FACTORS ASSOCIATED WITH INCOMPLETE ROUTINE IMMUNIZATION IN BAUCHI LOCAL GOVERNMENT AREA, BAUCHI STATE, NIGERIA.

BY

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ABSTRACT

Immunisation is effective only if under-five children receive the full course of recommended doses of antigens. In 2013, 14.9% of children aged 12-23months were fully immunised in Bauchi. This rate is below the 80% level required for sustained herd immunity. The low Routine Immunisation (RI) coverage in the State has resulted in the up-surge of vaccine preventable diseases, particularly measles and poliomyelitis. The barriers to full coverage of RI have not been clearly identified. This study was conducted to examine the factors associated with incomplete childhood vaccination coverage in Bauchi State, Nigeria.

This study is cross-sectional in design. Using WHO modified sampling technique; 540 mothers of children aged 12-23 months were selected from 60 clusters. Structured interviewer-administered questionnaire was used to collect data on socio-demographic characteristics, and knowledge of RI was assessed on a 7- point scale in which ≥ 4, were graded as good knowledge. Information was also collected on symptoms of Vaccine Preventable Diseases (VPDs), attitude and perception towards RI, vaccination history of children and reasons for incomplete immunisation. Vaccination status was ascertained from RI cards. Twelve Focus Group Discussion sessions and 12 Key Informants Interviews were conducted among mothers and fathers of children aged 12-23months, health workers and community leaders respectively. Quantitative data were analyzed using descriptive statistics, Chi-square test and multinomial logistic regression at 5% level of significance. Qualitative data were analyzed thematically.

Age of mothers was 27 ± 6.2 years, 12.6% had no formal education while 51.5% had at least secondary education. Over one third (36.1%) did not know the importance of

childhood immunisation, while 40.6% had poor knowledge of RI and VPDs. Of the 52.2% who presented RI cards at the time of the survey only 8.5% had their children fully immunised, while 91.5% were partially immunised. Reasons for incomplete vaccination included: husband disapproval (60.6%), lack of information (98.7%), child's ill health (84.4%), financial incapacitation (31.7%), unavailability of vaccine (22.8%), and poor attitude of health workers (60.9%). Out of the total sampled, one hundred and ninety-nine (36.8%) had never vaccinated their children, owing to financial incapacitation (9.6%) and husband's disapproval (96.1%). Women who had husband disapproval (OR =3.71, CI= 23.01 - 4639) significantly increased the likelihood of a child being partially immunized. Qualitative result showed that although there was high patronage of immunisation service, but results showed that many did not immunise their children because of unavailability of vaccine, negative attitude of some health workers and husband's disapproval.

Complete routine immunization coverage in Bauchi State, Nigeria is low. Husbands have great influence on whether their children get immunized or not. Interventions that target men should be prioritized as a way of improving the immunization status of children in Bauchi State, Nigeria.

Keywords: Routine immunisation, Vaccine preventable diseases, Incomplete immunisation coverage

Word count: 444

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CERTIFICATION

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Abbreviations/ Glossary/ Definition

ANC:	Antenatal Care
BCG:	Bacillus Calmette--Guérin (vaccine)
DEFF:	Design Effect
DPT:	Diphtheria-Pertusis-Tetanus (vaccine)
EPI:	Expanded Program on Immunization
FIC:	Fully Immunized Child
GPEI:	Global Polio Eradication Initiates
HBV:	Hepatitis B vaccine
HC:	Health Centre
IPDs:	Immunization plus Days
NIDs:	National Immunization Days
OPV:	Oral Polio Vaccine
PPS:	Probability Proportional to Size (Sampling)
PSUs:	Primary Sampling Units
RI:	Routine Immunization
SIA:	Supplementary Immunization Activity/Activities
TT:	Tetanus Toxoid
UNICEF:	United Nations Children's Fund
VPDs:	Vaccine Preventable Diseases
WHO:	World Health Organization
YF:	Yellow Fever (vaccine)

CHAPTER 1- INTRODUCTION

1.1 Background

A basic concept of public health is that every child who is protected from a disease as a result of an immunisation is one less individual capable of transmitting the disease to others, and in some cases serve as a protective barrier for other children who have not been immunised with the antigens (USAID, 2003). Immunisation is a proven tool for reducing the morbidity and mortality associated with infectious diseases; and is considered among the most cost-effective health investments (WHO/IVB, 2008). Immunisation is the process whereby a person is made immune or resistant to an infectious disease typically by the administration of a vaccine; vaccines stimulate the body's own immune system to protect the person against subsequent infection or disease (WHO/IVB, 2008).

The World Health Organization(WHO) reported that the number of children under one year of age who did not receive DPT3 vaccine worldwide was 22.6 million in 2012 compared to 22.3 million in 2011 (WHO – July 2013). More than seventy percent of these children live in ten countries: Democratic Republic of the Congo, Ethiopia, India, Indonesia, Iraq, Nigeria, Pakistan, Philippines, Uganda and South Africa (WHO- July 2013). In 2005, WHO and the United Nations Children's Fund (UNICEF) developed the Global Immunization Vision and Strategy (GIVS) to improve national immunization programs and decrease vaccine-preventable disease–associated morbidity and mortality (WHO/UNICEF, 2005). Expanded Program on Immunization (EPI) in middle and low income countries has prevented more than two million child deaths from these diseases since its inception in 1974 (WHO/UNICEF, 2005). It is estimated that about 2 million deaths occur globally each year from vaccine preventable diseases (VPDs) with approximately

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1.5 million occurring in children under five years of age and constituting 15% of under five deaths (Adebayo and Oladokun, 2012). The United Nations Millennium Development Goals (MDGs), goals four and five, lay specific emphasis on reducing child mortality through child survival interventions and improving maternal health in general which in turn recognises immunisation as key component in reducing vaccine preventable diseases. Failure to reach the Millennium Development Goal number four (MDG 4) for child survival will result in an estimated forty million children's lives lost by 2015 (Human Development Trends, 2004). As nearly a quarter of global under–five mortality is attributable to vaccine–preventable diseases, vaccination can contribute significantly to attaining MDG 4 (World Health Organization, 2004). Considering that more than 130 million children are born each year worldwide and need to be immunized, over 27 million children, who live mainly in disadvantaged rural communities, are not reached by routine immunization services and significant variations in coverage exist between and within regions and countries. Unless this gap is closed, 2 million children under five years of age will continue to die annually from preventable diseases for which vaccines are available or will be available in the near future (Anon, 2010). World Health Organization has described the commonest childhood diseases as poliomyelitis, tetanus, diphtheria, whooping cough, measles, yellow fever, and tuberculosis. In Nigeria at least 20% of the under- five mortality rate is said to be from vaccine preventable disease (Itimi et al. 2012).

Nigeria adopted the EPI program in 1979, and later renamed it National Program on Immunization (NPI) as a way of promoting national consciousness and ownership of the program. Since then the country has progressively demonstrated the political will in strengthening the health system and routine immunization services particularly to reduce the burden of vaccine preventable diseases. The coverage in many parts of Nigeria falls below 50%

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(Abdulraheem *et al* 2011; Antai 2009; Kunle-Olowu *et al* 2011), and studies have shown that many countries in Africa have severe constraints in maintaining the WHO recommended coverage levels at 80 percent (Anon, 2010). The constraints include inadequate financing; insufficient equipment and supplies; cold chain and transport; inadequate access to facilities: inadequate trained personnel; inadequate information to the populace as well as poor receptivity (Anon, 2010). Some of the identified reasons for low coverage rates are mothers' poor knowledge of immunization against targeted diseases, parents' concern about immunization safety, long waiting time at the health facility, long distance from the hospital, lack of vaccine on the appointment day, absence of personnel at the health facility, child ill-health at the time of immunization, lack of information about the days for vaccination, forgetting the days of immunization, long distance walking, mother's illness on the day of vaccination, social engagements, lack of money, schooling mothers (Abdulraheem *et al.*, 2011; Mackewa *et al.*, 2007). Apart from these problems, false contraindications like catarrh and mild fever at the time of immunization, failure to administer simultaneously all vaccines for which the child was eligible and lack of information on the vaccination regimen are reported causes of missed opportunities to immunize children in Nigeria (Onyiriuka *et al.*, 2005; Anah *et al.*, 2006; Kabir *et al.*, 2004; Adeiga *et al.*, 2006).

In Nigeria, Routine Immunization (RI) services are provided at primary, secondary and tertiary health facilities. (National Primary Health Care Agency: NPHCDA) and the private sector. In addition, to the health facilities, RI services are also provided through immunization outreach activities to rural and hard to reach communities. The current RI vaccines or antigens administered for children 0–12 months of age are Bacille Calmette Guerin (BCG) which protects against tuberculosis, Oral Polio Vaccine (OPV) which protects against poliomyelitis and

Hepatitis B vaccine (HBV) which protects against hepatitis B. Others are diphtheria-pertussis-tetanus (DPT) which protects against diphtheria, pertussis and tetanus; measles vaccine which protects against measles and yellow fever vaccine which protects against yellow fever (FMoH, 2009). In the year 2012, the Nigerian Government introduced Pentavalent (Hib+DPT+Hepatitis B) vaccine, into her routine immunization schedule with a view to improving child health. The implementation took off in different phases with Bauchi State falling into the first phase of the vaccine implementation (National Demographic and Health Survey: NDHS, 2013). Pentavalent vaccine is to immunize children against five diseases namely *Haemophilus influenzae* type b (Hib) diseases, diphtheria, tetanus, pertussis and hepatitis B (Salami, 2012). These vaccines will eventually replace DPT vaccine and the new schedule used in Bauchi State is as shown below:

Age	Antigens (Vaccines)
Birth	BCG, OPV0, HepB0
6 weeks	OPV1, Pentavalent 1
10 weeks	OPV2, Pentavalent 2
14 weeks	OPV3, Pentavalent 3
9 months	Measles, Yellow Fever

Table 1.1: Formal schedule for RI in Bauchi State Nigeria

Vaccine	Number of doses	Age	Minimum interval B/W doses	Route	Dose	Site
BCG	1	At birth/as soon as possible		Intradermal	0.05ml	Upper left arm
OPV	4	At birth, and at 6,10 and 14wks	4weeks	Oral	2drops	Mouth
DPT	3	At 6,10 and 14 weeks of age	4weeks	Intramuscular(i-m)	0.5ml	Anterior part of the thigh
Hepatitis B	3	At birth,6 and 14 weeks of age	4weeks	i-m	0.5ml	Anterior part of the thigh
Measles	1	At 9th month		Subcutaneous	0.5ml	Upper left arm
Yellow/Fever	1	At 9th month		Subcutaneous	0.5ml	Upper right arm
Tetanus	5	Women of child bearing age		i-m	0.5ml	Upper arm

Nigeria like many countries in the African region is making efforts to strengthen its health system in general and routine immunization services in particular to reduce disease burden from vaccine preventable disease (VPDs). In Bauchi State, according to 2008 Nigeria Demographic and Health survey: the proportions of fully immunized and non-immunized children aged 12-23months are 1%, and 27% respectively, however in 2013 Demographic and Health Survey, the proportions of fully immunized and non-immunized children aged 12-23months are 14.9% and 44.1% respectively.

1.2 Problem Statement

Every year, four million infants die within their first month of life, representing nearly 40 percent of all deaths of children under age five (Lawn *et al.*, 2005). The Expanded Programme on Immunisation (EPI) when introduced experienced some initial success. However a few years after its inception, it became obvious that it was no longer achieving its stated objectives and had to be relaunched in 1984. Nigeria attained universal childhood immunization (UCI) with 81.5 percent coverage for all antigens in 1990, but the success was not to last long and by 1996, immunization coverage had declined substantially to less than 30 percent for DPT-3 and 21 percent for the doses of oral polio virus (OPV).

Data from 2013 National Dermorgrahic Health Survey shows that fifteen percent of children aged 12–23 months received the validated complete dose of the recommended antigens in Bauchi State. The low routine immunization coverage in Bauchi has favored the transmission of wild polio virus with high cases of poliomyelitis. Immunity gap by this low immunization coverage favors the emergence and transmission of vaccine preventable diseases like measles. Incomplete immunization leaves the child susceptible to the devastating effects of VPDs

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including death. Therefore, this study was carried out to determine immunization coverage and investigate the factors associated with failure to complete childhood immunization in Bauchi LGA of Bauchi State.

1.3 Justification for the study

Many factors that have been identified as influencing the vaccination uptake include mothers' poor knowledge of immunization against targeted diseases, parents' concern about immunization safety, and health-system related factors such as long waiting time at the health facility, lack of vaccine on the appointment day etc, (Abdulraheem *et al.*, 2011). However, these factors vary from one community to another. In the height of the above, it is important to examine prevailing factors in different geographical areas with a view to identifying the import determinants. Identifying the factors associated with incomplete child immunization in Bauchi LGA will enable the government to provide programmes and service environment through well-articulated policies. This is to ensure increased uptake and ultimately child survival as well as healthy growth of children in Nigeria and enhance their quality of life. It may also suggest a perception on how to improve on current National Programme on Immunization in Nigeria. This is expected to eventually lead to the reduction of morbidity and mortality due to vaccine preventable diseases in the LGA.

1.4 Research Questions

- What are the socioeconomic and demographic factors that affect the immunization status of the children 12-23months in Bauchi LGA, Bauchi State Nigeria?
- What is the immunization status of children 12-23 months in Bauchi LGA, Bauchi State Nigeria?

1.5 Objectives of study

To assess factors associated with incomplete childhood routine immunization, in children 12-23 months in Bauchi LGA, Bauchi State Nigeria.

1.6 Specific Objectives

- To assess the factors associated with incomplete routine childhood immunization in Bauchi LGA
- To determine coverage of routine immunization in Bauchi LGA
- To assess mothers' knowledge on routine immunization in Bauchi LGA
- To determine the attitude of respondents toward routine immunization

1.7 Operational definitions

Fully immunized child (FIC): a child who had received **one dose** of BCG, **three doses** of oral polio vaccine (excluding oral polio vaccine given at birth), **three doses** of DPT vaccine and **one dose** of measles vaccine by 12 months of age (NPHCDA,2006 AND NHDS, 2008)

Partially (incomplete) immunized child (PIC): a child who missed at least any one of the above doses.

Percentage of fully immunized: Percentage of individuals in the target population who are vaccinated by receiving the complete antigen doses.

Un-immunized child (UIC): a child who had not received any vaccine as at 12 months of age.

Pentavalent vaccine (Hib+DPT+Hepatitis B): It's a single **vaccine** that protects children against five potentially lethal diseases: tetanus, diphtheria, pertussis (whooping cough), Hepatitus B and Haemopghilus Influenzae B (which causes meningitis and pneumonia).

CHAPTER 2 - LITERATURE REVIEW

2.1 Global Immunization on Epidemiology

Immunization has great potential to improve the health of people. The inception of public immunization campaigns has contributed in reducing vaccine-preventable diseases and deaths globally. Immunization is regarded as one of the most cost-effective public health interventions. It is enshrined as one of the utmost medical accomplishments that have succeeded to save more lives than any other health care intervention in the 20th century (Wiysonge, *et al.*, 2009).

Notably, deaths due to measles decreased worldwide by a remarkable 74% between 2000 and 2007 from 750,000 to 197 000 and it is estimated that during this period, 11 million measles deaths were averted globally as a result of measles control activities.(WHO, 2007). The eradication of poliomyelitis is imminent though there are still some unfolding challenges. According to WHO, the number of cases of polio has fallen by over 99% since Global Polio Eradication Initiative (GPEI) was launched in (1998) and as at 2013 only three countries in the whole world (Nigeria, Pakistan and Afghanistan) remain polio-endemic (WHO, 2013).

2.2 Immunization schedule in Nigeria

The principle in the administration of EPI vaccines to children is that protection must be accomplished before they attain ages at high risk for the diseases. Nigeria's immunization policy is based on the epidemiological pattern of the diseases in the country, the availability of vaccines and the operational capacity of the National Programme on immunization as stated in National Immunization Policy and standard Practice (NIPSP,

1995). The schedule is such that a child receives one dose of BCG, measles and yellow fever vaccine, four doses of OPV, 3 doses of DPT and HB vaccines before the first birthday (FMoH, 1993).

2.3 Factors associated with incomplete Immunization of children

In Bayelsa State Nigeria, Itimi *et al.*, 2012, found out in their study that more children were immunized in the rural than in the urban areas, although parents in the urban areas were more educated than those in the rural community and were expected to have better health seeking behavior.

Several reasons have been given for incomplete vaccination and in Nigeria, (Abdulraheem *et al.*, 2011) outlined various reasons adduced by mothers for incomplete vaccination to include: long waiting time at health facility, lack of vaccine on the appointment day, absence of personnel at the health facility, child ill-health at the time of immunization, lack of information about the day of immunization, forgetting the days of immunization, lack of money and concern about immunization safety.

In a study by Harahap (2000) in North Sumatra Province, Indonesian children who were likely to receive more complete immunization were those whose parents were educated, children of those who had prenatal care and children who were born with the help of health personnel. In a study to identify constraints to childhood vaccination in rural Uganda, it was demonstrated that low level of formal education and fear of vaccine side-effects were the major constraints to childhood vaccination (Tuqumisirize *et al.*, 2002).

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2.4 Knowledge on Routine Immunization

In 2006, the National Program on Immunization carried out a study on knowledge, perception and beliefs on childhood immunization especially polio in eleven high risk states in the northern part of Nigeria. Results from Bauchi indicated that fathers rejected immunization because of the controversies between groups of religious leaders concerning the authenticity, while mothers refused OPV because it was not a felt need. However, malaria and measles were regarded as more serious problems compared to poliomyelitis.

Olumuyiwa (2008) in a study to identify determinants of vaccination coverage in Edo State, southern Nigeria found that majority (87%) of respondents had a satisfactory knowledge on childhood immunization. Oluwadare (2009), in a study in Ekiti state, found one common misconception he noticed was that immunization protects against all diseases. However, these people believed that polio vaccine was a general vaccination for all the other childhood diseases because all they get easily is polio vaccine.

Partnership for Reviving Routine Immunization in Northern Nigeria (PRRINN, 2007) conducted a household baseline survey on the factors affecting routine immunization in northern Nigeria. Results from Jigawa, Katsina, Yobe and Zamfara States revealed a relatively low level of knowledge about immunization among the respondents. According to the survey, the respondents recalled fewer than three vaccine-preventable diseases on the average. The childhood diseases most often recalled were polio and measles; about three-quarters of the women recalled polio while more than half mentioned measles. In contrast, very few of the respondents knew about yellow fever, hepatitis B, pertussis or diphtheria. PRRINN (2007) indicated that the poor knowledge about immunization was

evidenced in the significant proportion of respondents that believed that certain diseases and symptoms such as malaria; diarrhea, convulsion and pneumonia were vaccine-preventable. Furthermore, the study indicated that the knowledge about the timing of RI visit was generally poor; equally, few respondents knew the correct number of times that a child should be taken for immunization to complete the immunization schedule.

Partnership for Transforming Health System (PATHS, 2005) conducted a study to determine the factors influencing immunization uptake in Nigeria. Overall, about 66% were able to spontaneously and correctly name at least one vaccine-preventable childhood disease while 48% could name at least two. Furthermore, the researchers found that in general, awareness was highest for polio and measles. In contrast, very few respondents demonstrated awareness of diphtheria. PATHS also found that knowledge about the number of times a child should receive the various childhood vaccines was generally poor.

2.5 Coverage of Routine Immunization

Routine immunization coverage of 29.5% was reported in a study of rural community in Nigeria (Adebayo and Oladokun, 2012). The commonest reason for the failure to immunize the kids was non-availability of vaccines while the most important predictor of the immunization status was place of delivery with those delivered in the health facilities being 2.3 times more likely to complete immunization. Several other studies (Babalaola *et al.*, 2009, Luman *et al.*, 2005, Oladokun *et al.*, 2009), reported that delivery in health facilities afforded mothers the opportunity to receive health education and other preventive health care services including immunization. The authors concluded in their

study that the coverage in the rural community was sub-optimal and lower dropout rates may be achieved by making vaccines readily available.

According to national immunization coverage survey 2010, 53.01% of the children were fully immunized by verifying with maternal history, although only 18.38% were verified by card. Other local rural community survey carried out in Sokoto, northern Nigeria reported coverage rates as low as 7% (Okolo *et al.*, 2003). It is then important to note that national estimate may not reflect the immunization rates in different communities and this is because national administrative coverage data use national averages. Regardless of the sample locale, immunization rates were abysmally low compared to the acceptable target set by the NPI of 80% Feilden (2005).

2.6 Factors that influence Immunization Coverage

Immunization coverage refers to the proportion of individuals in the target population who are vaccinated. Several factors are known to influence immunization coverage both in the developed and developing countries. Fatunde *et al.*, (2001), in their study on post-neonatal tetanus in Nigeria noted that ignorance and non-availability of vaccines were most important factors that influenced tetanus toxoid immunization in Ibadan.

Ezeoke (2002) noted that 20% of mothers interviewed in Iji Nike in Enugu East Local Government Area (LGA) did not immunize their children against measles mainly due to the mothers not understanding the immunization schedule. 50% of these mothers had either primary education or no formal education at all while only 6% had post secondary education. Nationally, 31.1% of children of mothers with secondary education were fully immunized as against 3.9% in those of mothers with no formal education (NPI , 2003).

Several studies showed that non participation in immunization sessions is linked to lack of knowledge and poor attitude of mothers and to some, a deliberate choice to refuse (Matsumura *et al.*, 2005, Torun *et al.*, 2006, Paulussen *et al.*, 2006).

Vaccination uptake is considered to be highly culturally sensitive, influenced by local perception on childhood diseases and decisional processes in households (Dugas *et al.*, 2009). There has also been an erroneous belief in some developing countries like Nigeria that vaccination is an international conspiracy against selected communities particularly those in the developing countries (Das, 2004) and (Renne, 2006).

2.7 Missed Opportunities

Missed opportunity for immunization is defined as any visit by an eligible child who has no contradiction to immunization to a health facility without receiving all the needed vaccines. Missed opportunities have been associated with low immunization coverage. Missed opportunities for immunization are a problem both for developing and industrialized countries. In Nigeria, missed opportunity is recognized as a priority issue in the immunization policy.

From these reviews, it is possible that some groups of children in our environment might still be under-immunized. It is hoped that this study will provide information that will contribute to an extent, in the formulation of policies on childhood immunization.

2.8 Concern about vaccine safety and contraindications to immunization.

It is known that mothers refuse immunization to their children with the slightest excuse. Even health workers are not sure of the absolute contraindications to immunization. Concerns about vaccine safety are not new. Vaccine safety concerns are common in the developing countries. This is related to the belief system of the people. Recent fear in

Northern Nigeria about the oral polio vaccine and a potential contraceptive effect on the children is an example (Pincock, 2003). There are other fallacies and myths about vaccines globally. Obionu (2007), noted that to withdraw immunization from children who have upper respiratory tract infections, malnutrition and minor febrile illness would result in many children remaining unimmunized.

2.9 Socio-economic status

Higher socio-economic condition of the parent is also associated with greater probability of the child being vaccinated under routine immunization programme compared to mass vaccination campaigns (Zuber, 2001). There is a strong association between low socioeconomic status and under immunization (Fatunde *et al.*, 2001).

The association is probably mediated through the many factors associated with poverty. Children from poor settings for instance, often have uneducated mothers, parents with low income and many siblings. Ignorance of health services and transportation difficulties is common among the poor.

2.10 Attitude of Respondents toward Routine immunization

Attitudes of respondents towards routine immunization varied widely from one study to another. In Edo State, southern Nigeria, where most mothers had a positive attitude towards immunization; 99.1% of the respondents felt that immunization was beneficial and would advise other mothers to get their children immunized (Olumuyiwa *et al.*, 2008). However, a significant proportion of respondents in a study conducted to determine the factors influencing immunization uptake in Nigeria believed that immunization could lead to serious health complications for the child, while some (13%)

believed a hidden agenda lies behind immunization efforts in the country. Results from the study indicated that some (15%) respondents believed that the OPV could cause infertility. Also, it was demonstrated that rumors played a significant role in hindering the uptake of immunization (PATHS, 2005). Furthermore, the researchers reported that majority of the respondents had widespread misconceptions that immunization could prevent all childhood illnesses and polio and measles vaccines were the most likely perceived as very effective. Oluwadare (2009), in his study highlighted that one common misconception he noticed was that immunization protected against all diseases. However the people believed that polio was a general vaccination for all the other childhood diseases because it is what all they got.

2.11 Immunization practices and determinants of childhood immunization

Various immunization practices are related to the socio-demographic characteristics of respondents and their knowledge on RI. Sebahat *et al.,(* 2006) in their study indicated that one of the reasons for non-vaccination of children in the village was inaccessibility of health care services, having no knowledge about vaccination; father of child didn't allow vaccination and inter-current illness of child during vaccination time. Additionally, paternal and maternal levels of education were found to influence whether children were completely vaccinated or non-vaccinated.

Partnership for Transforming Health System (PATHS) (2005) in their study identified that participants were discouraged from immunizing their children because of the lack of access to health facilities, the perceived lack of availability of vaccines, the lack of respect and lack of skill from immunization service providers and long waiting times. In

addition, socio-economic status was an important predictor of use of immunization services; all the indicators of immunization improved with socio-economic status and the level of education.

Partnership for Reviving Routine Immunization in Northern Nigeria (PRRI, 2007); the researchers found that receiving antenatal care and a child's place of birth were two of the strongest determinants of child immunization; children whose mother received antenatal care and those who were born in a health facility were significantly more likely than others to receive the various childhood vaccines.

A study to determine the factors influencing immunization uptake in Nigeria, conducted in six states namely Borno, Enugu, Jigawa, Kano, Lagos and Yobe, found lack of knowledge about immunization to be the most common factor. This lack of knowledge was classified into two categories- those reflecting lack of knowledge about schedule of RI and those reflecting lack of awareness about the role and health benefits of immunization. Another set of reasons for non-immunization identified by the researchers relate to disapproval of immunization by husbands, this finding is similar to that obtained in Turkey (Sebahat *et al.*, 2006) but different from what was obtained in Uganda (Tuqumisirize *et al.*, 2002) where low level of formal education and fear of vaccine side-effects were the major constraints to childhood vaccination.

CHAPTER 3 - MATERIALS AND METHODS

3.1 Study area

The study was carried out in Bauchi Local Government Area (LGA) of Bauchi State. Bauchi LGA is one of the oldest local government areas in Bauchi State since its creation in the year 1976. Bauchi town serves as the LGA Headquarters as well as the state capital. The LGA has four districts, 20 political wards, 1084 settlements, with estimated total population of 904,195,and total number of under five is 217,188 and under one population is 30,176.

The predominant people of the area are Fulani, Hausa, and the Gerawa. Islam is the predominant religion and farming, livestock rearing, and trading are the major occupations of the inhabitants. There are 84 health facilities within Bauchi LGA and immunization services are delivered through, supplemental immunization activities (SIAs) and routine immunization (RI). Immunization services are provided through immunization outreach activities to rural and hard to reach communities.

3.2 Study design

A cross sectional design was used.

3.3 Study Period

The study was carried out from September to October, 2013.

3.4 Study population

The participants were (i) mothers (or caregivers) of children aged 12-23 months, and (ii) health workers, community/opinion leaders and members of the community for the qualitative study.

3.5 Eligibility Criteria

Mothers of children aged 12–23 months old, who must have been residing in the study area for not less than 18months. This age group was chosen because, at 12 months, it is expected that a child would have completed his/her routine immunization. Health workers in charge of routine immunization.

3.5.1 Inclusion criteria

Mothers with children aged 12 - 23 months old residing in the study area for not less than 18months.

3.5.2 Exclusion criteria

Mothers who have children aged 12 - 23months of age and have not lived in the area for less than 18months.

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3.6 Sample size for mothers

The sample size for the study was determined using the methods recommended by the World Health Organization (WHO) for Immunization Coverage Cluster Survey, (2008). The calculation of the sample size was based on:

$$\underline{n=Z^2pq} \times \text{DEFF (WHO/IVB, 2008)}$$
$$d^2$$

Where n = minimum sample size

z = standard normal deviate 1.96 when the level of significance is 5%

p = proportion of children 12-23months with full immunization coverage 50%, because of inconsistence of the data gotten from the state.

q = 1 – p

d= degree of accuracy desired set at 0.06 (6% precision)

DEFF= design effect in conformity with standard recommended for immunization surveys (WHO/IVB, 2008)

Therefore,

$$n = \frac{1.96^2 \times 0.50 \times 0.50}{0.06^2} == \frac{0.9604}{0.0036} = 266.8 \times 2 = 534$$

However, to enable subgroup analysis, a total of 534 women with children aged 12-23months was selected and enrolled in the study. It was derived by multiplying the minimum sample size with design effect of 2. We sampled children from 60 clusters, in accordance with the WHO recommendation (WHO/IVB, 2008). The number of children required per cluster was therefore, **534/60= 9** children. Nine children per cluster which gave a total of **9 × 60 or 540** children for the entire 60 clusters. The final calculated

sample size was thus, **540** children. Thus, 30 children were sampled per cluster giving a total sample size of 540 children.

3.7 Sampling technique:

For the sampling process, two-stage cluster sampling technique was used, (appendix 5)

3.7. 1 Stage Two: Selection of Households

At the second stage, 30 households were selected from each of the 60 clusters; the first household in each cluster was selected using simple random sampling method. In selecting the first household in each cluster, we obtained a list of all the households in that cluster. A comprehensive list of all the households in each cluster was obtained with the assistance of the local supervisors and the head of each settlement (clusters). We then assigned a number to each household. Thereafter, a number less than or equal to the highest household number was randomly selected using table of random numbers. The household whose number corresponded to the selected number was selected as the first household. And then subsequent households were selected contiguously until the number of households for that cluster was complete. From each selected household, one eligible child was selected. If a selected household had more than one eligible child, only one was randomly selected; if a selected household had no eligible child, the next contiguous household was visited and one eligible child selected.

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3.8 Data Collection

It was conducted in all the 20 wards of the LGA, using a structured questionnaire for the quantitative and semi-structured for the qualitative collection of data. The two sets of data tools were developed and were pre-tested in the field before proceeding to the field after the data collectors were trained for two days followed by a one day practice on data collection and field testing. For the qualitative data tool two FGDs each were conducted in six wards to triangulate data from the quantitative data tools.

3.8.1 Quantitative Data

Data for the study were collected by trained and adequately supervised female interviewers using structured questionnaire. The data collection instrument contained both close and open ended questions and it gathered data on socio-demographic information of respondents, their level of knowledge on routine immunization including the number of doses and schedule of routine immunization antigens, knowledge on vaccine preventable diseases, perceived benefits and other pre-conceived ideas towards routine immunization as well as various immunization practices. Data was also collected on access to information on RI, vaccination history of the children and reasons for partial and non-vaccination. Data collection instrument was validated by extensive review of the literature and field testing prior to the study. It was translated into local language (Hausa) and back translated into English to ensure uniformity. The questionnaire used for the study is attached as annex 4.

3.8.2 Qualitative Data Collection

Six wards were selected using simple random sampling. This was done in order to improve our understanding on the factors, knowledge, accessibility and safety of using routine immunization services. These were used to explore caregivers' and community members' opinions on vaccines as children benefits, reasons for incomplete of vaccination and the potential for change. A total of 12 Focus Group Discussions and 12 Key Informant interviews were conducted in 6 wards of Bauchi LGA, Bauchi state. The selected wards were: Galambi, Kangere, Turum, Dan Amar A, Liman Katagum, Zugur.

3.8.3 Focus Group Discussions (FGDs)

A total of 12 FGDs were conducted in the study area, 2 in each of the 6 selected wards. Each group consisted of homogenous persons in age groups, educational background and local language that were willing to discuss their beliefs and practices and to explain their understanding of childhood immunization. Approximately 6 to 8 individuals participated in each focus group discussion. Refer to Appendix 2 for interview guides. The FG Discussants were mothers and fathers with children between 12 to 23months old.

Table 3.2: Number of Respondents per Focus Group Discussion

Category	Participants						
	Turum	**Liman Katagum**	**Dan Amar A**	**Kangere**	**Galambi**	**Zugur**	**TOTAL**
Mothers of children between 12 to 23 months old	7	6	8	6	7	8	42
Fathers of children between 12 to 23months old	8	6	7	8	7	7	43

CHAPTER 1- INTRODUCTION

1.1 Background

A basic concept of public health is that every child who is protected from a disease as a result of an immunisation is one less individual capable of transmitting the disease to others, and in some cases serve as a protective barrier for other children who have not been immunised with the antigens (USAID, 2003). Immunisation is a proven tool for reducing the morbidity and mortality associated with infectious diseases; and is considered among the most cost-effective health investments (WHO/IVB, 2008). Immunisation is the process whereby a person is made immune or resistant to an infectious disease typically by the administration of a vaccine; vaccines stimulate the body's own immune system to protect the person against subsequent infection or disease (WHO/IVB, 2008).

The World Health Organization(WHO) reported that the number of children under one year of age who did not receive DPT3 vaccine worldwide was 22.6 million in 2012 compared to 22.3 million in 2011 (WHO – July 2013). More than seventy percent of these children live in ten countries: Democratic Republic of the Congo, Ethiopia, India, Indonesia, Iraq, Nigeria, Pakistan, Philippines, Uganda and South Africa (WHO- July 2013). In 2005, WHO and the United Nations Children's Fund (UNICEF) developed the Global Immunization Vision and Strategy (GIVS) to improve national immunization programs and decrease vaccine-preventable disease–associated morbidity and mortality (WHO/UNICEF, 2005). Expanded Program on Immunization (EPI) in middle and low income countries has prevented more than two million child deaths from these diseases since its inception in 1974 (WHO/UNICEF, 2005). It is estimated that about 2 million deaths occur globally each year from vaccine preventable diseases (VPDs) with approximately

3.8.4 Key Informant Interviews (KII)

Two Key Informant Interviews were conducted in each of the six districts. Key Informants were persons selected from the communities considered to be frequent participants in the routine immunization of children. One person from each of the following categories was selected for an interview. Refer to Appendix 2 to view the interview guidelines.

- A health worker from a formal health unit.
- A community, religious and opinion leaders.
- A mother with a fully immunized child
- A mother with partially immunized child.
- Fathers

3.9 Data Processing and Analysis

At the end of every field collection day, questionnaires were checked for completeness and consistency of information. Data cleansing/editing was done to completed questionnaires and entered using Epi Info 3.5.1 version software. Data analysis was done using Epi Info 3.5.1 version and SPSS version 18. A debrief (a meeting) was held at the end of every session to examine the focus group activities and results. The recorded session on tape was transcribed to notes, processed, edited and coded to ease analysis

3.10 Statistical Analysis

The unit of analysis of this study is a woman with a child 12-23month of age preceding the study. Univariate analysis, the descriptive statistics (frequency analysis) was done. Thus, the percentages of the demographic, socio-economic as well as other information were calculated. Vaccination coverage was calculated by getting the number of children who receive the immunization divided by the total number of children sampled. Bivariate analysis; Chi-square was used to examine factors association between categorical vaccination status based on RI card. Qualitative data was transcribed and detailed analysis of FGDs was done.

Study Variables

Independent: education, occupation, birth order and, sex, marital status, knowledge and age

Dependent: vaccine status (fully immunized, partially immunized and non- vaccinated)

Definitions

Fully immunized child: a child who had received 1 dose of BCG, 3 doses of oral polio vaccine (excluding oral polio vaccine given at birth), 3 doses of DPT vaccine and1dose of measles vaccine by 12 months of age (NPHCDA,2006 AND NHDS, 2008)

Partially immunized child: a child aged 12 – 23 months who missed at least any one of the standard antigens doses.

Non -immunized child: a child who had not received any of the standard vaccines as at 12 months of age.

3.10 Grading of Knowledge

Knowledge of the participants was scored on a seven-point domain to measure knowledge. For each, one point was scored for correct response and zero for wrong response; thus, the maximum score was seven and the minimum score was zero. Anyone who scores 3 points and below, was graded as having poor knowledge, while scores of 4 points and above was graded as having satisfactory knowledge (Olumuyiwa et al, 2008). The questions that were asked to assess the level of knowledge were all open-ended questions so as to reduce the possibility of prompting. Table 3.3 shows the seven domains used to grade the level of knowledge and the expected responses.

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Table 3.3: Domain questions and correct responses to grade knowledge level on RI and VPDs

S/N	Domain question	Correct response	Score for correct response	Score for wrong response
1	Purpose of childhood immunization	To protect against communicable diseases	1	0
2	Age at which a child should be taken to health facility for second routine immunization	6weeks	1	0
3	Age at which a child should be taken to health facility for last routine immunization	9months	1	0
4	Number of visits to health facility for a child to complete routine immunization	5visits	1	0
5	Knowledge of at least 3 symptoms of vaccine preventable diseases	Any three of fever, cough, skin rash, paralysis, difficulty in breathing, jaundice	1	0
6	Knowledge of at least common side effects of vaccine preventable diseases	Any three of fever, swollen site,	1	0
7	Knowledge of at least 4 diseases prevented by routine immunization vaccines	measles, hepatitis, diphtheria, polio, pertusis	1	0

3.11 Quality Control

I. Research assistants were trained for two days on how to administer questionnaires.

II. Questionnaires was translated from English to the local language (Hausa) and also back translated to English; this was to ensure that all data collectors were asked the same questions.

III. Questionnaires were pre-tested among those who were not be recruited into the study before field work at the LGA.

IV. Data was cleaned before analysis.

V. Translators and native of the area were used as data collectors.

3.12 Ethical Consideration

Ethical clearance was obtained from Bauchi State Ministry of Health Ethical Committee and informed consent was obtained from all the respondents.

3.12.1 Beneficence

Respondents were educated on the benefits of completing and implications of not completing their child's routine immunization.

3.12.2 Confidentiality

Names respondents were not used on the questionnaires. Codes were assigned to each participant.

CHAPTER 4 - RESULTS

A total of 540 questionnaires were administered. Table 1 presents the soico-dermographic characterics of respondents.

The mean age of respondents was 27 years (standard deviation: 6.2 years, median: 25 year, range: 18 to 52 years). A third of the respondents were between the ages of 20 and 24 years old. A total of 89 respondents (16.5%) had Koranic education; majority 218 (40.0%) of the study participants had secondary education. Five hundred and thirty six (99.3%) were married and 425 (78.7%) were full time housewife. (Table 4.1).

Table 4.1: Socio-demographic characteristics of mothers

Variable (n=540)	Frequency	Proportions (%)
Age group (Years)		
15-19	30	7.2
20-24	170	31.5
25-29	169	31.2
30-34	89	16.3
35-39	53	9.3
≥40	20	3.7
Occupation		
Housewife	425	78.7
Trader	74	13.7
Teacher	38	7.0
Farmer	3	0.6
Religion		
Islam	521	95.9
Christianity	20	3.7
Traditional religion	3	0.6
Education		
None	68	12.6
Koranic	89	16.5
Primary	105	19.4
Secondary	218	40.4
Tertiary	60	11.1
Marital status		
Married	536	99.3
Divorced	4	0.7

4.2 Demographic Characteristics of the Children

Mean age of the children was 18 months (standard deviation: 3.9 months; median: 18 months, range: 12 to 23 months). A total of 188 (34.8%) and 159 (29.4%) of the children were delivered at home and health center respectively. Most (28.8%) of the sampled children were of 2 or higher birth order and consists of 288 females and 252 males. (Table 4.2).

Table 4.2: Some demographic characteristics of child

Age in months	Frequency n = 540	Proportion(%)
12-14	149	27.6
15-17	84	15.6
18-20	113	20.9
21-23	194	35.9
Sex of child		
Female	288	53.3
Male	252	46.7
Place of delivery		
At Home	188	34.8
General hospital	193	35.7
Health center	159	29.4
Child birth order		
1st position	126	23.3
2nd position	134	28.8
3rd position	80	14.8
4th position	63	11.7
5 and above	137	25.4

4.3 Respondents Utilization of Health Faciltiy Services

Of the 540 respondents, 390 (72.2%) had antenatal care; however, the most popular place for antenatal care was the general hospital and health centers.

Table 4.3: Antenatal care attendance by respondents

Variable	Frequency n = 540	Proportions(%)
Antenatal care(ANC)		
Yes	390	72.2
No	150	27.8
Place of ANC		
Chemist Shop	5	0.9
Health Center	126	23.3
General Hospital	259	48.0

Among the respondents, 196 (36.3%) had three doses of tetanus (TT) and 42 (7.8%) had at least one dose of TT as shown in Table 4.4

Table 4.4: Uptake of tetanus vaccination

Tetanus dosage	**Frequency** **n = 540**	**Percentage**
None	190	35.2
1 dose	42	7.8
2 doses	112	20.7
3 doses	196	36.3
Total	540	100

Table 4.4: Uptake of tetanus vaccination

Tetanus dosage	**Frequency** **n = 540**	**Percentage**
None	190	35.2
1 dose	42	7.8
2 doses	112	20.7
3 doses	196	36.3
Total	540	100

4.4 Immunization Practices and Vaccination Coverage

The various immunization related practices including uptake of routine immunization vaccines, reasons for partial/non-vaccination and coverage for specific routine immunization vaccines are presented below.

4.4.1 Uptake of Routine Immunization Vaccines

Of the 540 respondents interviewed, 341 (63.1%) had taken their children for at least one of the recommended antigens and 199 (36.9%) had not. Of the total number of those that had at least one antigen, 157(46.0%) had fully (completely) vaccinated their children did so based on maternal history. Two hundred and eighty-two respondents had vaccination cards, only 24 (8.5%) fully immunized their children based on the card report. The immunization practice of respondents relating to the uptake of immunization antigens is presented in Table 4.5 below.

Out of the total number of respondents 63.2% took their children for vaccine; while 36.9 did not and reasons given for vaccination was were no permission from husband (27.2%).

Table 4.5: Vaccination status of children studied based on card and maternal history

Vaccination status	**Maternal recall/report (%)**	**Immunization card (%)**
	n= 341	**n= 282**
Number of immunized		
Partially immunized	184 (54.0)	258 (91.5)
Fully immunized	**157 (46.0)**	**24 (8.5)**
Total	341	282

Table 4.5: Vaccination status of children studied based on card and maternal history

Vaccination status	Maternal recall/report (%) n= 341	Immunization card (%) n= 282
Number of immunized		
Partially immunized	184 (54.0)	258 (91.5)
Fully immunized	**157 (46.0)**	**24 (8.5)**
Total	341	282

4.4.3 Reasons for partial vaccination

Of the 282 respondents that had vaccinated their children with at least one RI antigen from immunization cards, only 24 (8.5%) had completely vaccinated their children. The reasons given for partial vaccination are shown in Figure 4.3.

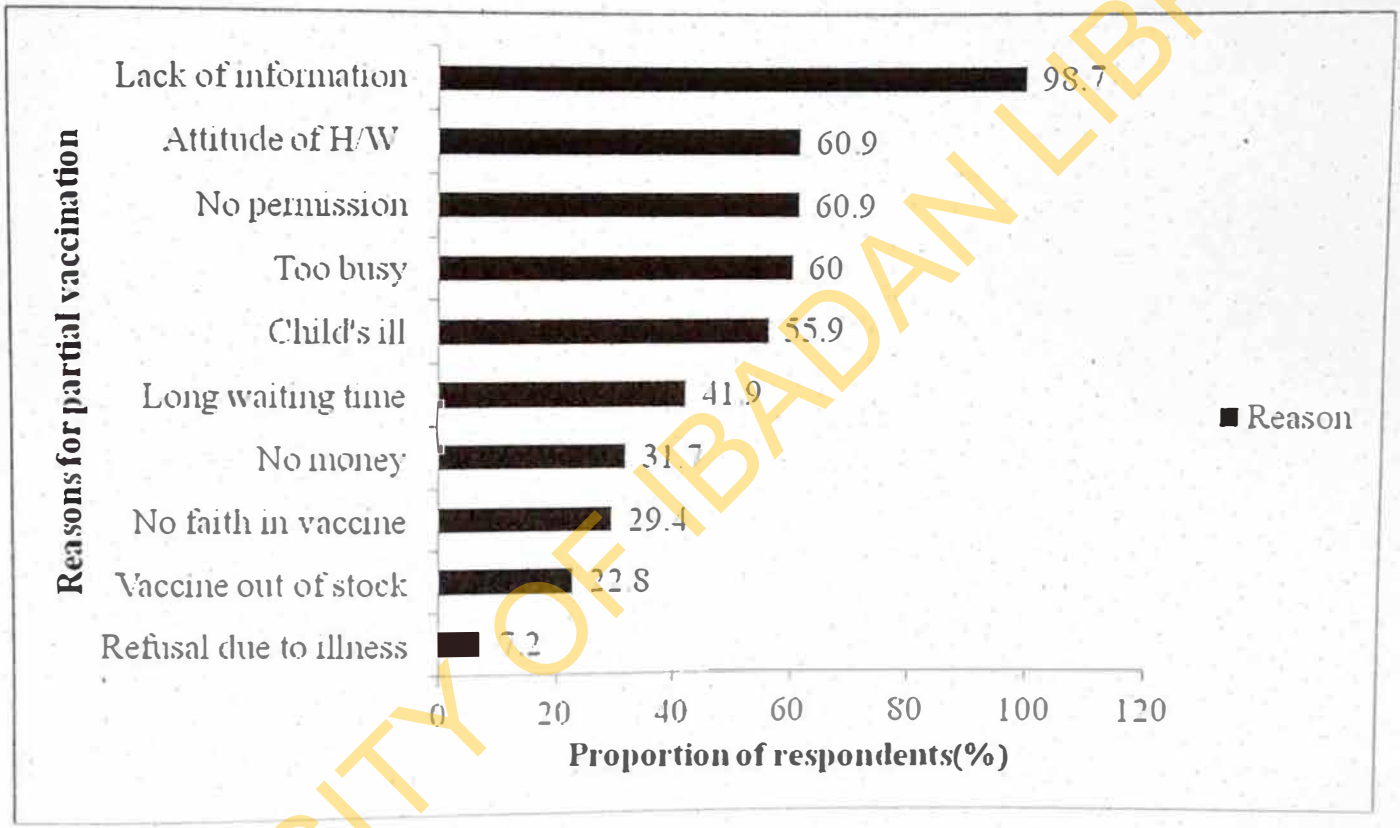

Fig 4.3: Reasons for partial vaccination based on mothers recall

Reasons relating to lack of permission from husband (60.6%) and no money (31.7%) were given by most respondents for partial vaccination of children. This is similar to the reasons given for non-vaccination.

4.4.4 Immunization card retention

Of the 341 respondents that had vaccinated their children with at least one RI antigen, 282 (82.7%) had their children's vaccination card and presented the card during interview. Table 4.6 shows the association between the vaccination status of children (fully or partially immunized) and immunization card retention.

Table 4.6: Association between the Vaccination Status and Immunization Card Retention based on RI cards.

Vaccination status	Immunization card	Immunization card not present	Chi square(X^2)
Fully immunized (%)	145 (51.4)	22 (8.5)	
Partially immunized (%)	137 (48.6)	236 (91.5)	**114**
Total	**282**	**258**	**p = ≤ 0.05**

Mothers who completed their children's vaccination were more likely to keep immunization card than those who partially vaccinated their children.

4.4.5 Immunization between vaccination status and place of delivery:

Regarding place of delivery of children, the children (92.7%) who were born at home were less likely to complete immunization (Table 4.7).

Table 4.7: Association between vaccination status and place of delivery of index child

Place of delivery	Fully immunized n (%)	Partially immunized n (%)	Chi square(X^2)
Health facility (%)	10(10.9)	81(89.0)	1.1
Home (%)	14(7.3)	177(92.7)	
Total	**24 %**	**258 %**	

Table 4.8: Association between vaccination status and place of antenatal of index child

Place of Antenatal	Fully Immunized	Partially Immunized	Chi square(X^2)
General hospital (%)	23 (95.8)	124 (48.1)	**18.2**
Home (%)	1 (4.2)	134 (51.9)	
Total	**24**	**258**	

P = ≤ 0.05

4.4.6 Immunization practices relating to uptake of specific antigens

The coverage for the specific routine immunization antigens are gotten from both immunization card and maternal history and showed in Table 4.9 below.

Coverage rates for the vaccines given BCG, Measles, and DPT 1 were higher compared to the rest antigens. The percentage of DPT3 was low for both mother's history and card.

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Coverage rates for the vaccines given BCG, Measles, and DPT 1 were higher compared to the rest antigens. The percentage of DPT3 was low for both mother's history and card.

Table 4.9: Vaccination coverage for RI antigens

Antigens	Immunization card (%); N=282
At Birth	
BCG	282 (100%)
OPV 0	282 (100%)
HBV	282 (100%)
At 6 Weeks	
OPV 1	56 (19.9%)
DPT 1	58 (20.6%)
HBV 2	54 (19.2%)
At 10 weeks	
OPV 2	212 (75.2%)
DPT 2·	211 (13.8%)
At 14 weeks	
OPV 3 (given at 14 weeks)	157 (56.7%)
DPT 3 (given at 14 weeks)	100 (35.5%)
HBV 3 (given at 14 weeks)	95 (33.7%)
At 9 months	
Measles (given at 9 months)	51 (18.1%)
Yellow fever (9 months)	50 (17.7 %%)

4.4.7 Decision about vaccinating children

Respondents were asked about who decided whether their children should be vaccinated or not. Husbands of most respondents (54%) decided whether the children should be vaccinated or not. A total of 203 (38%) of the respondents jointly decided with their husbands and 40 (7%) were taking by the mothers. The result is presented in Table 4.11

Table 4.11: Decision making about immunization

Decision maker	Number of respondents	Proportion (%)
Husband	292	54.1 %
Jointly	203	37.6 %
Self	40	7.4 %
Father in-law	5	0.9 %
Total	**540**	**100**

4.4.8 Health care seeking behavior and immunization practices

Respondents were asked on health care seeking behaviors to relate it with their immunization practices.

Total of 193 (35.7%) gave birth at the General Hospital, 188 (34.8%) of respondents delivered at home, while 159 (29.4%) delivered at health centre.

Ante-natal care: 483 (85.4%) of the 540 respondents received ante-natal care when pregnant with the index child and 42 (8.0%) received 1Tetanus (TT1).

Tetanus coverage: 112 (20.7%) of the 540 respondents received at least two doses of TT received during their lifetime, of which at least one dose was during the last pregnancy. 196 (36.3%) for TT3 and 112 (20.7%) for TT2.

4.4.9 Husband permission before vaccinating children

Of the 540 respondents interviewed, 519 (96.1%) required the permission of their husbands before vaccinating their children.

4.4.10 Advising people about routine immunization

Of the 540 respondents interviewed, 513 (95.0%) had advised someone to take their children for routine immunization in the 12 months preceding the survey.

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4.4.10 Advising people about routine immunization

Of the 540 respondents interviewed, 513 (95.0%) had advised someone to take their children for routine immunization in the 12 months preceding the survey.

4.4.11: Information on routine immunization practices

Preceding the study, 421 (78.0%) of the 540 respondents received information on routine immunization.

The types of RI information received by 540 respondents are shown below in Table 4.12. Many (39.3%) received information on the side effect of routine immunization, while 21 (3.9%) of respondents received information of the schedule of routine immunization.

Table 4.12: Types of routine immunization information received by respondents

Type of Information (n=540 for each information)	Number of Respondents	Proportion (%)
Side-effect of routine immunization	212	39.3
Schedule of routine immunization	21	3.8
Benefit of routine immunization	192	35.6
Can't remember any	115	21.3
Total	540	100

The various sources of RI information mentioned by the respondents are shown in Figure 4.5

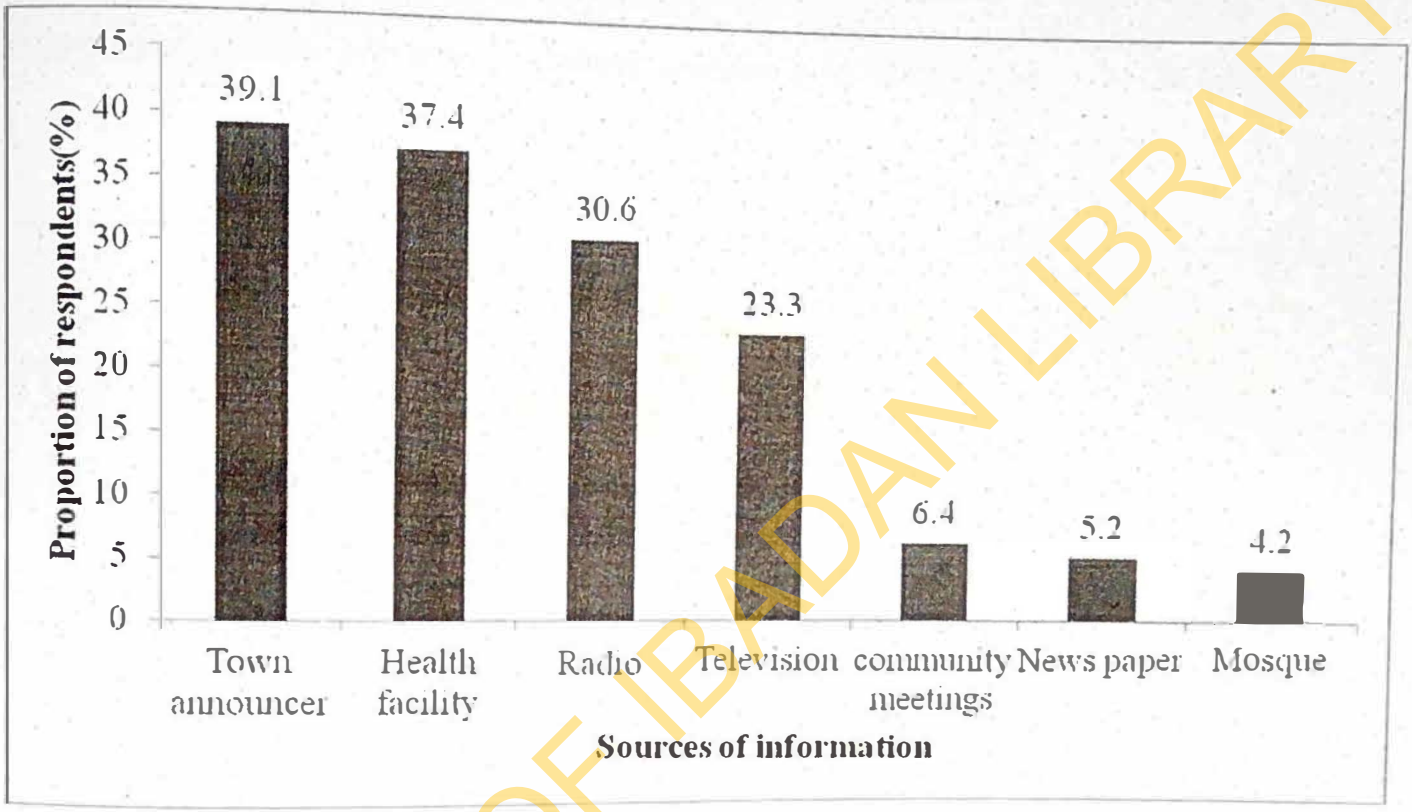

Figure 4.5: Sources of RI information mentioned by respondents

Town announcer (39.1%), health facility (37.4%) and radio (30.6%) were the most common sources of information on routine immunization mentioned by the respondents.

4.5 Knowledge on Vaccine Preventable Diseases and Routine Immunization

4.5.1 Knowledge of Symptoms of Vaccine Preventable Diseases

Symptoms of vaccine preventable diseases mentioned by the respondents is shown in Figure 4.6

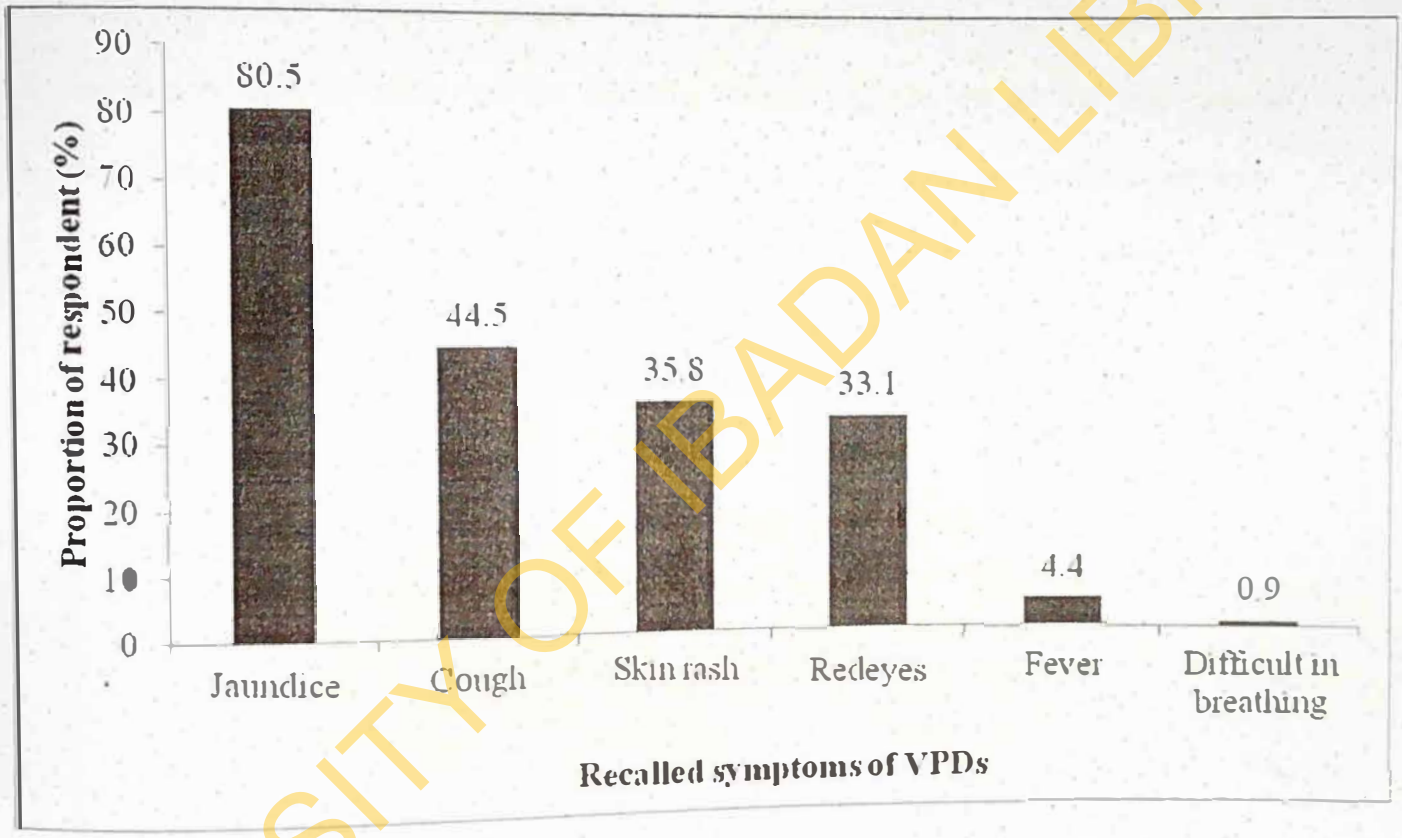

Figure 4. 6: Knowledge of symptoms of vaccine preventable disease

Out of the 540 respondents, jaundice (80.5%) was the commonest symptoms of vaccine preventable diseases mentioned by the respondents, followed by cough (44.5%); skin rash (35.8%) and difficulty in breathing was the least symptoms mentioned (0.9%).

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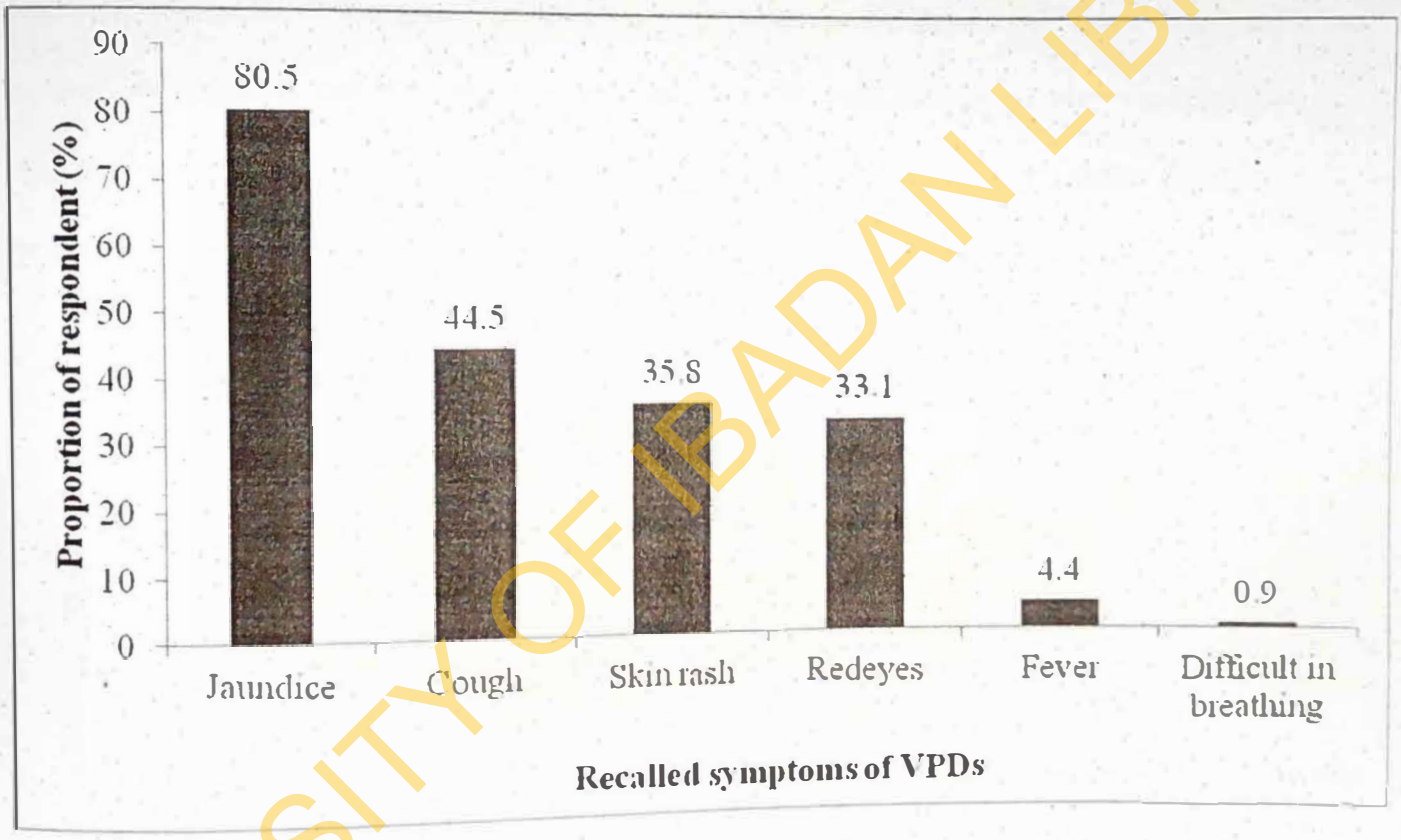

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4.5.2 Knowledge on the Purpose of Childhood Immunization

Majority of the respondents 345 (63.9%) stated the correct purpose of immunization; 195 (36.1%) did not state it correctly.

4.5.3 Knowledge of Vaccines Preventable Diseases (VPDs)

Vaccines preventable diseases recalled by the respondents are shown in Figure 4.7. Most of the respondents (69.9%) recalled measles; 64.2% and 59.6% of the respondents recalled tuberculosis and poliomyelitis respectively as vaccine preventable diseases. Malaria was also mentioned by 9.4% respondent as vaccince preventable disease.

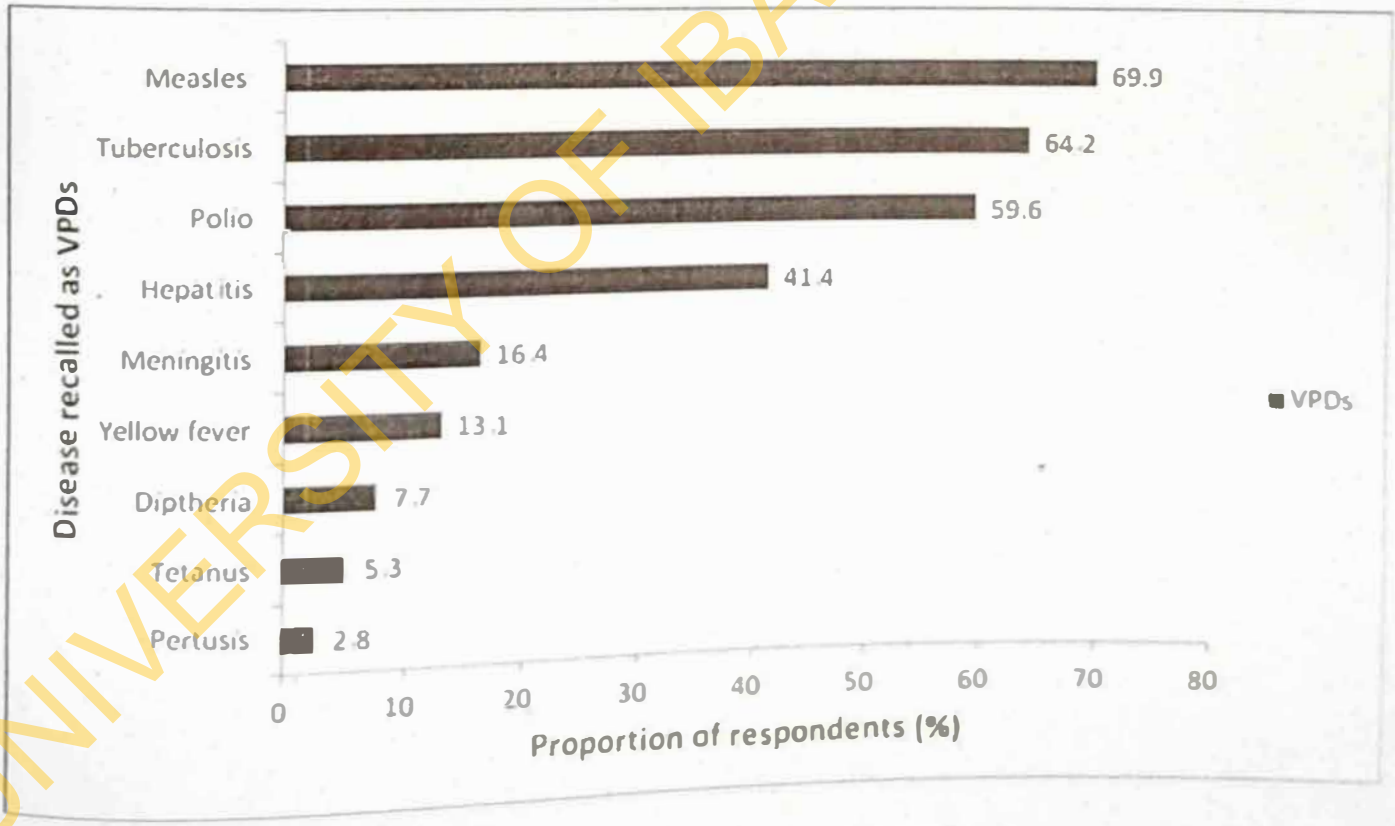

Figure 4.7: Vaccine preventable diseases mentioned by respondents

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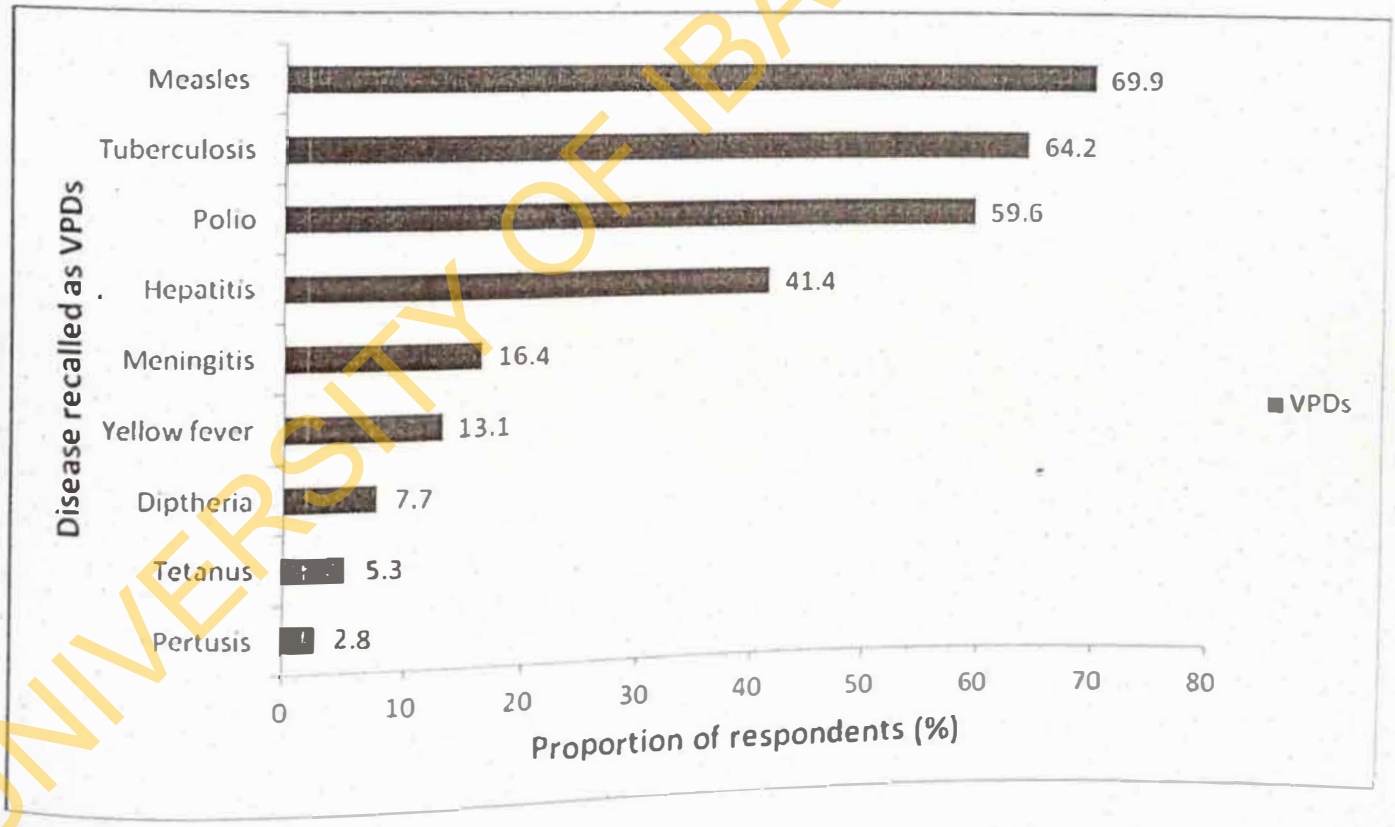

Figure 4.7: Vaccine preventable diseases mentioned by respondents

4.5.4: Knowledge of respondents on the schedule of routine immunization (RI)

Of the 540 respondents, 88.1% knew the timing of RI first immunization schedule; 81.5% knew the timing of the second RI visit while 59.8% knew the timing of the last RI visit. 63.1% of the respondents knew the correct number of RI visits to complete RI as shown in table 4.13 below.

Table 4.13: Knowledge of Respondents on Schedule of Routine Immunization

Schedule on routine immunization. (n=540 for each knowledge accessed	**Number of respondents**	**Proportion (%)**
Correct knowledge of first RI visit	478	88.1%
Correct knowledge of second RI visit	440	81.5%
Correct knowledge at nine month	323	59.8%
Correct knowledge of number of RI visit to complete it	341	63.1%

4.5.5 Knowledge of respondents on common side-effects of childhood vaccines

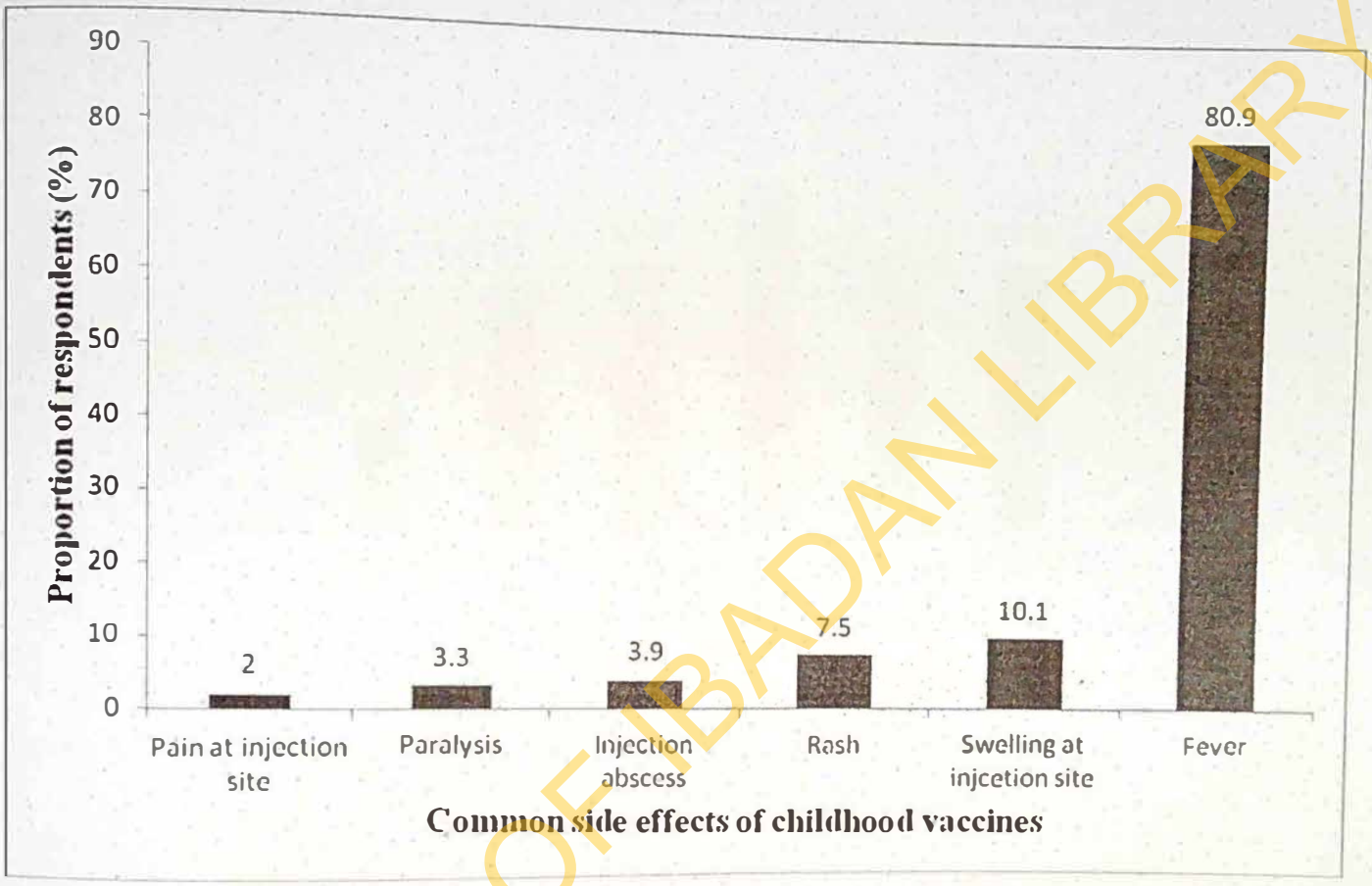

Figure 4.8: Knowledge of respondents on common side-effects of childhood vaccines reported by respondents

Fever was the commonest side effects mentioned by the respondents (80.9%), followed by swelling at injection site (10.1%); 0.9% of the respondent did not know of any side effect.

4.5.6 Grade knowledge of respondents on routine immunization and VPDs

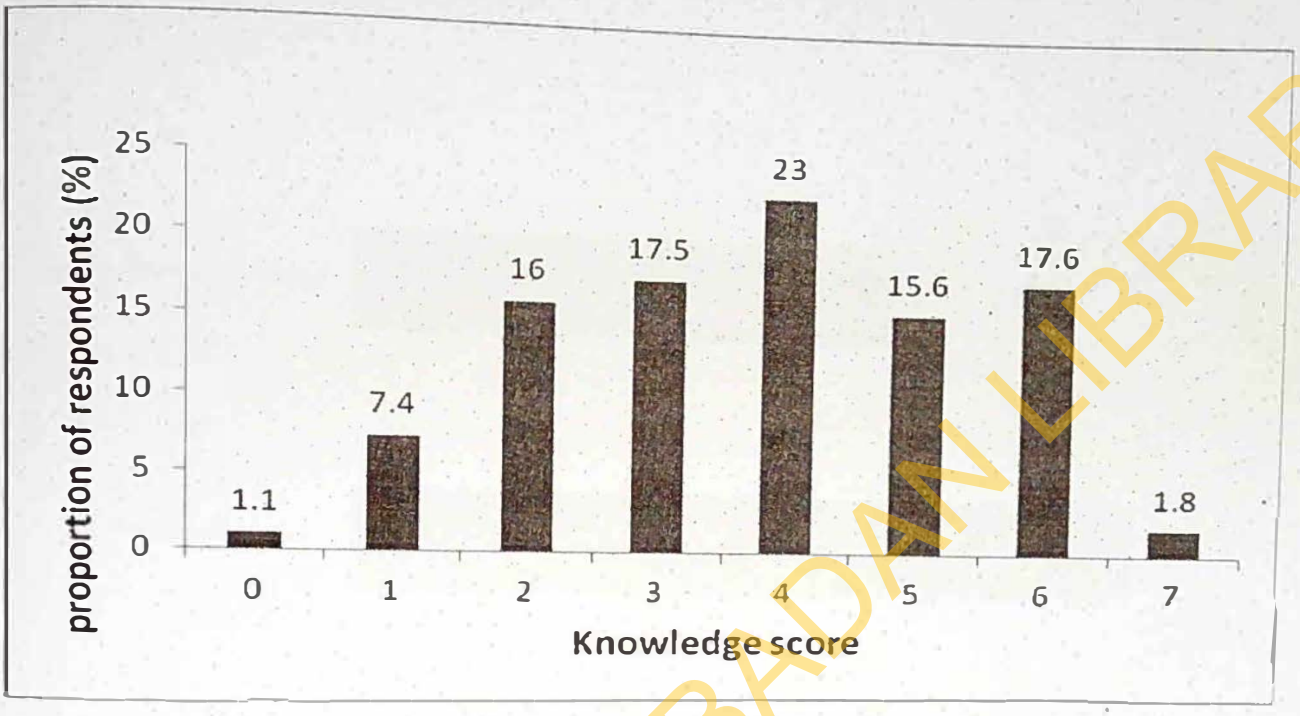

Figure 4.9: Score knowledge on RI and VPDs of respondents

Twenty three (23%) of respondents had a total knowledge score of four; while 1.1% had a total knowledge score of zero. Just 17.5% had a total score of three. A knowledge score of 4 and above is considered as satisfactory (Figure 4.9).

4.5.7 Level of knowledge of respondents on routine immunization and VPDs

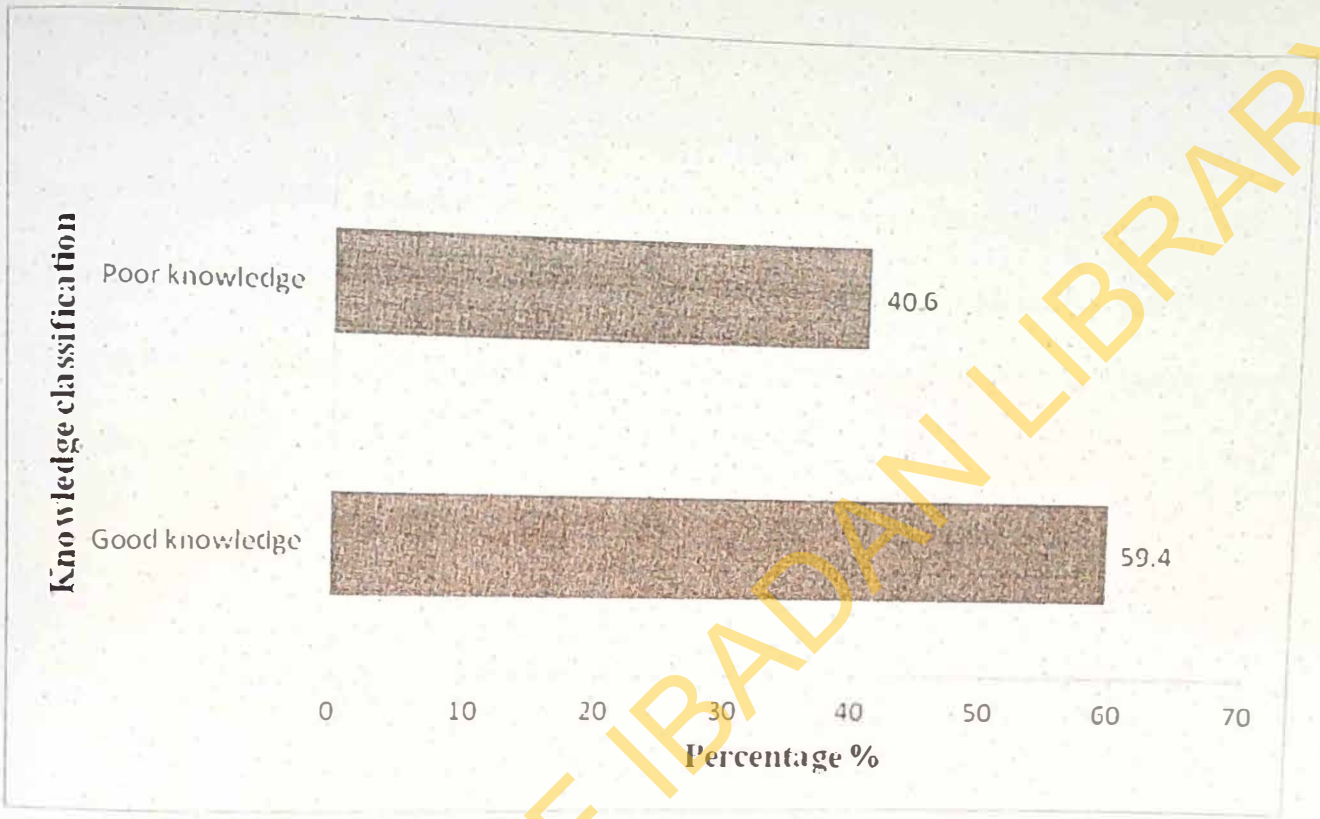

Figure 4.10: Performance of knowledge category on RI and VPD

A total of 321 (59.4%) had satisfactory knowledge while 219 (40.6%).

4.6 Attitude of Respondents towards Routine Immunization

This section presents the results of the attitude of respondents towards routine immunization. Below is the summary in Table 4.14.

Majority (86.0%) of the respondents believed vaccine should not be given to a sick child, 63.3% agrees that their major problem is malaria not immunization, RI should be administered in houses instead of the health facility (63.9%) and 28.5% don't believe in immunization.

Table 4.14: Attitude of respondents toward routine immunization (n= 540 for each)

Respondents attitude towards RI n=540 for each statement	Agree (%)	Undecided (%)	Disagree (%)
Major problem is malaria not immunization	63.3	2.0	34.6
Immunization is a waste of time	57.2	2.2	40.6
I need permission from my husband	53.2	5.4	41.8
No immunization because child is sick	86.0	1.1	13.0
My job is important than taking my child for RI	60.0	2.0	38.0
Health workers are not friendly	58.5	5.7	35.7
No means of transport to the health facility	55.7	2.4	41.9
Do not believe in immunization	28.5	1.7	69.9
Health worker should come to my house for RI	63.9	11.3	24.8

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My job is important than taking my child for RI	60.0	2.0	38.0
Health workers are not friendly	58.5	5.7	35.7
No means of transport to the health facility	55.7	2.4	41.9
Do not believe in immunization	28.5	1.7	69.9
Health worker should come to my house for RI	63.9	11.3	24.8

4.7 Perception of Respondents towards Routine Immunization

Majority (81.7%) of the respondents believed that if mothers deliver at health facility; they use RI services. Multiple shots at once overload a child's immune system (69.1%), use of outreach helps increase RI coverage (65.6%) and parent should get exemption from vaccination (77.8%). Furthermore, 67.8% of respondent believed that day to day activities of mother's affects schedule of vaccination. However, 71.3% of respondents believe that government should set policy for vaccine. A large proportion (55.4%) of respondents believes that routine immunization prevents all childhood diseases.

Table 4.15: Perception of respondents towards safety and effectiveness of routine immunization

Respondents perceptions on RI	Agree (%)	Disagree (%)	Undecided (%)
Immunization keeps children healthy	55.6	34.1	10.4
Do you think immunization keeps children healthy	55.4	30.2	14.4
I trust the vaccine health talk my child's health care provider gives	79.4	15.4	5.2
Child's health care provider is easy to talk to	43.5	53.5	3.0
Parent should be allowed to get exemption from vaccination for their children	77.8	12.6	9.6
Trust government to set policy for vaccine	71.3	28.7	0
Getting multiple shots at once overload a child immune system	69.1	21.5	9.4
Use of outreach is helping to increase coverage of immunization	65.6	8.1	26.3
RI is sufficient to reach all children for immunization	48.2	9.1	42.8
If mothers deliver their babies in HF; more likely to use RI services	81.7	13.0	5.4
Day to day activities of the mother affects their attending clinic for RI	67.8	25.0	7.2
Level of education of mothers will help increase the use of immunization services	47.0	37.6	15.6
Age of mothers plays an important role in the use of RI services	55.2	36.0	8.9
Immunization is expensive	58.0	37.0	5.2

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Trust government to set policy for vaccine	71.3	28.7	0
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4.8 Factors Associated with Uptake of Routine Immunization Antigens

The result of the bivariate analysis to determine the association between socio-demographic factors (and other related factors) and uptake of immunization antigen is presented in table 4.16.

Nine factors were tested at bivariate analysis to check for significant association with full immunization and only five factors were significantly associated with full immunization. These factors included receiving antenatal, possessing at least secondary education, having primary occupation, receive information on RI and no motivation from health workers.

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Table 4.16: Association between characteristics of children and their immunization status

Bivariate logistic regression analysis of factors associated with full and partially immunization

Variable	FIC (%) n= 24	PIC(%) n= 258	Chi-square	P-value
Sex of child				
Female	16	134	1.91	0.17
Male	8	124		
Marital Status				
Divorced	1	3	1.42	0.23
Married	23	255		
Education				
None/primary	5	111	**4.47**	**0.03**
Secondary/post secondary	19	147		
Knowledge				
Poor	12	111	0.44	0.51
Good	12	147		
Place of antenatal				
General hospital	0	182	**47.7**	**0.000**
Home	24	76		
Information on RI				
No	0	61	**7.24**	**0.007**
Yes	24	197		
Place of delivery				
Health facility	1	153	29.9	0.000
Home	23	105		
No husband approval				
No	6	257	**194.5**	**0.000**
Yes	18	1		
Childbirth order				
1-4	22	179	**5.33**	**0.021**
≤ 5	2	79		
Religion				
Christian	2	9	**1.38**	**0.241**
Islam	22	249		
Primary occupation				
Farming	1	0	**12.9**	**0.005**
Health worker	18	183		
Teaching	0	23		
Trading	5	52		

FIC- fully Immunized, PIC- Partially Immunized

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4.9 Multivariate analysis

All the factors significant at bivariate analysis were subjected to multinomial logistic regression to control for possible confounding and effect modification; the result of the logistic regression is shown in table 4.17.

Of the five factors that were significantly associated with being fully and partially immunized, only two – having low education and no motivation from health workers remained as the only independent significant factors associated with full immunization after controlling for possible confounding and effect modification at unconditional logistic regression analysis. Women who had low education were more likely not to complete vaccination for their children.

4.17: **Unconditional logistic regression analysis of factors associated with full immunization.**

Vaccination status	Odds ratio	P- Value	95% CI
Fully immunized			
Received antenatal	1.58	0.99	Undefined
Low educational level	0.18	0.02	0.04-0.79
Primary occupation	0.18	0.05	0.03-1.01
Received information on RI	1.74	0.51	0.33-9.18
Lack of motivation	19.16	0.00	6.14-59.74
Partially immunized			
Received antenatal	6.49	0.98	Undefined
Educational level	0.03	0.00	0.01-0.07
Primary occupation	1.95	0.97	Undefined
Received information on RI	1.43	0.38	0.64-3.16
No-motivation	0.02	0.01	0.01-0.19

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Fully immunized			
Received antenatal	1.58	0.99	Undefined
Low educational level	0.18	0.02	0.04-0.79
Primary occupation	0.18	0.05	0.03-1.01
Received information on RI	1.74	0.51	0.33-9.18
Lack of motivation	19.16	0.00	6.14-59.74
Partially immunized			
Received antenatal	6.49	0.98	Undefined
Educational level	0.03	0.00	0.01-0.07
Primary occupation	1.95	0.97	Undefined
Received information on RI	1.43	0.38	0.64-3.16
No-motivation	0.02	0.01	0.01-0.19

4.10: Results of FGD and KII in Bauchi LGA

This section focuses on findings from transcribed interview data Key informant interview of health workers professionals.

Knowledge on routine immunization?

Immunization protects children (and adults) against harmful infection before they come into contact with them in the community. From the focus group discussions, health workers stated that immunization helps prevents some diseases like polio, hepatitis, tuberculosis and pertusis. It also helps to keep the child healthy.

"Immunization it is an antigen introduced into the body in order to prevent diseases.....

"Immunization is when an antigen is introduced into the body to prevent the occurrence of disease..."

For some mothers, it simply meant *"protection"*. For them, immunization strengthened the child and prevented diseases as indicated by eight out of the 10 focus group discussion participants in Galambi. A common concept of immunization in the communities is *"rigakafin yara"*, which literally means *"child's immunization"*. One of the respondents says immunization "For them, immunization like Oral Polio Vaccine (OPV) when introduced into the body protects, strengthened and prevents the child from diseases.

Prevention of diseases through the introduction of vaccine into the body may happen in different ways. First, the substances may be taken orally, like Oral Polio Vaccine (OPV) which was described as *"magani" "digawa" "shan inna" digawa* means *drops "drops"* and *"shan inna"* means *"paralyzed limb"*. Nevertheless, in the case of oral polio vaccine, everyone agreed that despite the small volume and the licking, it was efficacious as

indicated by all the focus group discussion women from three of the ward except one participant who said "*it is not effective because those that collected it still come down with polio paralysis and that is why they give us every month by coming to our houses*"……

Another concept used by respondents is "*rigakafin ciwon hanta*", literally meaning "*injection that prevents hepatitis*"…. For them, certain injections were capable of promoting the health of children.

When asked on the advantages and disadvantages of immunization, respondents mentioned that one of the advantages is that it protects the child during any outbreak of the disease the child had received, "*it makes my child healthy and strong*" ….FGD Turum and "*it makes the child sick at the same time*"….FGD Liman/gatagum.

What are the activities carried out and practice of RI in this community?

In view of the preceding discussion, how can RI and the activities carried out in your center can be described? RI is offered every at least a day of the week and outreaches are carried out once in a month. Activities such as lectures on benefit, effect, importance of immunization and RI schedule are all carried out during the session, as indicated by all the health workers participants in the focus group discussion saying "*they should not bath the child after pentavalent vaccine…*" Another said "*how to prepare sugar and salt solution*".

In response to this, majority of the respondents see it as a means of social networking. Some women indicated that they made new friends at the centers. At Turum, a 19 year old housewife said: "*it is a place for making new friends. This is a small community, people going for immunization know one another*". Similarly at Zugur, a 28year old

housewife stated: *"it helps people to make new friends and walk home together or board same public transport"*. This suggests that those who could have defaulted on the basis of transport fare may receive assistance from co-nursing mothers, whom they know at immunization centers. Activities such as lectures on side effects of vaccines, personal hygiene were thought during the sessions.

For men, the situation was a bit different. They claimed ignorance of what happened at the clinic or the schedule of activities carried out in the community. However, immunization events also promote social networking among married men. Sometimes, a husband may contact a neighbor whose wife has been going for immunization, and inquire about his experience. This, most of the time, creates a type of relationship based on a common interest. At Liman Katagum a literate young man said: *"it is a place for our wives to make new friends and for them to meet their old friends"*. Similarly at Zugur, an illiterate 30 years old man stated: *"it helps people to make new friends"*. *"I even keep my children's routine immunization card ……FGD Galambi"*

Willingness of mothers to take their children for routine immunization?

The mothers all said they are willingly but at times the lack of some vaccines and a 19 year old participant *"the waiting time is discouraging"* …..FGD Dan Amar B and *"the side effect of these five in one vaccine (Pentavalent) is scary"*….FGD Galambi, after prompting a 22 years participant from FGD Zugur said *"effects like fever, body temperature, headache…."*

Challenges on identifying defaulted infants and addressing missed opportunity issues

In order to explain why communities do not go for routine immunization, health workers explained that centers are far and there is no permission from husbands to come for routine immunization. Since routine immunization is held every week and is dependent on individuals to bring their children to the site, the numbers appear to be lower than for IPDs.

Most health worker did not know many community members who were not bringing their children for immunization, but explained that those who do not bring their children are often ignorant. They need to be further educated in order to better understand the importance of routine immunization and in order to erase any misconceptions. Furthermore, they explained that routine immunization needs to be brought closer to peoples` homes with outreaches similar IPDs.

"We can use an immunized child as an example because such a child even when attacked by measles is able to play"……KII Liman Katagum.

"I give them examples comparing those children who are not immunized with those who are"….KII Zugur.

"They should bring their children below one year to be immunized so that diseases may not attack them, they can be immunized against and even if he gets such a disease he is not badly off"……KII Galambi

Reason why some mothers complete and some do not complete their child's vaccination. Since no action can be understood without its latent meaning. Generally, women in the study area knew the importance of immunization, but they were constrained by certain factors, which made them sometimes miss immunization

schedules. Mothers who did not usually attend vaccination clinics were categorized into the following groups: those that feel the money their being asked was too much, vaccine out of stock, health facility too far and those who needed the permission of their husbands.

Respondents complained that some women do not complete their child's vaccination for four different reasons. Seven of those who did not complete their child's vaccination were scared of the side effects from the vaccine *"that five in one"*....FGD in Turum, while others said *"body temperature" and "swelling at the site of injection"*

A nurse from KII explained how they responded to mother's complaints about such reactions, saying that *"immediately a child is immunized, we usually tell the mothers to rub the point of injection where needle entered the body very well especially when the baby takes Penta vaccines because it now fights five diseases together"*. She further said that *"after being immunized, the baby's body temperature becomes high. Mothers were always advised to give their children paracetamol to help relieve the pains"*. The mothers were not against immunization, but they feel whatever government gives has pulses for vaccination should be given to them. According to a respondent, *"I was told that am suppose to be given paracetamol at the health facility after the collection n of penta vaccine, but I was not given after collecting penta 1 and didn't have money to buy one, so I didn't go back for the remaining vaccine"*....FGD Dan Amar B and *"the health workers often claimed that they were not given any pulses (paracetamol, vitamin c) to give to mothers"*.....FGD Liman/katagum. According to a respondent , *"I hear people saying that most of the health workers have their own clinics and they take the paracetamol there to sell and make money for themselves, but I don't know how far that*

may be true".....FGD Kangere. For them, reminder on vaccination date was important; yet that was not available. In response to the above question vaccine stock out and number of children required before a vial of vaccine is used was also a contributing factor and it discourages the mothers to go back to the health facility considering the distance. According to a respondent, *"I sometimes miss the appointment for immunization because I went to the health facility twice and the vaccine was not available. Occasionally, I find it difficult to leave the house, especially when it rains"*. Finally, three women said that they needed to take permission from their husbands, and as a result failed to comply with immunization schedules.

Many of the participants agreed that these gaps can be overcome if the health workers can be sincere and committed to their duties.

Behavior or attitudes of health care workers?

Community members had different views about staff. However, some health workers behaved in ways that made mothers feel discouraged about taking their children for immunization. For instance, mothers complained that clinic staff was rude, come late on the day of immunization and that they did not treat them with respect. Such behaviors had contributed to the low coverage of immunization indicated by a 30years old woman in Zugur saying: *"They pick their friends or family members among us to attend to them first"* Also, they do not come to the clinic promptly on many occasions and when they eventually come, they never apologize. *"They come to the health facility late and say we will like to take our breakfast first"* This sometimes prolongs the waiting period in the clinic. Great concern was showed in terms of payments at the health facility for registration before collection of the vaccine.

Men had no problem with clinic staff since they had no direct interaction with them. Nevertheless, they seemed to form opinions based on reports from their wives, and thus majority of the male participants in the focus group discussion had negative perception of clinic staff. For instance, clinic staff were said to rebuke mothers publicly for coming late or not coming, or for forgetting vaccination cards at home. Mothers complained that clinic staff attended to persons they were familiar with first and disrupted the "first-come-first-served" principle which used to guide their service. *"I was annoyed with such services that I had to stop my wife from going to the health facility for vaccine……FGD Dan Amar" "thank God my wife doesn't go for vaccination at all…… FGD Galambi".* Although there were leaders that announce and encourage the community members to go for RI both house to house and outside the house.

Who takes decision on the health care of children in this community?

Majority (54%) of the respondents said it was their husbands while 203 (38%) indicated that it was a joint decision. At Kangere, a 25years old woman said: *"ni ma sai na sa baki a chikin bada rigakafi yaro na"* meaning *"I must also contribute to the vaccination of my child"*. Although a 30years old woman in Turum indicated that *"I take decision on my own because I know the consequences my child will face if I don't vaccinate against childhood diseases, so I don't wait for my husband permission". "I am more educated than my husband, so I understand the importance's of routine immunization ……FGD Galambi".*

Most mothers said that they ask for permission from their husbands to take their children for immunization, but many explained that this was in order to obtain money for transport or to receive a ride to the health facility. Some women said that they must tell their

husbands why they are leaving the house so that he does not become suspicious, whereas others did not feel it was necessary to inform their husbands.

In most cases when you reach the date to take the child for immunization, most husbands may doubt as to whether you have to go. So in such a situation, you have to ask for permission so that he does not doubt where you are going..... FGD Dan Amar- women.

We don't have to ask for permission because our husbands are supportive and encourage immunization.....FGD Liman Katagum-women.

Some family members are tough; a wife is supposed to stay at home thus she has to ask for permission...FGD Kangere.

Effectiveness of routine immunization given to children in this community?

Majority believe that it is effective and helps to prevent childhood diseases, but some had great concern with the effectiveness of the vaccine. *"It is no longer effective because they give us at home (during IPD) and expect us to go to the health facility to collect another dose, why.....FGD Dan Amar B". 29 years old woman said that "I have seen a child that collected measles vaccine and few weeks later the child had measles and i have also heard of stories of the children that took "rigakafin" "shan inna" (OPV) and still had polio.....FGD Kangere".*

What is the future plan for routine immunization of your children?

In response to this, majority (97%) of the respondents believe that the future of their children is in the hands of God. *"I have five children now and my last is 18month old and I have never giving her any vaccine and she is doing very fine……FGD Dan Amar" A 20years old woman said my child will not take any vaccine because I don't trust the vaccine given……FGD Kangere".* Some women indicated that they will not take their children for vaccine, because that was their least problems. *"We are suffering from malaria and cholera and you are saying we should go for vaccination in the hospital, as for me I will not go……FGD Liman Katagum". "I will take my children for vaccination because it gives the child immunity when there is any childhood disease outbreak……FGD Zugur".*

What are the roles of Husbands?

Husbands play important roles in household decision-making in the study areas; sometimes, they were able to influence their wives. Therefore, acceptance of immunization by husbands is likely to help create good demand for it. *"I make sure my children's vaccination is card is kept by me and safe"……FGD Kangere.*

"We should take trouble to keep reminding our wives of the dates and importance of immunization"….FGD Turum. "I help her with transport to the health facility"……FGD Dan Amar.

"Sometimes when my wife is too busy, i personally take the child to the health centre"……FGD Galambi. "If I have something to do I cannot help"……FGD Dan Amar.

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Chapter 5 - Discussion

In this study half of the study participants had satisfactory knowledge on routine immunization (RI) and vaccine preventable diseases (VPDs). However, the majority of children of the study participants were only partially immunized and only (8.5%) of the children who were fully immunized based on card verification. The reasons mostly mentioned for non-vaccination were economic reasons (lack of money for registration at health facility and transportation) and cultural reasons (lack of permission from husband).

5.1 Level of Knowledge Regarding RI and VPDs

Overall grading of the knowledge of respondents in this study indicated that 59.4% had satisfactory knowledge on RI and VPDs; this is similar to findings obtained in study by PATHS, in Nigeria (2005). This study also indicated that respondents with at least secondary education are more knowledgeable on RI compared to those with primary or no formal education. This is expected, as respondents with high level of education ought to understand scientific information more easily than those with low level of education, this finding is consistent with that of Olumuyiwa (2008) in Edo state, who indicated 87% of respondent had a satisfactory knowledge on VPDs.

More respondents knew the age at which at a child should be taken to health facility for first RI visit compared to the last visit and the correct number of RI visit; this may possibly, be due to the high level of maternal concern for her newborn. In addition, the first set of antigens is usually given at the health facility after delivery, except in situations where the child was delivered at home or vaccines are not available at the

health facility; mothers thus know that a child should receive vaccine at birth. This finding is in sharp contrast to (20%), obtained in Northern Nigeria (PRRINN), (2007). Proportion (88.1%) of respondents in this study who knew the age at which a child should receive the first set of routine antigens. Regarding place of delivery of children, the highest population of those with incomplete immunization was among the children who were born at home (50.9%). The reason may be that it is the policy of government hospitals, private clinics, and health centers to provide adequate information about immunization and to give BCG, OPV0 and HBV1 vaccination to the newborn baby after delivery. This factor may also be responsible for the highest coverage obtained for those antigens given at birth – BCG, OPV0 and HBV1 when compared to antigens given at other times.

Tuberculosis, measles and poliomyelitis were the most common VPDs recalled by the respondents. Measles is currently targeted for elimination in Nigeria; poliomyelitis is targeted for global eradication (GPEL, 2013).

Surveillance of both measles and acute flaccid paralysis (WHO GUIDELINE, 2006 and FMoH, 2007) are active surveillance systems with case-based reporting. The active surveillance requires scaling up of community involvement including the participation of both religious and traditional leaders in case detection and reporting; information on the two diseases therefore reaches the entire community through the religious and traditional leaders. Measles is associated with a characteristic rash which forms part of its diagnostic criteria; most mothers are familiar with this characteristics rash. In addition, the several Immunization Plus Days (IPDs) conducted every month to give supplementary doses of

OPV to children between 0 and 59 months old has poliomyelitis particularly in rural communities in northern Nigeria.

Most respondents knew the age at which a child should be taken to health facility for first RI visit compared to the last visits; this may possibly, be due to the high level of maternal concern for the health of a newborn. In addition, the first set of antigens is usually given at the health facility after delivery, except in situations where the delivery is not at the health facility; mothers are thus aware that a child should receive vaccine at birth. This finding is similar to that obtained by PRRINN in Jigawa, Katsina and Yobe states, all in northern Nigeria (2007). The proportion (88.2%) of respondents in this study who knew the age at which a child should receive the first set of routine antigens is quite different from the proportion (65.1%) of respondents who delivered at health facility.

Red eyes, fever, cough and skin rash were the most common symptoms of VPDs recalled by the respondents; a combination of these symptoms occurs in measles infection which was the most common VPDs mentioned by the respondents. Some of the respondents mentioned malaria and cholera diseases as VPDs; this possibly reflects a low level of knowledge on RI which is also similar to findings observed in Jigawa, Katsina and Yobe States all in northern Nigeria (PRRINN, 2007).

5.2 Level of education of respondents

Key issues highlighted in this study were related to the low RI coverage in the community. The level of education among the respondents in this study was low. Being a predominant Muslim community, most parents enroll their children in Quranic schools due to their religious disposition. In additional, some of the villages in this community

are remote and lack formal educational institutions; these factors pose a lot of challenge to the attainment of Millennium Development Goal (MDGs 2), (UNDP, 2010). In a study to determine the factors influencing immunization uptake in Nigeria, it was demonstrated that rumors played significant role in hindering the uptake of immunization (PATHS, 2005). The researchers reported that majority of the respondents had widespread misconceptions that immunization can prevent all childhood illnesses and polio and measles vaccines were the most likely perceived as very effective. Furthermore, a significant proportion of respondents believed that immunization can lead to serious health complications for the child, while some (13%) believed a hidden agenda lies behind immunization efforts in the country. However, the study indicated that some (15%) respondents believed that the OPV can cause infertility. Oluwadare, (2009) in his study highlighted that one common misconception he noticed was that immunization protects against all diseases. People believed that polio is a general vaccination for all the other childhood diseases because it is what all they get.

5.3 Attitude towards Routine Immunization

The majority of respondents believed that no immunization should be given when the child is sick. During this period, there was a controversy over the safety of OPV due to its perceived composition and side effects; 55.6% agrees that the vaccines given to children are safe, and this is in sharp contrast with findings in Edo state (Olumuyiwa *et al.*, 2008). Most respondents had positive attitude towards immunization; 95.0% of the respondents felt that immunization is beneficial and will advise other mothers to get their children immunized which is similar to findings in Edo state (Olumuyiwa *et al.*, 2008).

Most of the respondents (77.8%) believed that parents should be allowed to get exemption from vaccination for their children. The widespread perception resulted in poor acceptability and outright rejection of immunization activities in the LGA.

Respondents (81.7%) beliefed that giving birth in the health facility will help to improve the use of RI; this demonstrates the need for appropriate interventions to correct this misconception.

The majority of the respondents agreed that their major problem was malaria and not VPD, although most believe that immunization prevents all diseases, which is similar to findings in Ekiti state (Oluwadare, 2009); this could be the reason why some mention malaria as VPDs. This indicates the need for appropriate intervention to correct this misconception.

5.4 *Determinants of Full Immunization*

Receiving ante-natal care is significantly associated with being fully immunized or not. Furthermore, receiving ante-natal care and delivery at health facility are both indicative of good health seeking behavior which influences health-based decision making including childhood immunization: both factors have been demonstrated in similar studies to be associated with full immunization (PATHS, 2005) and (PRRIN, 2007). Satisfactory maternal knowledge was demonstrated by virtually all the articles reviewed to be significantly associated with full immunization (Olumuyiwa, 2008).

Possessing at least secondary education, having primary occupation, and high of motivation on RI were more likely to have fully immunized children but in contrast with

findings obtained in Edo state (Olumuyiwa *et al.*, 2008) possibly because of their tradition and religious believe in the study area.

In terms of birth order, it shows that the prevalence of complete immunization is higher among children who are at first to fourth birth order rather than children with birth order five and above, but contrast with findings (48.9 against 31.4 per cent) obtained in north Sumatra province, Indonesia (Juliandi Harahap.2000) . In other words it can be said that the higher the birth order, the lower the completeness of immunization. A possible reason is that mothers pay more attention to their first child rather than the next child. Another possible reason is that women having their first children are young and inexperienced and willing to accept advice. They care more about the health condition of their first child and how to prevent them from contacting diseases. Also it could be due to the concerns about side effect of the newly introduced penta vaccine.

5.5 *Immunization Practices and Reasons for Non-vaccination*

In this study vaccination coverage for all antigens was low. Routine immunization coverage of children aged 12-23 months old that are fully immunized based on mothers recall report obtained from this study (46.0%) is lower than what was obtained in a study of rural community in Nigeria (Adebayo& Oladokun, 2012). 8.5% of the children were fully immunized by verifying with immunization card, but is comparable to figure (7%) obtained for Sokoto, northern Nigeria, (Okolo *et al.*, 2003). Overall, the coverage for antigens given at birth – BCG, OPV0, and HBV1 was higher than coverage for other antigens. Emphasis; the OPV3 coverage obtained in this study is of concern; 36.3% OPV3 coverage obtained from maternal history and 38% coverage obtained from

immunization card are far below the 80% OPV3 coverage recommended by the World Health Organization for polio eradication . Several studies have demonstrated that the key risk factor for circulating vaccine derived polio virus (cVDPV) is substantial immunity gap occasioned by low OPV coverage (Olen *et al*.,2004), also encouraging wild polio virus transmission. the low OPV coverage in this LGA has favored the emergence and transmission of cVDPV.

5.6: Factors associated with Incomplete Immunization of Children

The reasons mostly mentioned for non-vaccination were lack of money and no permission from husband; this finding is similar to that obtained in Borno, Enugu, Jigawa, Kano, Lagos and Yobe States of Nigeria (PATHS, 2009), but different from what was obtained in rural Uganda (Tuqumisirize *et al* , 2002). It is generally believed that husband's permission is required by mothers prior to undertaken any activity including childhood immunization – a reflection of both religious and cultural belief. 60.8% of respondents require the permission of their husband before taking their children to health facility for RI.

Further reasons indicated for incomplete vaccination were reasons like (too busy, difficult transport due to rain), perception (no motivation) and health-facility related factors (vaccine stock out).

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Further reasons indicated for incomplete vaccination were reasons like (too busy, difficult transport due to rain), perception (no motivation) and health-facility related factors (vaccine stock out).

5.7 Access to Information on RI and VPDs

This study pointed out that 25.5% of respondents had access to radio compared to 18.1% that have access to television; this trend perhaps reflect rural characteristics of some parts of this LGA.

Majority (78.1%) of respondents in this study had received information on RI in the 12 months preceding the study. This figure is higher than what was obtained in similar study in Jigawa, Katsina and Yobe States in 2007 (PRRINN, 2007); this is due to the scaling up of public enlightenment and sensitization activities on immunization by Government agencies and development partners to address the polio eradication challenges in the country.

Respondents who received information on the side-effects of routine immunization was (39.3%) compared to 35.0% of respondents who received information on the benefit of RI and the lowest is 4.0%, who received information on schedule of immunization. Since the aim of sensitizing the public on RI is to promote immunization and improve RI coverage, information which may discourage parents from vaccinating their children such as the side-effects of RI should be emphasized more.

This study showed that most of the respondents received information on RI through town announcer (30.6%) and radio (25.2%) and health facility (29.6%). This trend reflects both the rural nature of the community, where information is typically disseminated through town announcer; and the widespread use of radio in different houses. This is similar to findings observed in Katsina, Nigeria (PRRINN, 2007).

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CHAPTER 6 - Summary and Conclusion

6.1 Summary

The study found that the majority of the children did not receive complete immunization (48.0%), using card to identify those that received complete dose of all antigens. The completeness of immunization is very important in order to ensure the effectiveness of the vaccine and to ensure that the child is fully protected from morbidity and mortality caused by tuberculosis, diphtheria, pertusis (whooping cough), tetanus, poliomyelitis, and measles.

Factors associated with completeness of immunization were possessing at least secondary education, having primary occupation, and high of motivation on RI. There was no significant relationship between immunization status and marital status, place of delivery, knowledge grade, and RI information in the last 12months.

6.2 Conclusion

The attitude of respondents toward routine immunization was generally positive, though there were specific misconceptions about routine immunization, maternal knowledge regarding RI and VPDs in the LGA was fragmentary. Uptake of routine immunization antigens was generally low. Factors associated with incomplete vaccination were no permission from husband, health center too far, and no money, vaccine stockout, too busy, lack of motivation and low level of education independently account for the low RI coverage in this LGA.

Complete routine immunization coverage in Bauchi State, Nigeria is low. Husbands have great influence on whether their children get immunized or not.

Recommendations

I. At Health Facility Level:

a. It is recommended that all Health Centers and Health Personnels should encourage and educate the parents about the values and benefits of the vaccination and vaccine diseases and its consequences to children's health.

II. At Community Level:

a. It is necessary to provide the parents with some health information by distributing printed materials such as brochures, pamphlets and leaflets in local languages.

b. Interventions that target men should be prioritized as a way of improving the immunization status of children in Bauchi State, Nigeria.

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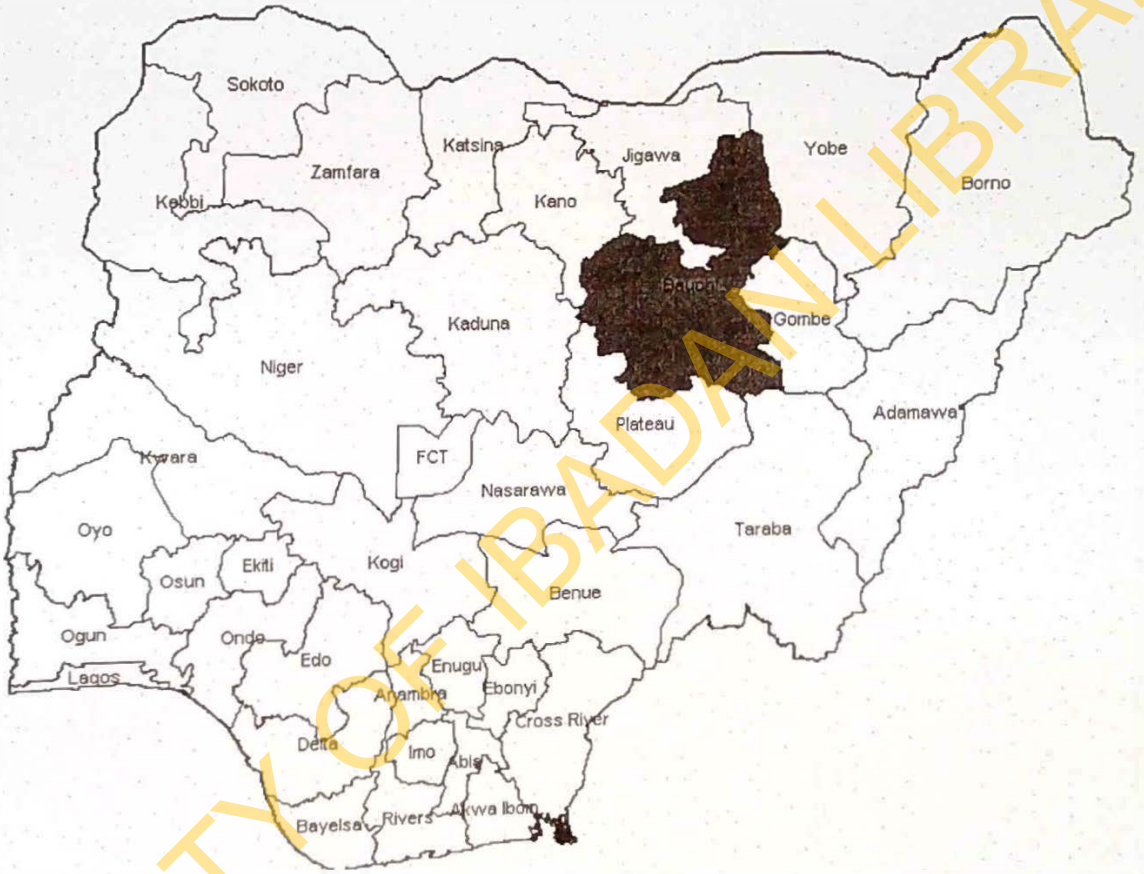
Appendix 1

Map of Nigeria highlighting Bauchi State



Appendix 2

Map of Bauchi State highlighting Bauchi Local Government Area

Appendices 3

WORK PLAN

Task to be performed	Dates	Status
Finalize proposal and submit for clearance	April 2013	Completed
Typing ,translating of questionnaire	23-27 May 2013	Completed
Recruit research assistant and data collectors	28-31 May 2013	Completed
Obtain clearance from SMOH, orient DHO and village health workers	June-July 2013	Completed
Train research assistant and data collectors	June-July 2013	Completed
Pre test study and finalize procedures and tools	June-July 2013	Completed
Collect data	15-18 Aug 2013	Completed
Process data	Each day of data collection	Completed
Analyze data and write report	25 -15 Sept 2013	Completed
Disseminate and discuss research findings/actions and preliminary recommendations with health workers, community, policy makers and Managers.	End of Sept 2013	Completed

Appendices 4

Stage One: Selection of Clusters:

The selection was done based on the WHO Cluster Survey Sampling manual (WHO/IVB, 2008). At the first stage, 60 clusters were selected from the available 1283 clusters based on probability proportionate to size. To select the 60 clusters, the following steps were followed:

(i) All the 20 wards in the LGA were listed using the cluster identification form; this list constituted the sampling frame (**Table 3.1**).

(ii) The population of each ward was listed. Cumulative population was then computed by adding the population of the next settlement on the list to the sum of the population of the previous settlement. Example of how it was done, the population of the second settlement was added to that of the first, the population of the third settlement was added to the total population sum of the first and second settlements; the population of the fourth village was added to the total population sum of the first, second and third, until the population of the 60^{th} settlement was added to the total population sum of the previous 59^{th} settlements (**Table 3.1**). The cumulative population at the 60^{th} settlement was added to the total population of the entire settlements (1047127).

(iii) The sampling interval was determined by dividing the total population of the ward by the number of clusters to be selected. Sampling interval = Total population to be surveyed divided by no of cluster 1047127/60= (17452).

A random number less than or equal to the sampling and with the same number of digits of the sampling interval was selected using tables of random numbers = (16542).

v) To identify the ward in which cluster one was located, the first ward listed in which the cumulative population equals to or exceed the random number (16542) was Bishi (Table 3.1). To identify the village where cluster two was located, the sampling interval was added to the random number (17452 + 16542 = 33994) and the ward whose cumulative population contained this number was Gwaskwaram (Table 3.1). To identify the ward where cluster three was located, the sampling interval was added to the **running total of sum of sampling interval and random number** (17452 + 33994 = (51446) and the ward whose cumulative population contained this number was Yamrat (Table 3.1). To identify the ward where subsequent clusters (numbers four to sixty) were located, 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 this number. The list and population of all the ward, the cumulative population and the clusters located in each ward is shown in Table 3.1

A random number less than or equal to the sampling and with the same number of digits of the sampling interval was selected using tables of random numbers = (16542).

v) To identify the ward in which cluster one was located, the first ward listed in which the cumulative population equals to or exceed the random number (16542) was Birshi (Table 3.1). To identify the village where cluster two was located, the sampling interval was added to the random number (17452 + 16542 = 33994) and the ward whose cumulative population contained this number was Gwaskwaram (Table 3.1). To identify the ward where cluster three was located, the sampling interval was added to the **running total of sum of sampling interval and random number** (17452 + 33994 = (51446) and the ward whose cumulative population contained this number was Yamrat (Table 3.1). To identify the ward where subsequent clusters (clusters four to sixty) were located, 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 this number. The list and population of all the ward, the cumulative population and the **clusters** located in each ward is shown in Table 3.1.

Appendix 5: List of study clusters in different wards in Bauchi LGA

Wards	Population	Cumulative Population	Cluster numbers
Birshi	17957	17957	1
Gwaskwaram	24955	35912	2
Yamrat	37180	73092	3,4
Hardo	30645	103737	5,
Zungur	38055	141792	6,7,8
Kangere	59385	201177	9,10,11
Turwum	70880	272057	12,13,14,15
Kundun Durum	6320	278377	16
Mun Munsal	42920	321297	17,18
Miri	44450	365747	19,20,21
Dan amar A	53920	419667	22,23,24
Dan'Amar B	91300	510967	25,26,27,28,29
Makama A	61180	572147	30,31,32
Makama B	79070	651217	33,34,35,36
L/Katagum	52670	703887	37,38,39
Dandango	27305	731192	40
Daniya	91275	822467	41,42,43,44,45,46
Dankade	61050	883517	47,48,49
Dawaki	94365	977882	50,51,52,53,54,55
Galambi	69245	1047127	56,57,58,59,60
Total	1047127		

GOVERNMENT OF BAUCHI STATE

MINISTRY OF HEALTH

Tel: 077 - 542895
- 542309

P.M.B. 0065

MOH/GEN/S/1409/I

23rd May 2013

Ms. Makinde Idowu,
Dept of Epidemiology & Med. Statistics,
Faculty of Public Health,
College of Medicine,
U.C.H. Ibadan,
Oyo State.

ETHICAL CLEARANCE FOR SUBMITTED PROTOCOL:
"FACTOR ASSOCIATED WITH INCOMPLETE IMMUNIZATION OF CHILDREN IN BAUCHI LGA OF BAUCHI STATE"

The Bauchi State Health Research Ethics Committee (BASHREC) has received the above named protocol for ethical clearance and approval in line with the guidelines set by the Committee. The protocol was reviewed and it was noted that the research falls under the low risk category which does not entails obtaining any specimen of human subject and or any other procedures.

2. Consequently, the Committee has granted exemption status and approved for the research to be conducted subject to observance of all the regulations patterning the issuance of an expedited approval by the BASHREC, as the committee reserves the right to withdraw any approval if it noticed any violation of research ethics.

3. It is expected however, that you will share with us the results of your findings, please.

(Usman U. Muhammad)
For: Hon. Commissioner