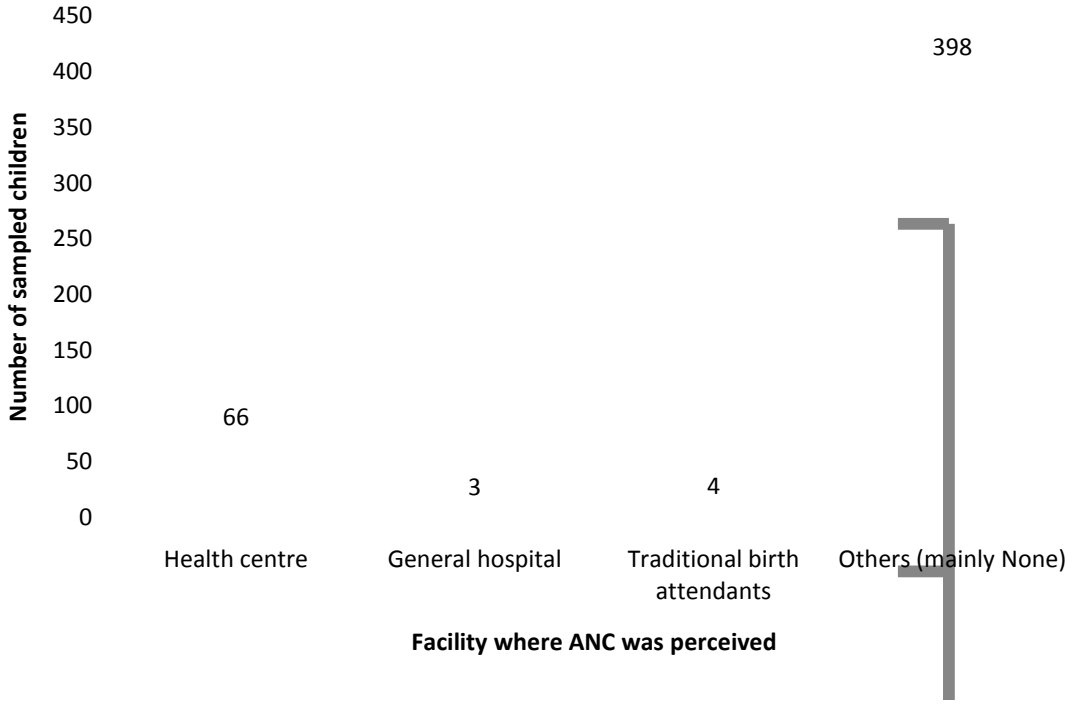


Figure 3: Shows distribution of place of ANC by caregivers during index pregnancy

Only 69 (14.6%) of caregivers received ANC services from the HF during the index pregnancy while majority (85.4%) did not received ANC services from the HF.

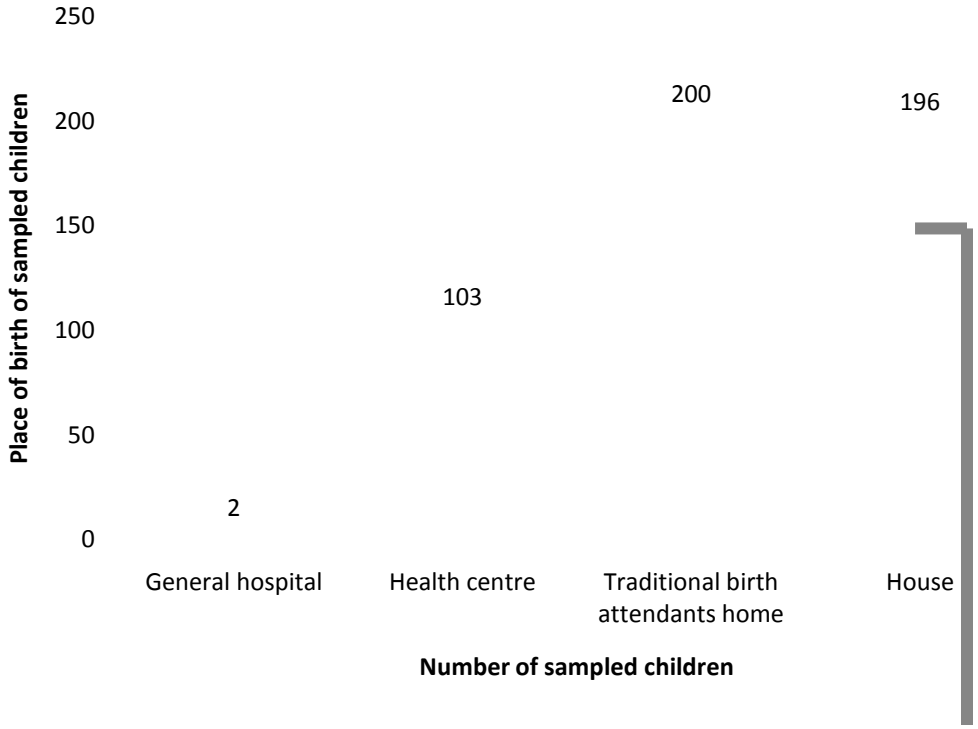


Figure 4: Shows the place of birth of sampled children by caregivers

Only 105 (21.0%) of sampled children were delivered in the HF. Children delivered at TBA's homes are 200 (39.9%) while those at the house are 196 (39.1%).

Table 4.1.3: Shows the distribution of birth order of study population:

Birth Order	Frequency (n=501)	Percent (%)
1st	179	35.7
2nd	116	23.2
3rd	76	15.2
4th	54	10.8
5th	45	9.0
6th	19	3.8
7th	7	1.4
8th	5	1.0

Most, 179 (35.7%) of the sampled children are the first born of their mothers, while the second born accounted for 116 (23.2%) of the children. Therefore, majority 295 (58.9%) of the sampled children are either 1st or 2nd order.

4.2 Knowledge on Routine Immunization

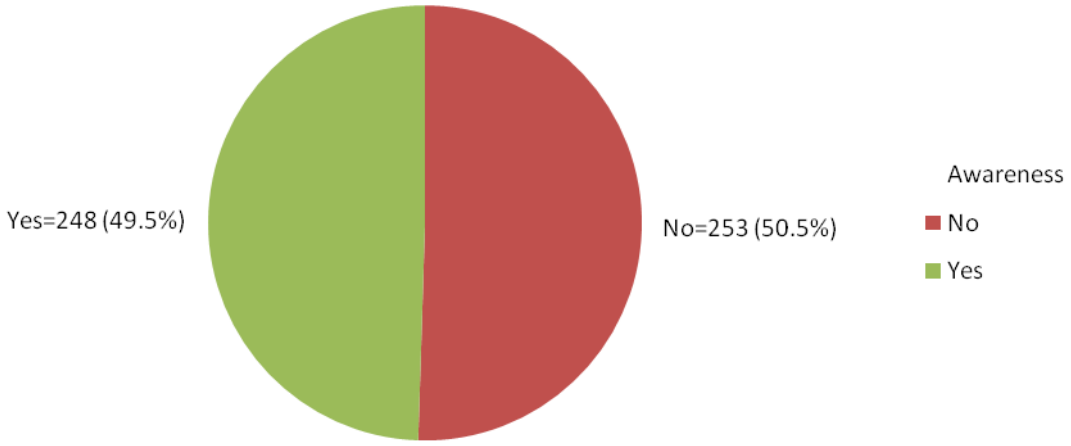


Figure 5: Level of awareness of RI by the caregivers

Only 49.5% of caregivers have heard of RI while 50.5% have not.

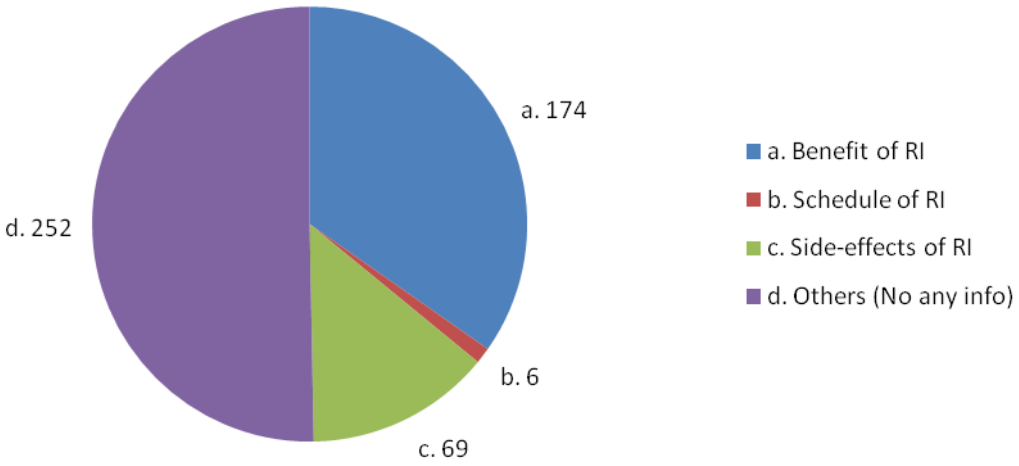


Figure 6: Shows the types of information received in the last 12 months on RI

Figure 6 shows 174 (34.7%) heard of the benefit of RI, 6 (1.2%) are aware of the schedule of RI and 69 (13.8%) aware of the side-effects of RI.

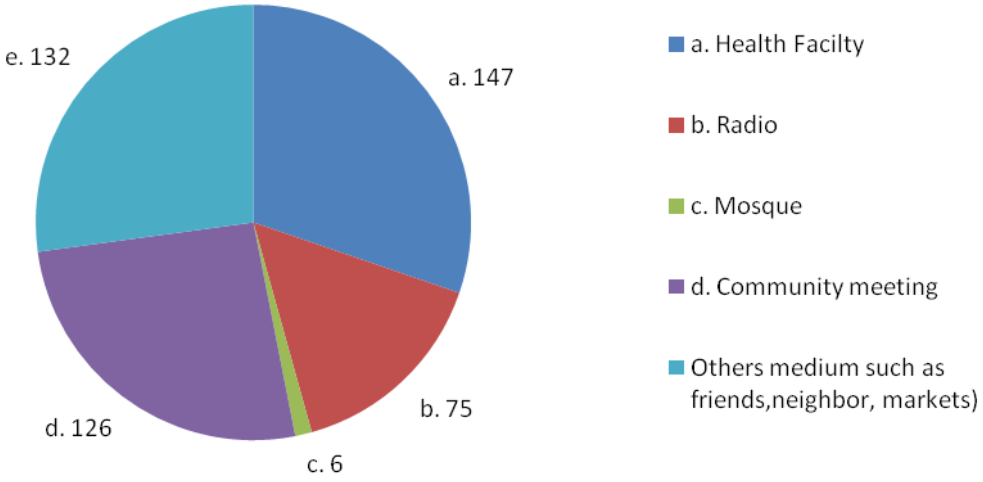


Figure 7: Showing the sources of information/awareness on RI

The caregivers' source of information on RI is the HF with 147 (30.2%), followed by community meetings 126 (25.9%) and Radio 75 (15.4%).

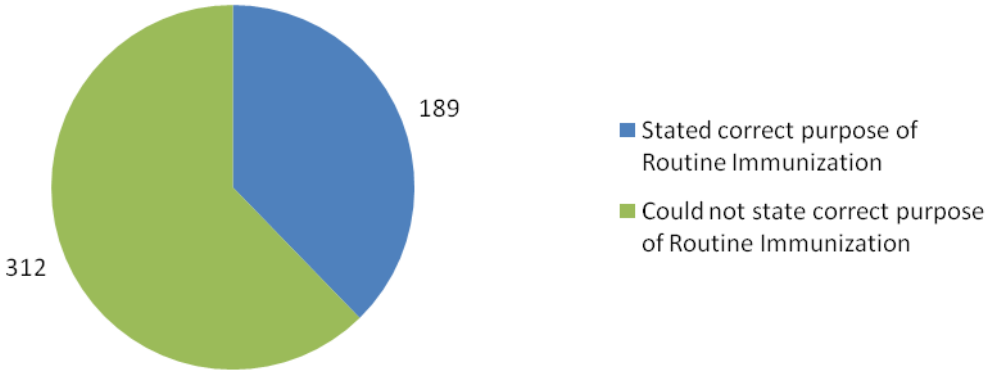


Figure 8: Shows the knowledge of caregivers on the purpose of routine immunization

Figure 8 shows only 189 (37.7%) stated correctly the purpose of routine immunization.

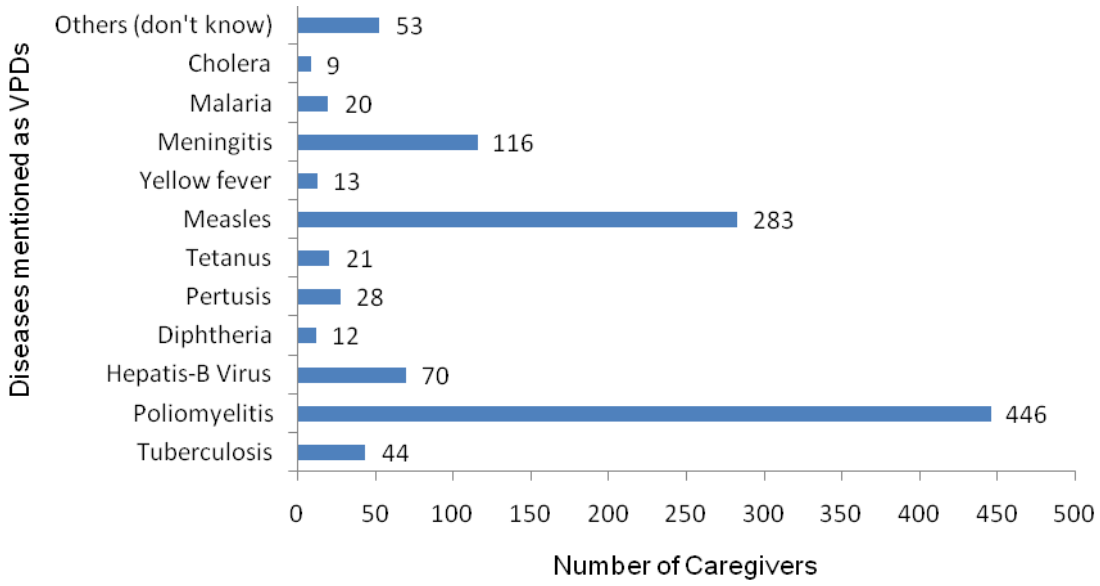


Figure 9: Shows level of Awareness by Caregivers on Vaccine Preventable Diseases (VPDs)

Majority 446(89.0%) of the caregivers are aware that polio is a VPD, followed by measles and meningitis. These may due to the ongoing IPDs for polio and outbreaks of the measles recently among this population. Malaria and cholera were mentioned as VPDs by 20 and 6 caregivers respectively.

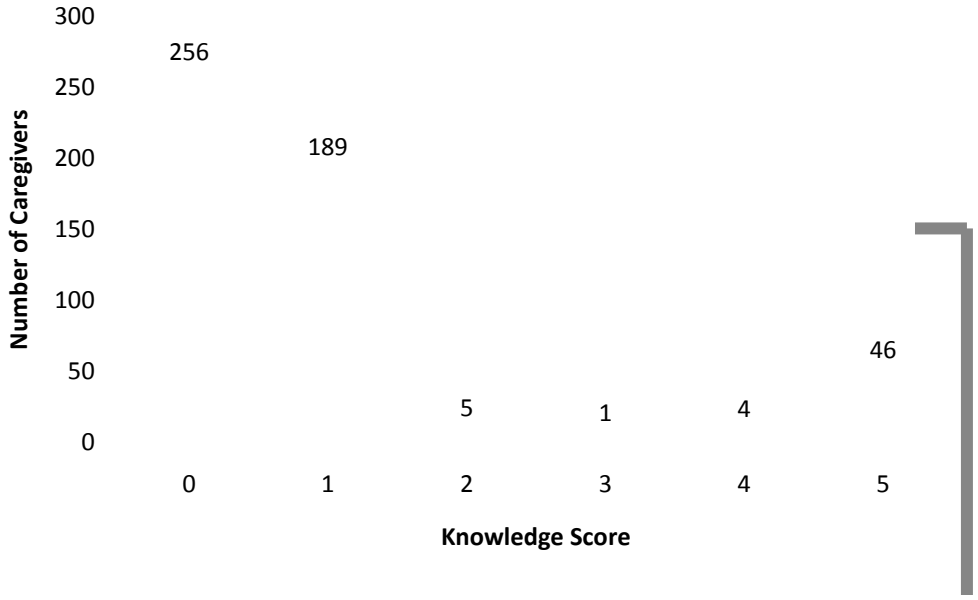


Figure 10: Shows the scoring of knowledge of caregivers on RI (n=501)

Fifty, 50 (10.0%) of the respondents have good knowledge on the RI, 1 (0.2%) fair knowledge and 450 (89.8%) have poor knowledge.

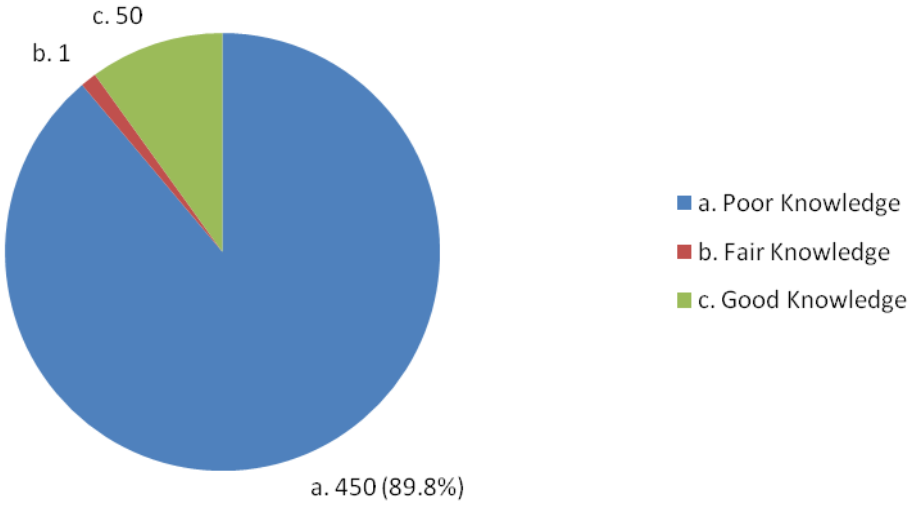


Figure 11: Knowledge of caregivers on routine immunization

Figure 11 shows majority (89.8%) of the caregivers have poor knowledge on RI and only 50 (10.0%) have good knowledge on RI.

4.3 Attitude of Caregivers of Sampled Children Towards Routine Immunization

Table 4.3.1: Shows attitude of the caregivers towards RI (n=501)

Statement	Agree (%)	Undecided (%)	Disagree (%)
RI prevents all childhood diseases	30.5	25.1	44.3
RI is safe for children	36.3	62.5	1.2
I trust the vaccine advice of my child's health providers give	34.0	65.0	1.0
My child's Healthcare provider is easy to talk to	33.8	65.4	0.8
I trust government policy for childhood vaccine	35.2	63.8	1.0
If mothers attend ANC at HF, they are more likely to seek for RI for their children	71.5	28.3	0.2
If mothers deliver their babies in HF, they are more likely to use RI services provider there	71.7	27.9	0.4
Day-to-day activities of mothers affects their attending clinic for the child's RI	69.1	30.7	0.2
Level of education of the mother is important role in the use of RI services	21.6	78.0	0.4
Age of mothers play an important role in the use of RI services	26.6	72.6	0.8
RI is free	1.0	60.2	38.8
RI is effective in VPDs prevention in children	26.6	72.6	0.8
There are local preparations that can serve as substitute for RI to prevent VPDs in children	1.2	5.8	93.0
Our problem is malaria and not polio so RI is not a priority	23.2	13.4	63.4
To me going for RI is a waste of time	2.6	20.0	77.4
I will not take my child for RI	2.0	19.8	78.2
I need the permission of my husband to take my child for RI	93.6	0	6.4
Going to my farm/Trade/Work is more important to me than taking my child to HF for RI	1.8	21.4	76.8
I do not like to go to HF for RI of my child because the Health workers are not friendly	1.2	21.2	77.6
I cannot trek to HF for my child's RI because I do not have the means of transportation to the HF which is far from my ruga	37.3	19.6	42.1
I do believe in RI and will not take my child for RI	1.4	20.4	78.2
I want Health workers to come to my ruga to give RI to my child as I do not have time and HF is too far from here	88.8	8.2	3.0

Majority of the respondents believe that if the mothers attend ANC services (71.5%) and delivers their babies at HF (71.7%), are more likely to seek and vaccinate their children. Most (69.1%) of the caregivers believe the day-to-day activities of the mothers' affects their attending clinic for the child's RI. Also 93.3% of the caregivers require their husbands' permission before the take their children for RI and 88.8% of the respondents want the health care providers to come to their settlements to their children RI because of distance to HF and nature of their trades and movement from place to place.

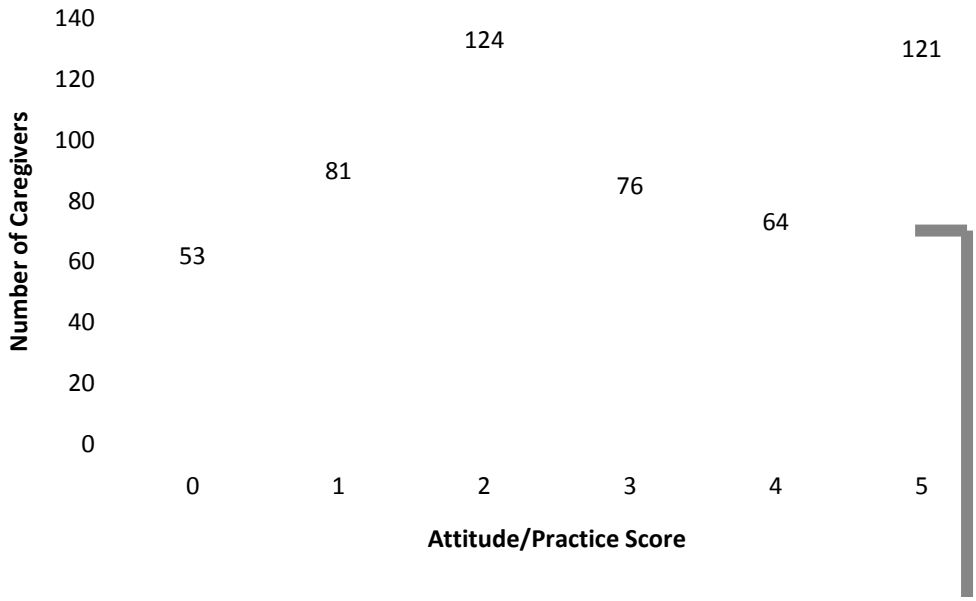


Figure 12: Scoring of attitude of caregivers toward RI

Only 121(24.2%) of the Caregivers have excellent attitude towards RI while 35 (7%) of the Caregivers have extremely poor/bad attitude towards RI.

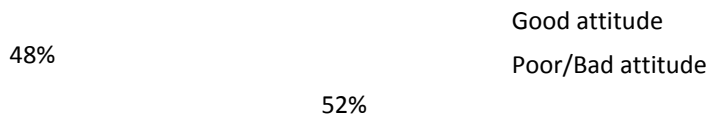


Figure 13: Attitude of caregivers on routine immunization

Majority (52%) of Caregivers have good attitude towards RI.

4.4: Immunization Status of the Children of Nomadic Population

Table 4.4.1: Shows the distribution of vaccination coverage of RI antigens among sampled children

RI antigens	Coverage by history n=501 (%)	Coverage by vaccination card n=501 (%)
BCG	116 (23.2)	62 (12.4)
OPV_0	116 (23.2)	62 (12.4)
OPV_1	47 (9.4)	20 (4.0)
OPV2	65 (13.0)	30 (6.0)
OPV_3	121 (24.2)	69 (13.8)
Measles	149 (29.7)	93 (18.6)
DPT_1	45 (9.0)	12 (2.4)
DPT_2	62 (12.4)	19 (3.8)
DPT_3	120 (24.0)	36 (7.2)
HBV_1	115 (23.0)	20 (4.0)
HBV_2	46 (9.2)	5 (1.0)
HBV_3	60 (12.0)	9 (1.8)
Yellow fever	137 (27.3)	5 (1.0)

The drop-out rate =DPT_3 -DPT_1 = (24-9) %=15%. Immunization coverage by 'history' of the study population with BCG coverage 116 (23.2%), DPT3 120 (24.0%), OPV3 121 (24.2%), Measles 149 (29.7%), HBV3 60 (12.0%) and Yellow fever 137 (27.3%). While, for the immunization by 'card' with BCG 62 (12.4%), DPT3 36 (7.2%), OPV3 69 (13.8%), Measles 93 (18.6%), HBV3 9 (1.8%) and Yellow fever 5 (1.0).

Table 4.4.2: Shows the distribution of vaccination status among the sampled children on routine immunization

Vaccination status	History n=501 (%)	Vaccination card n=501 (%)
Fully Immunized	30 (6.0)	5 (1.0)
Partially Immunized	141 (28.1)	88 (17.6)
Un-Immunized	330 (65.9)	408 (81.4)

Majority of the sampled children were un-immunized. Only 30 (6.0%) were fully immunized.

Table 4.4.3: Shows the distribution of reasons for non-vaccination

Reasons	Frequency (n=330)	Percent (%)
Lack of Awareness on RI	78	23.6
No permission from the husband	22	6.7
Personal disapproval of RI	16	4.8
Distances to HF	126	38.2
Movement of the family from place to place	160	48.5
Others (e.g., No reason given, Child not sick)	42	12.7

Seventy-eight (23.6%) of caregivers said they did not take their children for RI because of lack of knowledge on RI, 126 (38.2%) due to distance to HF, 160 (48.5%) because of frequent movement of the family from place to place, discouragement from husbands accounted for 22 (6.7%) and lack of personal faith in RI accounted for 16 (4.8%).

Table 4.4.4: Shows the distribution of reasons for partial RI uptake for the sampled children by the caregivers

Reasons for Partial Immunization Uptake	Frequency (n=141)	Percent (%)
Unaware to return for $2^{nd}/3^{rd}$ dose of RI	18	12.7
Place and/or time of RI unknown	10	7.1
Distances to HF	44	31.2
Movement from place to place	38	27.0
Past experience of effect of RI	7	5.0
Others (e.g. Illness of mothers, Child not sick,)	24	17.0

Reasons for not completing RI were distance to the HF 44 (31.2%), movement of the family 38 (27.0%) and unaware to return for $2^{nd}/3^{rd}$ dose accounted for 18 (12.7%).

4.5 Factors that Affected Routine Immunization Uptake in the Study Population

Table 4.5.1: Bivariate analysis of the predictors of completion of RI uptake

Factors	Not FIC n=471 (%)	*FIC n=30 (%)	OR	95% C.I
Age of caregiver (in years)				
<30	363 (77.1)	1 (3.3)	97.47	13.12-723.87
30 and more	108 (22.9)	29 (96.7)		
Education of Caregiver				
None	417 (88.5)	20 (66.7)	3.86	1.72-8.68
Koranic/Primary	54 (11.5)	10 (33.3)		
Occupation of caregiver				
Housewife	37 (7.9)	6 (20.0)	0.34	0.13-0.89
Farming/Trading	434 (92.1)	24 (80.0)		
Monthly Income (in naira) of caregiver				
9000	471 (98.9)	22 (88.0)	11.59	2.60-51.64
10,000 and more	5 (1.1)	3 (12.0)		
Home:				
Monogamous	313 (66.6)	1 (3.3)	57.82	7.80-428.36
Polygamous	157 (33.4)	29 (96.7)		
Age-group of child (in months)				
12-17	252 (53.5)	11 (36.7)	1.99	0.93-4.27
18-23	219 (46.5)	19 (63.3)		
Child's sex				
Female	184 (39.1)	28 (93.3)	0.05	0.01-0.19
Male	287 (60.9)	2 (6.7)		
Birth order				
1^{st}	179 (38.0)	0	Undefined	Undefined
2^{nd} -8^{th}	292 (62.0)	30 (100.0)		
Mother's received ANC				
Yes	44 (9.3)	24 (80.0)	0.03	0.01-0.07
No	427 (90.7)	6 (20.0)		
Child's delivery place				
Health Facility	78 (16.6)	26 (86.7)	0.03	0.01-0.09
Non-health Facility	392 (83.4)	4 (13.3)		
Caregiver received RI Info				
Yes	219 (46.5)	30 (100)	0.0000	Undefined
No	252 (53.5)	0		
Number of visit to HF for RI knowledge				
No	446 (94.7)	9 (30.0)	40.13	16.67-96.65
Yes	25 (5.3)	21 (70.0)		
Duration of stay in this location				
Less 1year	199 (42.3)	1 (3.3)	21.22	2.87-157.01
More than 1year	272 (57.7)	29 (96.7)		
Distance to the nearest HF				
Less than 5km	26 (5.5)	29 (96.7)	0.002	0.0003-0.015
More than 5km	445 (94.5)	1 (3.3)		
Time taken to HF				
1 hour or less	196 (41.6)	27 (90.0)	0.08	0.02-0.26
More than 1 hour	275 (58.4)	3 (10.0)		
Husband permission				
Required	466 (98.9)	30 (100.0)	0.3	Undefined
Not required	5 (1.1)	0		

*FIC=Fully Immunized Child

Children of respondents who live in a location less than 5km compared to more than 5km, children of mothers who received ANC services compared to those who did not received and female children compared to males were 500, 33 and 20 respectively times more likely to be fully immunized children. However, children of respondents who stayed in the current location less than 1year compared to more than 1year, children from the monogamous homes compared to polygamous homes and children of respondents from age group less than 30years are about 21, 58 and 97 respectively times more likely to be not fully immunized children.

Table 4.5.2: Multivariate analysis: Unconditional logistic regression of the predictors of completion of RI uptake

Factors	Adjusted Odds Ratio, AOR (95% C.I)	p-Value
Age of caregiver (in years)		
<30 (ref.)	14.8 (1.7-135.7)	0.02
30 and more		
Education of caregiver		
None (ref.)	2.7 (0.8-8.8)	0.10
Koranic/Primary		
Occupation		
Housewife (ref.)	0.1 (0.0007-13.9)	0.4
Trading/Farming		
Monthly income (in naira)		
9000 or less (ref.)	3.2 (0.4-28.4)	0.3
>9000		
Home		
Monogamous (ref.)	9.1 (0.84-99.5)	0.07
Polygamous:		
Age-group of child (in months)		
18-23 (ref.)	0.28 (0.08-0.97)	0.04
12-17		
Child's sex		
Female (ref.)	0.035 (0.004-0.30)	0.002
Male		
Birth order		
1st (ref.)	39425 (0.000->1.0E12)	0.93
2nd -8th		
Mother's received ANC		
No (ref.)	5.2 (1.67-16.53)	0.005
Yes		
Child's delivery place		
HF (ref.)	0.14 (0.04-0.45)	0.001
Non-HF		
Caregivers' received RI Info		
Yes	107351.5 (0.000->1.0E12)	0.93
No (ref.)		
Number of visit to HF for RI knowledge		
No (ref.)	4.77 (1.67-13.95)	0.004
Yes		
Duration of stay in this location		
Less than 1year (ref.)	20.06 (2.00-200.81)	0.01
More than 1year		
Distance to the nearest HF		
Less than 5km (ref.)	0.0006 (0.0000-0.018)	0.0000
More than 5km		
Time taken to HF		
More than 1hour	5.72 (0.29-112.48)	0.25
Less than 1hour (ref.)		
Husband permission		
No	2722.1 (0.0000->1.0E12)	0.98
Yes (ref.)		

After controlling for not fully immunized child and fully immunized child, there was significant statistical association between the age of the respondents, duration of stay in the current location and distance to the nearest HF with immunization status of the study population. However there was no significant association between the educational level of respondents, monthly income earning and birth order of the child with immunization status of the study population.

CHAPTER FIVE: DISCUSSION

This section highlights the factors affecting routine childhood immunization uptake amongst children of nomadic population aged 12-23months of life. It has documented the immunization coverage status among the nomadic population in the local government area. Up to 6.0% of the children were fully immunized, 28.1% partially immunized and 65.9% of the children are un-immunized. The coverage for the fully immunized child was lower than that found in the NDHS of 2013 for Nasarawa state which recorded 20.1%.[23,79] The proportion of fully immunized child was also lower than that obtained by Kabir et al (10%)[62] and that of the survey in six states in Nigeria (12%).[63] It revealed several factors were associated with the increased and decreased uptake of routine childhood immunization. The study explored the demographic characteristics of the respondents and the study population that influence the uptake of the routine childhood immunization. The study revealed that there were more males (57.7%) than females among the children and 52.5% of the target children were between the ages of 12 and 17months. Majority (72.7%) of the respondents were between 15 and 29 years of age. All the caregivers are married and all are Muslims. Only 0.6% of the respondents had primary education, 12.2% koranic and majority (87.2%) had no formal education. The socio-demographic characteristics found in this survey is in consonants with the case finding reports from the state[78] and similar to the information given at the LGA headquarters[78] and consistent with the study area. The 15-29 years of age group is consistent with the practice of early marriage amongst the study population. Majority (90.8%) of the caregivers in addition to being housewives were traders while farmers accounted for 0.6% and housewife only accounted for 8.6%. Majority (97.6%) of the

head of households had cell phone numbers and can be reached through the phones. Majority, (62.2%) of the respondents were from monogamous homes and children who are first born were 35.7%.

The study also showed there were statistical significant association between the age group of the respondents, child's sex and the age group of the child with uptake of routine childhood immunization. The age group of the respondents, child's sex and age group of the child are predictors of the routine childhood immunization uptake in our study. The results documented in this study were similar to the study carried out by Babalola, S and Aina, O which shows children of mothers aged 34 years or more had higher likelihood of receiving full immunization compared to less than 30years (OR=0.65, 95% C.I=0.44-0.95).[68] The age group of both the respondents and child, and child's sex are in contrast with the results obtained by Antal D's study in Nigeria in 2011 where he documented no significant association between the age group of the mother, child's sex, and child age group with routine immunization uptake.[34] There were no significant association between the birth order of the child, educational level and the occupation of the respondents with uptake of the routine immunization. The results obtained were in contrast to the Goa study which shows that children with high birth order and those with high household size had significant low immunization coverage levels[65], but similar to Nath et al's in India which showed that birth order had no significant bearing on the immunization status of the child.[66]

The study showed the immunization status of the children aged 12-23months as earlier mentioned above. The immunization coverage documented in this survey is, BCG was 23.2%, DPT_1 9.0%, and Measles of 29.7% with DPT drop-out rate of 15%. These results

were lower than that obtained by Kabir et al where BCG was 50%, OPV1 70% and DPT_1 recorded 42% but measles and DPT_2 were comparable at 29.7% and 12.4% respectively.[62] The coverage obtained in this study is much lower than the figures from the NDHS 2013 for Nasarawa state which recorded 62.3% for BCG and that obtained by Odunsanya et al (88%).[64,79] The DPT_1 coverage is the adopted measure of access to routine immunization services. Thus, the figure 9.0% implies that majority (91%) of the children in the LGA do not have access to immunization services and it is much lower than that of NDHS 2013 record of 60.1% for $DPT1_1$ and 34.1% for DPT_3.[79] The DPT drop-out rate of 15% is small but it means more coverage and may bear witness to the fact that the respondents had understood the importance of returning and/or encouraged by their first visit.[59]

Immunization card retention is a direct measurement of the immunization services quality since immunization card provides recorded details of the services given to the child. Only 20.8% of the caregivers had their children immunization cards, 13.4% had misplaced their cards and a large proportion (65.9%) had no cards. When compared with among 12-23 months old children in urban slums of Lucknow district, India, it was observed that 47.2% of the total number of children complete and partially immunized, had vaccination cards.[66] this is very low. The low figure (20.8%) obtained in this survey implies that health education with regard to this aspect needs to be strengthened. The measles immunization coverage of 29.7% though is lower than that obtained by NDHS 2013 for Nasarawa state of 42.2% but is grossly inadequate in terms of the threat of epidemics.[23,66,79]

One of the principles of Primary Health Care (PHC) is to bring health care services close to where people live to enhance easy access and adequate utilization. Health care is said to be within reasonable reach if the facility is located within 3-5km in urban areas and 5-10km for rural communities, or a travelling (trekking) time of less than one hour and 1-2 hours respectively.[69] The study shows that only 13.6% utilize the nearest Health facility for ANC services, 89.0% live more than 5km from the Health facility and 38.2% of caregivers that never vaccinated their children before cited distance from the Health facility as the reason.[69] The figure of 38.2% in this survey is much higher than 9.0% documented in Ilorin who cited distance from the nearest Health facility as the reason for non-vaccination of their children before.[69] In this survey there was an indication that the service is not accessible to the caregivers which is similar with the inaccessibility facility which were reported by Musa I.O in rural communities of Jigawa and Kano where about 82.8% respondents living more than 5km from the Health facility and that was a major barrier to timely completion of childhood immunization schedule.[79]

The survey also shows 55.5% of respondents spent more than 1hour travelling time to the nearest Health facility.[69] Furthermore, 39.9% respondents and their family live in the present location for less than one year and 48.5% of the caregivers that never vaccinated their children before cited movement (relocation) of their families as the reason for not able to vaccinate their children. This is keeping with the information given at the Akwanga LGA headquarters/Lafia, the state Ministry of Health and the WHO/AFRO findings about migration in Africa and improving immunization coverage.[41,78]

The study shows there were significant association between the distance to the health facility, prenatal care (mother' received ANC services) and the duration of stay in the

current location with the complete uptake of routine childhood immunization; but no association between the time spent to reach the health facility and the complete uptake of childhood immunization. The distance to the health facility, prenatal care and duration of stay in the current location are predictors of uptake of routine immunization in this study. This result agrees to the WHO/AFRO findings about migration in Africa and improving immunization coverage[41]. But was in contrast with the result documented by Antal D. in Nigeria in 2011 where there were no association between the complete routine childhood immunization and the prenatal care.[34]

The respondents who earn less than 10,000 naira per month were 89.2% and those who earn 10,000 naira per month were 10.8%. There was no significant association between monthly incomes with complete routine immunization uptake. This finding is in contrast to Nath et al's in India which showed that, low socio-economic status increased the risk of non-immunization significantly.[66]

The survey shows that only 10.0% of the respondents have good knowledge on routine immunization while 89.8% have poor knowledge. Our study documented that about 29.3%, 25.1%, and 15.1% heard of routine child immunization through Health facility, community meeting and radio respectively.[62] This survey also reveals majority (89%) of the respondents named and were aware of the existence of poliomyelitis immunization and 56% of the measles. This may be due to largely to the ongoing immunization plus days campaigns to eradicate polio in the local government area. Of the 65.9% respondents that had never vaccinated their children, 23.6% cited lack of knowledge as the reason for none vaccination of the children and 89.2% had poor knowledge of the immunization schedule. This can be compared and is similar to the study by Musa, I.O.;

which found out that 68% had poor knowledge of the immunization schedule as well as knowledge on diseases prevented by vaccines.[69] Kabir et al found out that among factors associated with failure to immunize children was due to mother's ignorance (48%), in Panshekara.[62] In a Nigerian study, 66% of the Respondents were able to spontaneously and correctly name at least one vaccine-preventable childhood disease while 48% could name at least two[63]. While in Borno and Jigawa, only about a third of the respondents could name at least two vaccine preventable diseases.[63] Awareness for Polio and Measles are the highest in our study; this similar to the Nigerian study (by Babalola, S. and Adewuyi, A.) in which the awareness was the highest for Polio and Measles.[63]

Majority (86.6%) of the caregivers accept immunization because they have not been advised against it and of the 13.4% that do not accept, all fear it causes infertility later in the life of the child. Also the study showed that, 29.9% believed and are against vaccines being given to their children, that it was not safe (fear it causes sterility, causes diseases). This study also shows 40.8% of the respondents erroneously believed and expected that immunization protects against all childhood diseases. This can be compared and is lower than in a study in a northern Nigerian village, where 54% of the mothers studied were against and do not accept their children being immunized, 58.5% believed that immunization protects against all diseases while 48.0% believe vaccines are safe.[62] Other reasons shown in another study, is that most importantly parental expectations about their children revolve around good health and longevity.[51,63] The study also shows majority (99%) of respondents' husband/child's fathers are the ones who decides whether child is immunize, 28.1% of the respondents had encouraged and will encourage others to go for immunization and 64.9% of the respondents will take their children for future

immunization. There was likelihood for fully child immunization and this group (those that will take their child in future for routine childhood immunization, which constitute 64.9%). This finding similar was to the findings by Babalola, S. and Aina, O. where the prevalent belief is that fathers are responsible for making final decisions on whether a child is to be immunized or not, providing encouragement to mothers to have children immunized, and providing the necessary financial support, while in another, fathers of non-immunized children said they would rather be concerned with sourcing to meet family economic needs rather than be bothered with child immunization.[68] The result of our finding is also similar to another study by Babalola, S. and Adewuyi, A. which documented that only 37% encouraged someone to immunize their child.[63] Lastly, our finding of 64.9% of those that will take their children for immunization is in contrast to the documented findings in a study to determine negative attitude of parents towards possible future vaccinations for their children and the behavioural determinants, where only 43% reported a positive attitude towards all vaccination, 46% reported to have a positive attitude to have their children vaccinated against some diseases and 11% had no intention to comply with any new vaccination.[75]

The study showed that the main reason given for not completing/non-immunization was that the family's movement (48.5%) from one place to another place within short period of time, followed by those related to distance to the Health facility (38.2%) and lack of knowledge (23.6%). Others include, 6.7% for those with no permission from the husband, 4.8% for those with personal disapproval and 12.7% for others (child not sick all, Health workers attitude, vaccine stock-outs, vaccinated during IPDs and no reason given). This can be compared but different from the results obtained in a study carried out

in India; In Lucknow district of India, the commonest reasons for partial/non-immunization was unavailability of both parents (17.2%), followed by lack of necessary information regarding the details of vaccine administration (14.7%), carelessness (11.7%), sickness of older sibling as a result of the vaccine (11.7%) and lack of knowledge regarding the subsequent vaccine (10.4%).[66] Additionally, compared with a WHO funded study in 2005, 9.2% of respondents (mothers aged 15-49 years) evinced "no faith in immunization", while 6.7% expressed 'fear of side reactions'.[51] This high default related to movement of the family from one place to another and related to distance to the nearest Health facility is typical of the nomadic population which is similar to the WHO/AFRO study in Africa about migration and also can be noted from the findings of 2003 NICS, the National Immunization survey 2003 results show that vaccines not available (31.2%), place of immunization too far (21.2%), unaware of the need or unaware of the need for 2nd or 3rd basis (13.4%), fear of side reaction (10.0%), mother too busy (7.6%), place and/or time of immunization unknown (6.2%), no faith in immunization (5.1%) and rumors (5.0%) are reasons given by respondents for poor immunization coverage.[41,51,69,78] Similarly, in another study done in Panshekara, Kano state, Nigeria, the immunization coverage among children in Panshekara shows that 44% of the mothers had negative cultural practices and 30% were negligent.[62]

Some of the reasons for immunization default can be dealt with so as to prevent immunization failure unnecessarily occurring. For example, 4.8% personal disapproval (do not believe in immunization), 6.7% no permission from the husband (not approved by husband) and 12.7% others (child not sick at all, health workers attitude, fear rumor, vaccinated at home during IPDs, no reason given). This can be reduced through health

education, nomadic population (leaders) involvement in planning and massive awareness campaigns. Training and discipline on the side of the health care workers would overcome the problem of attitude of health workers complained.

CHAPTER SIX: CONCLUSION AND RECOMMENDATIONS

6.1 Conclusion

The study has shown that immunization coverage among children of nomadic population in Akwanga Local Government Area aged 12-23 months is very low and poor. Although for the minority (11%) of the population, services are accessible but generally affordable to all the population, only 6% of the children were fully vaccinated, 17.6% were partially vaccinated and bulk of the population of the sampled children (65.9%) had not received any vaccine at all. The immunization coverage with BCG was 23.2%, DPT3 24.0%, OPV3 24.2%, Measles 29.7%, HBV3 12.0% and Yellow fever 27.3%. Almost half (49.7%) of the caregivers have heard of routine childhood immunization in the last 12months prior to the date of the interviewed and 70.1% of caregivers accept immunization but only 10.2% have satisfactory knowledge on childhood immunization and are mainly housewives and those with Koranic/Primary education. A significant proportion of the caregivers do not accept immunization (personal disapproval of 4.8%) and influence of husband (6.7%) and others (12.7%). The findings in this study indicate that it is important health education among the nomadic population, involve the husbands' in every aspect of child care, involve their Religious/Political leaders (ardos) in immunization campaigns, periodic review of routine immunization micro-planning especially to capture new settlements (new rugas), and Health care providers to step up mobile health education activities.

6.2 Recommendations

Based on the finding of the survey, the following recommendations are made:

1. The nomads should be linked up through their various associations like Miyetti Allah Breeders Association and should be encouraged to use the health facilities and organization of health camps along their routes of movement.
2. The Local Government through the Health and Information Department should intensified social mobilization activity in the communities (rugas) with the use of local language on radio (fulfide services), busy markets and transit sites (motor parks) where these nomadic populations live and frequent for trade. There is need for more advocacy and sensitization campaign with involvement of the religious, traditional and opinion leaders of the nomadic settlements so as to improve the level of knowledge and influence change of Health seeking behavior among these populations.
3. Appropriate inter-agency planning meetings and schedule development to ensure synchronization of nomadic settlements census and micro-planning exercise with other states/LGA routine immunization processes e.g. the cross border planning/meeting to agree on demarcation/demarcation, nomad settlement micro-planning exercise and mobile routine immunization activities in these respective settlements (rugas).
4. The local government in collaboration with the state government should re-enforce immunization services by increasing manpower for mobile routine immunization to these settlements since they far from the health facility and

materials. The immunization services should be provided daily and effort to minimize mis-opportunity.

5. The Federal Government should ensure constant supply of all vaccines to the state and local government and subsequently to the immunization to the immunization centers.
6. There should be training and retraining of health care providers on patients care and good attitude towards work.

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Appendix

QUESTIONNAIRE

Determinants of Routine Immunization coverage among aged 12-23 months old children of nomadic population in Akwanga LGA, Nasarawa State, Nigeria.

Informed consent for respondents

Good day ma/sir, my name is Attah Peter a postgraduate student from Ahmadu Bello University Zaria Nigeria. I am conducting a study on the above study title. The result of the study will be used to guide appropriate intervention(s) improve routine immunization coverage in this LGA. I seek your permission to ask you few questions about your knowledge, attitude and practices regarding routine immunization in the study is voluntary and may decide not to participate if you wish.

Do you have a living child that is 12-23 months old? [ ] No [ ] (if no, STOP interview)

Do you consent to participate in the study? Yes [ ] No [ ]

If consented, interviewers proceed with the interview after appending or thumb print; if not, do not proceed with interview

Respondents signature/Thumb print/Date: …….

Interviewer's name ……..

Date (dd/mm/yyyy) ……..

Name of ward ……settlement (Angwa/ Ruga) number…….

Do the Head of the Household have phone number: YES or No (tick appropriately).

SECTION 1: Socio-demographic data of mothers.

1. How old are you? (in years) ……

2. What is your religion? (a) Islam (b) Christian (c) Traditional religion (d) others

3. What is your highest level of Education? (a) None (b) Koranic

(c) Primary (d) Secondary (e) Tertiary

4. What is your Primary Occupation? (a) Housewife (b) Trading

   (c) Farming (d) Teaching (e) others ……..

5. What's your monthly income. ----------(Naira)

6. Marital status? (a) Single [ ] (b) Married [ ] (c) Divorce [ ]

   (d) Widowed [ ] (e) Separated [ ]

7. How many wives does your husband have, including you? ……

SECTION 2: Child information

8. Age of index child? (12-23 months) ……

9. Sex of the child? Male [ ] Female [ ]

10. Birth order (position) of the child ……

11. Did you received ante-natal care during the pregnancy of this child (12-23 months)? Yes [ ] No [ ] **If No, skip to question 14**

12. Where did you received ante-natal care when you were pregnant for this child? (a) Health Centre [ ] (b) General Hospital [ ]

    (c) Chemist [ ] (d) Traditional Birth Attendant's [ ] (e) Home [ ]

    (f) others (specify)……

13. How many doses of tetanus toxoid (TT) injection did you received during the pregnancy of this child who is 12-23 months? (a) None

    [ ] (b) General Hospital [ ] (c) Chemist [ ] (d) three

14. Where did you give birth to the child in question? (a) House [ ]

(b) health centre [ ] (c) General Hospital [ ] (d) Traditional Birth Attendant's home [ ] (e) others (specify)

SECTION 3: Awareness of Routine Immunization

15. In the last 12months, did you receive any information on routine immunization? Yes { } No { } **if no, proceed to 18**

16. What type of information did you receive on routine immunization? (a) benefit routine immunization { } (b) schedule of routine immunization

[ ] (c) side – effects of routine immunization [ ] (d) other information (specify) ……

17. What is the source of the information on routine immunization? (interview indicate all that is mentioned) (a) Health facility [ ] (b) Radio [ ] (c) Television [ ] (d) Newspaper [ ] (e) Town announcer [ ] (f) Mosque [ ] (g) church [ ] (h) Community Meeting [ ] (j) others (specify)……

SECTION 4: KNOWLEDGE AND PERCEPTIONS ON IMMUNIZATION AND VACCINE PREVENTABLE DISEASE.

18. What is the purposed childhood immunization? (a) To protect childhood disease [ ] (b) to cure diseases in children [ ] (c) to Prevent disease in children [ ] (d) others (specify) ……

19. Which of the following are vaccine presentable diseases? (**interview indicate all that is mentioned**) tuberculosis [ ] poliomyelitis [ ] Hepatitis B [ ] Diphtheria [ ] pertussis (whooping cough) [ ] tetanus

[ ] measles [ ] yellow fever [ ] meningitis [ ] malaria [ ] cholera [ ] others (specify) …… don't know [ ]

20. How many times should a child be taken to a health facility to complete his/her routine immunization?

21. At what age (or at what time) should a child receive his/her routine immunization?

(**Interviewer only one response allowed for each visit)**

	First	**Second**	**Third**	**Fourth**	**Last**
Age in months/ at birth					

22. Please mention the common side-effects of childhood vaccines that you know (**interviewer indicate all that is mentioned but do not read out the list**) (a) Fever [ ] (b) Rash [ ] (c) swelling at injection site (d) injection abscess [ ] (e) Pain at injection site [ ] (f) don't know any [ ] (g) convulsion (h) paralysis (i) others …….

23. Immunization can cause infertility later in the life of the child? Yes [ ] No [ ]

24. Immunization prevents all childhood disease? Yes [ ] No [ ]

25. Childhood vaccines are safe for children? Yes [ ] No [ ]

Perceptions

Perception variables	Strongly agree	Agree	Neither agree or disagree	Strongly disagree	Disagree
26. How confident are you in the safety of routinely received childhood immunization					
27. Do you think immunization is for keeping children healthy?					
28. I trust the vaccine advice my child's main health care provider give me					
29. My child's main healthcare provider is easy to talk to.					
30. Parents should be allowed to get exemption from vaccination for their child on religious ground even if it were clear that it raised the risk of disease for the child and everyone else					
31. Do you trust the government to set policy for childhood vaccines?					
32. Getting multiple shots in one visit can overload a child's immune system.					
33. The use of outreach is to helping to increase coverage for immunization					
34. Routine immunization is sufficient to reach all children for immunization					
35. If mothers attend antenatal care at health facility they are more likely to use immunize their children					
36. If mothers deliver their babies in health facility they are more likely to use immunization services provided there					
37. Day to day activities of the mother affects their attending clinic for immunization as scheduled for the child					
38. The level of education of the mother is important role in the use of immunization services					
39. Age of the mother plays an important role in the use of immunization services					
40. Immunization is expensive					

41. How effective do you think childhood vaccines are preventing diseases that they are supposed to prevent?

(a) Very effective [ ] (b) effective [ ] (c) somehow effective [ ] (d) not effective at all [ ] (e) don't know [ ]

42. Do you think there are local preparations that can serve as substitute for immunization to prevent childhood disease? Yes [ ] No [ ]

If yes, please mention the local preparation? .....

SECTION 5: IMMUNIZATION EXPERIENCE

43. Please what are the activities carried out in the clinic/health facility when you take your child for immunization services?

……
……
……

44. Which of the mentioned activities do you consider a waste of time and why?

……
……

45. When you go to the clinic for your child's immunization, did the nurse ever refuse/delay immunization your child because of the following reasons? Child too young [ ] (b) clinic has no vaccine [ ] (c) No syringe available [ ] (d) others [ ]

…….

46. Has your child ever gone to the clinic few days after days after the date of his/her vaccination appointment? Yes [ ] No [ ] if no go to Q49

47. If yes, did the nurse ever refuse/delay immunizing your child for this reason?

Yes [ ] No [ ]

48. Has your child ever gone to get immunization when he/she had cold/catarrh, diarrhea or fever? Yes [ ] No [ ] if no go to Q51

49. If yes, did the nurse ever refuse/delay immunizing your child for this reason?

    Yes [ ] No [ ]

50. Have you ever missed vaccination for your child? Yes [ ] No [ ] if no go to Q53\

51. If yes, what are your reasons (interviewer do not read the list, circle all that is mentioned) (a) Too far (b) No money (c) Too Busy (d) No permission fro husband (e) vaccine out of stock (f) others (specify) ……

52. What is average number of hours you spend in the clinic when you go for immunization? .....

53. Do you consider the time you spend in the clinic to be (a) too long (b) short (c) Adequate (d) other (specify)

54. Do you pay for the service? Yes [ ] No [ ]

55. If yes, how much do you pay? ……

56. Do you think its too expensive Yes [ ] No [ ]

57. For how long did you stay in this present settlement (location)? (a) less than one year (b) more than or equal to one year

58. If less than one year, where was your last location?

LGA …….

State …….

Country ……

59. What is the distance from this settlement to the nearest clinic? (a) less than 5km (b) more than 5km

60. What is the time taken from this settlement to nearest clinic? (a) less than 30min. (b) 30 mins to 1hr (c) more than 1hr

SECTION 6: ATTITUDE TOWARDS ROUTINE IMMUNIZATION (INDICATE THE RESPONSE)

Attitude Variables	Strongly Agree	Agree	Neither Agree or	Strongly Disagreed	disagree
62. Our problem is malaria and not polio so immunization priority					
63. To me going for immunization is a waste of time					
64. I will not take my child for immunization					
65. I need the permission of my husband to take my child for immunization					
66. Going to my farm/work/trade is more important to me than taking a child to health facility for immunization					
67. I do not like to go to health facility for immunization because the health workers are not friendly					
68. I cannot trek to health facility for my child's immunization because means of transportation to the health facility which is far from my house					
69. I do believe in immunization and will not take my child for immunization					
70. I want health facility to come to my house to give immunization to my child as I do not have time/ do not like to go health facility					

Now I want to ask you some question about the immunization of your child who is 12-23months

Section 7: IMMUNIZATION COVERAGE

71. Did you ever take this child [12-23months] to health facility to receive routine immunization? Yes [ ] No [ ]

If no, ask question 64 and then skip to question 70

72. Why didn't you take this child to health facility to receive routine immunization?

    Please mention the reasons(s)……

(Interviewer skips to question 70 after asking question 64)

73. How many times did you take this child to health facility to receive routine immunization 1 [ ] 2[ ] 3[ ] 4[ ] 5[ ]

74. Which of these vaccines did this child received? **(interviewer describes the vaccines to the mother and then ticks as appropriate)**

Age	**Vaccines**		
At Birth	BCG	OPVO	HBV1
6 weeks	DPTI	OPV1	HBV2
10weeks	DPT2	OPV2	HBV3
14 weeks	DPT3	OPV3	
9 months	Measles	Yellow fever	

75. ***If yes, please can I see it? (interviewer record the vaccines and the date at which the vaccines were given)***

Vaccines and dates given		
BCG	OPVO	HBV1
DPT1	OPV1	HBV2
DPT2	OPV2	-
DPT3	OPV3	HBV3
Measles	Yellow fever	-

(**If the child received all the recommended vaccines go to question 77 if not ask question 76**)

76. Why did you take this child to receive some vaccines and not the vaccines?

(1) Lack of Information (tick all that applies)

Unaware of need for immunization

Unaware of need to return 2nd or 3rd dose

Place and/or time of immunization unknown

Pass experience of effect of immunization

Others (specify) ……..

(2) Lack of motivation (tick all that applies)

No faith in immunization

Place of immunization too far

Time of immunization inconvenient

Vaccine not available

Mother too busy

Family problem, including illness of mother

Child ill-not brought

Child ill-waiting time

Other (specify) ……....

Section: Decision making

77. Who decided whether or not to immunize your children? (**interviewer indicates one**) (a) self [ ] (b) Husband [ ] (c) jointly with husband [ ] (d) father in-law [ ] (e) Mother in-law (f) Religion leader (g) others (specify) ……

78. Do you need your husband's permission before you can take your child to health facility for immunization? Yes [ ] No [ ]

79. Did you advice someone to take her child for immunization in the last 12 months? Yes [ ] No [ ]

80. Will you take next child to the health facility to receive routine immunization? Yes [ ] No [ ]

Please mention the reason why you won't take your next child to the facility to receive immunization?

……

Thank you for taking time to answer these questions. I appreciate your help.

ETHICAL CLEARANCE

NASARAWA STATE OF NIGERIA

MINISTRY OF HEALTH

In replying, please quote reference and date
All correspondence should be directed to the commissioner

Ministry of Health Headquarters
Private Mail Bag 032
Lafia. Nasarawa State
E-mail: nsmolafia@yahoo.com

Telephon:

S/MOH/843/

14th April, 2014

Dr Attah O. Peter,
Department of Community Medicine
Ahmadu Bello University,
Zaria.

RE: APPLICATION FOR ETHICAL CLEARANCE

Reference to your letter of 18th February, 2014 to conduct study on "Determinants of Routine Immunization Coverage Among Aged12-23 Months old Children of Nomadic Population in Akwanga Local Government Area, Nasarawa State, Nigeria. "I am directed to convey the Ministry's approval to carry out the study.

2. You are to strictly adhere to the methodology in your proposal and to also seek permission and cooperation of the Community leaders in areas you will conduct the study.

3. At the end of the study, you must forward two copies of the report to the ministry for our record, please.

Dr Ekom G. Haruna.
Ag. Director Clinical Services,
for: Honourable Commissioner.