CHARACTERISTICS OF NON-COMPLIANT HOUSE-HOLDS DURING NATIONAL IMMUNIZATION PLUS DAYS IN SOKOTO STATE, NIGERIA

BY

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DECLARATION

I Mohammed Abdulaziz hereby certify that the work presented here was originally initiated, developed and conducted by me with support from my supervisors. All references used in the work were appropriately cited

_____ _____

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CERTIFICATION

This thesis entitled "**CHARACTERISTICS OF NON-COMPLIANT HOUSEHOLDS DURING NATIONAL IMMUNIZATION PLUS DAYS IN SOKOTO STATE NIGERIA**" by **MOHAMMED, Abdulaziz** meets the regulations governing the award of the degree of Master in Public Health of Ahmadu Bello University, Zaria, and is approved for its contribution to knowledge and literary presentation.

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DEDICATION

This work is dedicated to the memories of my late sister **Hajia Rasheeda Mohammed Ahmed**, May Allah grant her Aljannatul firdawsi

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In the name of God the beneficent and the merciful

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ABSTRACT

In1989, World Health Assembly (WHA) resolved to eradicate poliomyelitis from the world by year 2000. By 2008 only 4 countries were still endemic for Wild Polio Virus (WPV) namely Nigeria, India, Pakistan and Afghanistan. Nigeria the only African country still endemic for polio exported WPV to neighboring countries previously declared polio free. To break WPV transmission, Nigeria adopted Immunization Plus Days (IPD) a strategy used to deliver OPV (Oral Polio Virus) together with other vaccines as well as other child survival health interventions. Refusal of vaccination by parents or guardian of children eligible for polio vaccination (Non compliance) threatened to undermine polio eradication drive. This study was constructed to determine the socio-demographic correlates of non-compliant households during IPD as compared with controls in Sokoto north and Sokoto south of Sokoto state and to compare the knowledge, attitude and practice on IPD of heads of non-compliant house-holds and that of their controls. Finally an assessment for other risk factors associated with non-compliance in Sokoto north and south LGA was done

The study was case-control with 124 study participants (62 cases and 62 controls). Cases were defined as "House-hold refusing OPV vaccination in last three rounds of IPD in Sokoto north and south local governments", while controls were "House-holds to the right of the cases allowing OPV vaccination". Study participants were interviewed with a pre-designed questionnaire with sections on socio-demographics, media habits, knowledge of IPD, and reasons for refusal

A total of 130 interviews were conducted out of which 9 were disqualified. The mean age of cases (47.7years) and controls (44.3 years) were similar ($\chi 2 = 1.81$, $p=0.179$, $df = 1$). Cases were more

likely to lack tertiary education OR=3.74 (1.55-9.15), but religion, age and type of marriage was not statistically significantly different among the cases and control. A total of 45 cases and 14 controls lack knowledge of the benefit of immunization which was shown to be a statistically significant difference OR=35.32 (9.75-141.18). Cases were also more likely to lack knowledge of Global nature of polio eradication OR= 18.98 (6.91-54.09) and knowledge of other childhood survival strategies attached to Immunization Plus Days (IPD). Cases were more likely to have a negative attitude towards OPV OR=22.4 (7.11-75.56) and believe that government promote IPD for selfish interest OR=4.36 (1.81-10.67). Cases were significantly more likely to lack access to functional television and radio and source there information from town criers

It was concluded that lacking tertiary education was a risk factor for non compliance and that non compliant house hold heads had unsatisfactory knowledge and negative attitude towards IPD. There was a general lack of knowledge among them about the global nature of polio eradication initiative and they also have insufficient knowledge about other IPD initiatives for child survival. Sourcing information about IPD from town crier and lacking access to functional radio and television were other risk factors associated with non compliance. Majority of the controls who were previously not vaccinating their children were convinced to start accepting polio vaccines by the persuasiveness of their traditional rulers. I recommended that community dialogue targeted at identified high risk group precede every round of IPD. Involvement of traditional rulers and religious leaders should be scaled. Communication message of the town criers should be standardized and the town criers trained in communication skills

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ABBREVIATIONS

AFP	Acute Flaccid Paralysis
bOPV	Bivalent Oral Polio Vaccine
CNS	Central Nervous System
DPT	Diphtheria, Pertusis, Tetanus Vaccine
EPI	Expanded Program on Immunization
FMOH	Federal Ministry of Health
GPEI	Global Polio Eradication Initiative
ITN	Insecticide treated Net
IPD	Immunization Plus Day
LGA	Local Government Area
MDG	Millennium Development Goals
mOPV	Monovalent Oral Polio Vaccine
NID	National Immunization Day
ORT	Oral Rehydration Therapy
OPV	Oral Polio Vaccine
RI	Routine Immunization

SIA	Supplemental Immunization Activities
tOPV	Trivalent Oral Polio Vaccine
UCI	Universal Child Initiative
USA	United States of America
VPD	Vaccine Preventable Diseases
WPV	Wild Polio Virus
WHO	World Health Organization
WHA	World Health Assembly

CHAPTER ONE

Introduction

1.1. Background Information:

In May 1989, the World Health Assembly (WHA) resolved to eradicate poliomyelitis from the world by the year 2000[1]. Although this target was missed, the polio eradication initiatives had some achievement. By 2006 only 4 countries were still endemic for Wild Polio Virus (WPV) namely Nigeria, India, Pakistan and Afghanistan. When the global polio eradication initiative was launched in 1989 more than 350,000 children in 125 countries were permanently paralyzed by polio viruses each year, even though a cheap and effective Oral Polio Vaccine (OPV) was readily available[2]. By 1999 the initiative had reduced the number of annual cases of polio by 99% and type 2 polio virus seem to have been eradicated worldwide indicating that the concept of eradication could work[2]. For the other types of polio viruses to be eradicated globally, there is the need to interrupt transmission of the WPV in the remaining countries still endemic to the virus. The fear is that these endemic countries can export the virus to areas that have been previously declared as polio free. This was the case in outbreaks in Burkina Faso, Central Africa Republic, Chad, Cote d'Ivoire, Mali and Sudan in 2004[3] and in Indonesia and Yemen in 2005[4, 5] and in Kenya in 2006[6]

The Expanded Program on Immunization was launched in Nigeria in 1979 and for the five years that followed there was low national immunization coverage and consequent minimal impact on target diseases[7]. This was attributed to poor management and implementation strategies. The Program was revised in 1984 but coverage continued to be low. In 1988, the FMOH supported by WHO, UNICEF, POLIOPLUS and other Non- governmental organizations introduced the concept of mass campaigns as a means of boosting and sustaining EPI coverage nationwide[8] The first ever national EPI mass campaign was held in

1988, and was reported to be successful. This strategy accelerated immunization coverage to about 60% in 1989, and became the springboard for the attainment of universal child immunization (UCI) target of 80% in 1990[8]. Unfortunately, the coverage achieved, could not be sustained in subsequent years and as a result, there was decline in coverage. In June, 1990, the responsibility of primary health care services was transferred to the local governments as part of a structural adjustment program which required the federal government to curtail spending on social services[9], and in 1991, states were required to purchase their own EPI vaccines[10]. Overall immunization levels, as represented by DPT3 coverage, declined and by 1993, were reported to be around 30%[10]. When the global Polio Eradication Initiative (GPEI) was launched in 1989, it became apparent that depending on Routine Immunization (RI) only will lead to missing the set target.

Supplemental Immunization Activity (SIA) was introduced in 1996 to help reinforce RI and improve coverage of polio immunization to 80% necessary for herd immunity. The National Immunization Day (NID) as it was known then was a program for mass immunization of polio through the use of house to house vaccination team aimed at immunizing all children under the age of five years, irrespective of their previous vaccination status to ensure universal coverage[10]. It also established a system for monitoring the Wild Polio Virus through identification of children with acute flaccid paralysis and through the collection and transport of stool specimens[11].

The implementation of the NID led to criticism of the program for being too focused on polio eradication to the detriment of other childhood diseases such as measles that was seen to be a greater problem in Nigeria[10]. This argument coupled with the need to strengthen the polio eradication initiative led to the adoption of the Immunization Plus Days (IPD) in 2006 for SIA. The IPD is a strategy used to deliver OPV together with other vaccines as well as other

child survival health interventions such as ITNs, ORS, and anti-helminthics. IPD was introduced following an extensive consultative process and was aimed at increasing community confidence in the Polio Eradication effort while at the same time contributing to reducing the high child mortality and morbidity in Nigeria. The IPD is expected to contribute towards the achievement of the Millennium Development Goal number four (MDG 4) on child survival.

The IPD immunization delivery strategy[12] consisted of a team of vaccinators and supervisors stationed in two health facilities in each ward (the normal site of Routine Immunization) referred to as the "fixed teams". Other teams referred to as "house-to-house team" move from one household to another until all the households in the ward are covered. These teams have a daily work-plan and a map of the ward to ensure that no house-hold is missed. They carry only OPV for child immunization and advice the parents to visit the fixed posts for vaccination with other routine antigens. Another critical function they carry out is to mark the house-holds based on whether all the eligible children were vaccinated or not. A house-hold will be marked non-compliant if the parent or guardian refuses the vaccination for his eligible child or children. When the members of the house-hold are absent the house is marked for revisit. The house is revisited until the children are vaccinated. The 3rd teams are referred to as the "special teams". They are mostly stationed in market areas, schools, mosques, churches, and other open spaces were children of eligible ages can be found. They only carry polio vaccines. All the teams use indelible inks to mark the left fingers of the vaccinated children. The teams also give the parents of the children ITNs, ORT sachets, soaps and other incentives for their cooperation.

1.2. Problem Statement:

Breaking the transmission of polio virus in Nigeria will require immunization coverage of 80% and above for OPV. This translates to the minimum OPV coverage necessary for herd immunity that could break the transmission of the Wild Polio Virus and prevent both importation and exportation of the virus from neighboring countries. The IPD is one of the main strategies being employed to achieve 80% coverage for the polio antigen uniformly across the country. A drawback of the IPD is the refusal of some parents to allow their children to be vaccinated. Parents' refusal of polio vaccination for their children, especially in northern Nigeria, was traced back to the middle of 2003, when disagreement over the safety of the polio vaccine caused community leaders in the predominantly Muslim north of Nigeria to question the safety of OPV[13]. Subsequently five northern states (Niger, Bauchi, Kano, Zamfara and Kaduna) banned the use of polio vaccine in children in their respective domains. Due to the loss of public confidence in OPV and suspension of Supplementary Immunization Activities (SIA) in these northern states, Nigeria experienced resurgence of WPV transmission during the 2003-2004 periods[13]. Subsequently, WPV spread within Nigeria and into 19 other polio free countries[11]. Even after national SIA recommenced in 2004, limited acceptance and ongoing operational problems resulted in low vaccination coverage and continued polio transmission due to high numbers of un-vaccination of children missed during IPD. Refusal of vaccination by parents or guardian of children eligible for polio vaccination has the potential to reduce the impact of three of the four strategies adopted globally for polio eradication. These strategies include Supplemental Immunization Activities, high level of routine immunization coverage, and mop up campaigns[12]. What the three strategies have in common is the vaccination of eligible children using OPV to achieve a high herd immunity of over 80% that may be sufficient to break the transmission of wild polio virus in the community. Refusal of polio vaccine for eligible children during IPD (Non

compliance) is of public health importance in Nigeria because the only established method of delivering OPV to the un immunized children, that is routine immunization has a low coverage in polio priority states like Sokoto[12]. Again mop up campaigns, a specialized and targeted campaign to eliminate the last foci of transmission can only be successful if non compliance during the regular IPD is reduced to the minimum. If this is not achieved, the mop up campaigns will only be immunizing the children that had already been vaccinated during the IPD leaving those of non compliant house holds to continue to transmit the virus and in some cases spread it to areas that had hitherto succeeded in eliminating WPV

1.3. Justification / Relevance to Public Health:

Intense social mobilization and involvement of traditional leaders led to reduction in the number of missed children during IPD campaign[14] but non compliance defined as refusal of parent or guardian to allow an eligible child to be vaccinated during IPD continued to be a challenge facing the polio eradication program of Nigeria.

Despite the decrease in WPV cases in Nigeria from 1129 in 2006 to 285 in 2007[18] Nigeria still had the worlds highest polio burden in 2008 with 798 (48%) of 1651 WPV cases reported globally, including 721 (74%) of 976 type 1(WPV1) cases. During 2008-2009, Nigeria was the source for WPV1 transmission to 2 countries and WPV3 transmission to four countries[18]. Between January and June 2010, Nigeria recorded only 3 cases of confirmed WPV[16]. This constitutes a significant drop when compared with the same period in the preceding year. Therefore to sustain the gain of 2008 to 2009 and the significant leap forward of 2010 it is important to ensure that all eligible children less than 59 months are vaccinated against polio. To achieve this, the issue of non-compliant households has to be studied more in-depth so as to minimize its impact on the overall global polio eradication drive. The findings of this study could help IPD program planners tailor their social mobilization

campaigns to a sub group of clearly understood sub-population at a higher risk of refusing polio vaccination for their children. The results could also help in determining the message to be included in community health education programs. If the risk factors associated with non-compliance were identified the government can initiate a long term strategic plan to mitigate their effect. The findings from this study could offer useful insight for other eradication program of childhood killer diseases in the planning such as measles

Sokoto state of Nigeria where the index study was conducted could be one of the routes of spread to neighboring countries because it share borders with 2 different countries namely Niger and Benin Republic. In the period 2004 to 2008 Sokoto state had 186 cases of polio[15] which considering the population of the state will account for one of the highest incidence rate in the North western region of Nigeria. In the January 2009 round of SIA about 50% of monitored wards in Sokoto state had more than 10% missed children[14]. In the period March to November 2009 an average of 20% of the monitored wards in the state reported greater than 10% missed children. It has been shown that nearly 50% of all cases of missed children are due to non-compliance in very high risk LGA to which the study LGA belonged[16]. The only other method of OPV delivery to eligible children, which is Routine Immunization (RI), had an even worse performance in the North western region with coverage estimated at about 24% using coverage survey method[17]. Therefore improving quality of SIA still remains important to reach immunization coverage level that will confer herd immunity; a necessary step if polio is to be eradicated from the world

1.4. Research Questions:

- Do the socio – demographic attributes of households that are non – compliant to polio vaccination during IPD differ from other households that allow their children to be vaccinated

- Does the knowledge, attitude and practice of non – compliant households differ from those who allow polio vaccination for their children

1.5. General and Specific objective:

1.5.1. General objectives:

To determine the characteristics of non-compliant house-holds during the Immunization Plus Days in Sokoto north and Sokoto south of Sokoto state Nigeria.

1.5.2. Specific objectives:

1. To Determine the socio-demographic correlates of non-compliant households during IPD as compared with controls in Sokoto north and Sokoto south of Sokoto state
2. To compare the knowledge, attitude and practice conserning IPD of heads of non-compliant house-holds and that of their controls
3. To assess for other risk factors associated with non-compliance in Sokoto north and south LGA

1.6. Hypotheses:

1. There is no significant difference in the socio-demographic variables of heads of non-compliant house-holds as compared to their controls
2. There is no significant difference in knowledge, attitude and practice on IPD of the heads of non-compliant house-holds as compared to their controls

1.7. Scope of the study:

This scope of this research is to study non compliance during IPD leading to un-immunized children. This study does not attempt to study children that were not immunized due to their settlement not visited by vaccinators or due to the child been absent from the house during

the implementation of the IPD. This cause of non vaccination are usually due to defective micro-planning in the implementation of IPD.

CHAPTER TWO

Literature review

Non-compliance defined as households where the parent or guardian of an eligible child refused OPV vaccine for the eligible child is one of the major causes of non-vaccination of children during the IPD campaigns in Nigeria. This can constitute a serious set back for the polio eradication effort because it will impede on the high vaccine coverage needed to stop the natural transmission of the WPV. The implication of non-compliance is further accentuated by the fact that existence of pockets of under-vaccinated children could allow outbreaks of polio in countries that have achieved high levels of vaccination coverage and in countries with no cases for many years[19]. This literature review starts with a look at the socio-demographic findings of families/households that refuse vaccination or with non vaccinated children and then went on to review their knowledge, attitude and practices as regard immunization. Finally there was a review of the epidemiology of poliomyelitis and strategies adopted by Nigeria to break the transmission of polio

2.1. Socio-demographic associations of households refusing vaccination (non compliance)

Non vaccination of children due to non compliance by care givers/ parents has been documented world wide despite evidence that vaccination is among the most effective prevention tools for vaccine preventable diseases[20]. Vaccination was introduced in the United States at the turn of the 19th century. The first U.S. law to require smallpox vaccination was passed soon afterward[21], in 1809 in Massachusetts, to prevent and control frequent smallpox outbreaks that had substantial health and economic consequences. Subsequently, other states enacted similar legislation. Despite the challenges inherent in establishing a reliable and safe vaccine delivery system, vaccination became widely accepted as an effective tool for

preventing smallpox through the middle of the 19th century, and the incidence of smallpox declined between 1802 and 1840. In the 1850s, "irregular physicians, the advocates of unorthodox medical theories," led challenges to vaccination. Vaccine use decreased, and smallpox made a major reappearance in the 1870s. Many states passed new vaccination laws, whereas other states started enforcing existing laws and often enforced by local authorities at the point of school entry[22]. However the laws often had proviso for exemption of certain children based on medical reasons, religious reasons, philosophical and personal beliefs[23]

Studies conducted in the USA have shown that unvaccinated children were more likely to belong to families that intentionally refused vaccination[24-26] and socio-demographics association with such non-vaccinated children include being white, from high income households, living with four or more children and having a married mother with college education[27]. Such detailed study of households non-compliant to or refusing vaccination in other parts of the less developed world is rare but we can use socio-demographic profile of households of non vaccinated children as a proxy keeping in mind that not all non vaccination is due to vaccine refusal. A study conducted in Istanbul, Turkey found education of mother, education of father, number of siblings, monthly family income, parent living time in Istanbul and health insurance to be significantly associated with vaccination status of children at bivariate analysis but only education of father and mother and parent living time in Istanbul remained as predictors of vaccination of the child in multivariate analysis[28]. In Mozambique, in a study of risk factors for non vaccination, mothers not schooling was a risk factor for non vaccination OR= 3.38 (2.30-4.97) at bivariate analysis and remained a risk factor after multivariate analysis OR= 2.24 (1.41-3.56). Religious belief was a risk factor at bivariate but ceases to be a significant factor at multivariate analysis[29]. Having a caretaker who cannot read also appeared to be a risk factor for non-vaccination during mass campaigns

in India. The studies demonstrated that children with illiterate mothers and/or fathers were more likely to be missed during a mass campaign[30].

In Nigeria no literature that directly study the demographic profile of non- compliant house-holds to polio vaccination during IPD was found but numerous studies had tried to look at the determinants of non-vaccination which in most cases include a comparison of some demographic variables. In a cross sectional study done in Nigeria, having at least secondary school education by the mother ($p = 0.035$) was associated with completion of immunization. Marital status, religion and age were not of statistical significance in predicting completion of vaccination[31]. A study, perspective on polio and immunization in northern Nigeria[10], in which the authors used open-ended interviews with individuals selected by a snow-ball sample based on participation in IPD, reported that "It is the ones who are not educated who are refusing OPV during IPD in Zaria city"

2.2. Knowledge, attitude and practice of parent/caregiver of household refusing vaccination (non compliance) for their children

Studies have tried to assess the impact of the knowledge, attitude and practice of parents/caregivers on immunization and the choice to allow a child to be vaccinated or not. In a case-control study of the knowledge, attitude and belief of parents who refused vaccination for their children as compared with those of vaccinated children in the USA, significantly more parents of exempt children thought their children had a low susceptibility to the diseases (58% vs. 15%, $P<0.05$), that the severity of the diseases was low (51% vs. 18%, $P<0.05$), and that the efficacy and safety of the vaccines was low (54% vs. 17% for efficacy and 60% vs. 15% for safety, $P<0.05$ for both comparisons) [32]. In a case-control study still in the USA, under-immunization was associated with negative perceptions of vaccine safety (odds ratio, 2.0; 95% CI, 1.2 to 3.4) [33] Scoring vaccines as not safe versus safe also was more prevalent among parents whose children were under immunized (20.2%) than parents whose

children were fully immunized ($P< .005$). Logistic regression analysis demonstrated that parents scoring vaccines as not safe versus safe were more likely to live in households making $30 001 to $50 000 than more than $75 000 (OR: 2.5; 95% CI: 1.2–5.3). These parents were also less likely to have 2 vaccination providers for their children, compared with 1 (OR: 0.4; 95% CI: 0.2–0.7), and mothers were more likely to be non-Hispanic white, compared with Hispanic (OR: 2.7; 95% CI: 1.2–6.3) or "other" race (OR: 5.9; 95% CI: 1.2–25.0). The study documented that attitudes, beliefs, and behaviors indicative of vaccine safety concern contributed substantially to under immunization in the United States. Expression of concern were significantly more common among parents of under immunized children, though many parents of fully immunized children expressed similar attitudes and beliefs, suggesting potential risks to the high vaccine coverage levels in the US. There was evidence from the study that socioeconomic, family, and health care factors are key contributors for the majority of children who were under immunized. Another case-control study, still in the US found that concerns regarding general vaccine safety did not differ between the parents of vaccinated children and the parents of unvaccinated children and more than half of the cases and controls parents did express concerns about vaccine safety to their child's health care provider[34]. Parents of unvaccinated children were also more likely to believe that children receive too many vaccines[34].

In the developing countries where mass immunization campaigns for elimination or eradication of specific diseases is ongoing the knowledge of heads of households appears to have a great influence on who gets vaccinated or not. Studies have shown that caregivers who had incorrect knowledge of mass campaigns were less likely to have their children immunized. This was demonstrated in studies conducted in India[35-39], Pakistan[40], Mexico[41], and Ghana[42]. Sometimes reduction in the burden of vaccine preventable diseases brought about by successful use of immunization can cause caregivers not to see the apparent benefit

of vaccinating their children. This had been demonstrated in the USA were isolated outbreaks of measles in some states were traced to the growing refusal of measles vaccination by caregivers[43]. In another study in the US, an outbreak of measles was reported among members of a church with approximately 500 member most of whom were characterized by church officials as white, middle class, and well educated. The church estimated that 35 of its members declined vaccination, primarily out of concern for adverse events. Of these, 31 (89 percent) became infected[44]. According to representatives of six families who declined vaccination, issues considered important in their decision to refuse the vaccine were media reports of the dangers of the vaccine (e.g., the putative association between measles vaccination and autism, as well as the perceived effects of the vaccine preservative thimerosal) and a preference for naturally acquired immunity. The group that refused the vaccine was considered to be well integrated into the general community, creating the potential for multiple exposures and generalized transmission. The study concluded that the outbreak was caused by the importation of measles into a population of children whose parents had refused to have them vaccinated because of safety concerns about the vaccine. High vaccination levels in the surrounding community and low rates of vaccine failure averted an epidemic. Maintenance of high rates of vaccination coverage, including improved strategies of communication with persons who refuse vaccination, would be necessary to prevent future outbreaks and sustain the elimination of measles in the United States

As demonstrated in the above study in the USA, vaccine refusal by a subset of the population can be a challenge to disease elimination and even more of a bigger problem if the goal of the intervention is disease eradication. Nigeria is the only country in Africa still endemic to WPV but as reported earlier WPV of Nigeria origin had been exported to other countries in West Africa and even as far as East and Central Africa. In Nigeria where literacy rate is low it is quite conceivable that a caregiver might refuse vaccination with OPV because he does not

understand the benefit of vaccination and the logic behind its use. This was demonstrated in a study in neighboring Chad republic which shares many demographic and cultural similarities with northern Nigeria[45]. Caregivers concern about the safety of vaccines is one of the reasons frequently reported by field supervisors as reason for non-compliance and this was confirmed by a retrospective study of a rumor about sterilizing tetanus toxoid vaccine among Cameroonian women leading to cancellation of the campaign[46]. A Mexican study found the reasons for refusal of vaccination to include, child being ill, 'already vaccinated', or because they thought that an immunization card was a prerequisite to have their children vaccinated[47]. Also mothers with better socioeconomic status were more aware of the campaign, but a high percentage of them did not seek immunizations, while mothers with middle and lower socioeconomic status were motivated to immunize their children through the campaign. Promotion activities and messages communicated through the mass media were appropriate to inform and motivate mothers to seek immunization services for their children.

2.3. Other risk factors for non compliance

Other documented reasons for vaccine refusal or non vaccination during mass campaign include; too many doses[40], no need for booster doses[48] and being busy during rounds[41] A Nigerian study[10] found that people refused to allow their children to be vaccinated because they believed that the polio vaccine was contaminated with anti fertility substances as a plot to reduce populations, but disputes over the safety of the polio vaccine and the appropriateness of the polio eradication campaign were more complex than this single explanation. For the study also showed that questions about the type of public health programs being implemented was raised as well as about their underlying ideologies. People some times wonder why polio eradication should be given such high priority when they could use the money to help people who are sick in the hospital.

2.4. Epidemiology of poliomyelitis:

Poliomyeliti*s*, or polio, is an infectious disease caused by poliovirus, a member of the genus Enterovirus. There are three serotypes of poliovirus: 1, 2 and 3. A specific protein receptor on susceptible human cells allows the attachment and entry of poliovirus. The virus infects cells of the oropharynx, the tonsils, the lymph nodes of the neck, and the small intestines. Infection progresses through cycles of virus replication. Once infection is established in the gastrointestinal tract, poliovirus can invade the central nervous system (CNS) by penetrating the blood/brain barrier or by spreading along nerve fibers[20]. When non-immune persons are infected with poliovirus the outcome varies from infection without symptoms to mild illness, aseptic meningitis or paralytic poliomyelitis. About 1% of infections result in recognized neurological illness. The incubation period ranges from 4 to 35 days but is typically between 7 and 14 days. The initial clinical symptoms may include fever, fatigue, headache, vomiting, constipation, stiffness of the neck and pain in the limbs. The virus multiplies and destroys motor neurons, which may result in the permanent paralysis of muscles activated by the affected nerves. Poliovirus is transmitted from person to person either through droplets from the upper respiratory tract during the early days of infection or, more commonly, through the ingestion of infectious fecal material in circumstances of poor hygiene[49] When the global polio eradication initiative was launched in 1989 more than 350 000 children in 125 countries were permanently paralyzed by polio viruses each year, even though a cheap and effective Oral Polio Vaccine (OPV) was readily available. By 1999 the initiative had reduced the number of annual cases of polio by 99% and type 2 polio virus seems to have been eradicated[2]. Only four countries remain endemic to wild polio viruses in the world and Nigeria is the only African country in that group. After an initial drop in the incidence of polio cases in Nigeria in the beginning of the century, there was a significant rise in the

incidence of cases following the suspension of SIA in some part of the country[15]. In the period January to June 2010 only 2 cases of polio was reported in Nigeria[16]

2.5. Strategies for polio eradication in Nigeria:

Nigeria adopted the four globally recommended strategies for polio eradication in its quest to break the transmission of WPV in the country[12]. The strategies were

1. Achieve and maintain the highest levels of routine immunization coverage with OPV
2. Establish sensitive surveillance to detect all cases of Acute Flaccid Paralysis (AFP)
3. Conduct supplemental immunization activities (SIAs) with OPV
4. Carry out focused campaigns (mop up campaigns) to eliminate the last foci of transmission

Routine immunization against polio in Nigeria consists of trivalent OPV (antigen against WPV types 1, 2, and 3) at birth and at ages 6, 10, and 14 weeks. Immunization coverage is measured using both administrative data (estimated doses administered per targeted child population, determined by official census numbers) and coverage surveys. In 2009, using administrative data, national routine immunization coverage of children by age 12 months with three OPV doses (OPV_3) was 63% (range by state: 35%-90%)[18]. Using coverage surveys, the estimated national coverage (OPV_3) at 12-23 months was 39%, but lower in the northeast (28.6%) and northwest (24.3%) areas of Nigeria. In addition to routine immunization, Nigeria conducts SIA for polio using monovalent OPV type 1 (mOPVl), monovalent OPV type 3 (mOPV3), bivalent OPV types 1 and 3 (bOPV). In 2008 Nigeria conducted eight rounds of SIA using different types of OPV

HAPTER THREE

Methodology

3.1. Background information on Study area:

The study was conducted in Sokoto north and Sokoto south LGA of Sokoto state located in the North-western region of Nigeria. Originally the capital of the Hausa kingdom of Gobir, established before the 10th century, Sokoto is one of the seven traditional walled Hausa towns. It first blossomed as a center of Islamic culture in the 14th century, when it was an important terminus on the trans-Saharan caravan routes. In the early 19th century, Fulani chief and Islamic leader Usman dan Fodio chose Sokoto as the capital of his caliphate and a base for the spread of Islam and the expansion of the Fulani Empire. In a holy war known as the Fulani Jihad, lasting from 1804 to 1830, Usman and his followers took control of most of northern Nigeria and adjacent parts of Cameroon and Niger. The empire was conquered by the British in 1903. The city is located near the confluence of the Rima and Sokoto rivers. With an average annual temperature of 28.3° C (82.9° F), it is one of the world's hottest cities. Sokoto functions as a trade center for the dry savanna region of northwestern Nigeria. Rice and onions are cultivated and livestock is raised in the area. Industries in Sokoto include tanning and leather crafts, pottery, rice milling, and cement production. Sokoto is located at the junction of two highways connecting the city to Zaria and Jega, and it is served by an airport. It is 220 km (140 mi) from the nearest railhead at Gusau. Islam is the predominant religion in the state which is also the seat of the caliphate, the sultan of Sokoto. Majority of the people of Sokoto state are farmers, cattle herders and traders. Sokoto state was part of the Sokoto caliphate founded in 1804 and conquered by the British in 1903.

The state has an estimated population of about 3.7 million people[50] with a land mass of 32,000 square kilometres. The state has 23 LGA distributed across three senatorial zones

(Sokoto North, East, and South). The state is located to the extreme northwestern part of Nigeria between longitudes 4°8'E and 6°54'E and latitudes 12°'N and 13°58'N and shares common borders with Niger Republic to the north, Kebbi State to the southwest and Zamfara State to the east. Sokoto state being part of the Federal republic of Nigeria has an elected Governor who is the ultimate political power holder. The legislative arm of the government also comprise of elected members from all the local governments and are responsible for enacting laws and performing oversight function over the executive arm of the government. The state is further subdivided politically into local governments that are governed by elected chairmen. The smallest political units are the wards. The traditional institution has a chain of command that lead from the village head ultimately to the Sultan of Sokoto. The state has a commissioner of health who appoints the state immunization officer (SIO). The SIO is the officer who is in charge of all immunization related issues in the state. The Local Immunization Officers (LIO) who are responsible for immunization issues in the local governments report back to the SIO. The LIO considered as the field officer of polio campaigns have Ward Focal Persons representing all the wards in the LGA reporting to them

3.2. Study design:

The study was an unmatched case-control study. Cases were defined as households were the parent or guardian of an eligible child refused OPV vaccine for their child in the last three consecutive rounds of IPD. Controls were selected from the next household that allowed all their eligible children to be vaccinated situated to the right of the non-compliant household.

3.3. Study population:

The study population was all heads of house-holds in Sokoto north and Sokoto South LGA of Sokoto state.

3.3.1. Case definition

Cases

Households were the parent or guardian of an eligible child refused OPV vaccine for their children in three different rounds of IPD.

Control

The control for each non-compliant household was the nearest household to the right of the index case that allowed all its eligible children to be vaccinated

3.3.2. Inclusion criteria

1. Presence of house-hold head in the list of non-compliance for the last round of IPD in 2011
2. Presence of the house-hold head in the list of non-compliance for the two rounds of IPD immediately preceding the last IPD in 2011
3. Presence of an eligible child (0-5 years) within the house-hold

3.3.3 Exclusion criteria

1. Refusal of consent
2. Absence of house-hold head after three visits
3. Relocation of the house-hold outside the study area

3.4. Sample size determination:

The total number of non-compliant house-holds in Sokoto north and Sokoto south that met the inclusion criteria for the study was 250. A study conducted in a neighboring state (Zamfara) found that only 16 percent of respondents had satisfactory knowledge of Immunization[51]. In the absence of a better estimate of knowledge of immunization among

controls, 16 percent was used as the proportion of controls with satisfactory knowledge of immunization. The proportion of cases with satisfactory knowledge could not be estimated from available literature, it is therefore taken as 50 percent to allow maximum variability. The formula below for calculation of sample size for case control study[52] was used:

$$\text{n (each group)} = \frac{(p_0q_0 + p_1q_1)\,(z_{1-\alpha/2} + z_{1-\beta})^2}{(p_1 - p_0)^2}$$

Where,

n = desired sample size in each group (cases and control)

p_0 = Proportion of satisfactory knowledge of immunization in controls taken to be 16%[51]

$q_0 = 1 - p_0$

p_1 = Proportion of satisfactory knowledge of Immunization among cases assumed to be 50%

$q_1 = 1 - p_1$

$z_{1-\alpha/2}$ = Standard normal deviate (1.96) corresponding to 95% confidence interval

$z_{1-\beta}$ = Standard normal deviate (0.84) corresponding to a power of 80%

Thus

$$\text{n (each group)} = \frac{\{(0.16 \times 0.84) + (0.5 \times 0.5)\}\,(1.96 + 0.84)^2}{(0.5 - 0.16)^2}$$

$$= 0.384 \times 7.84$$

0.117

= 26

However, in order to compensate for possible non-response an adjustment was made to the calculated sample size, using the formula below.

$n_s = n_f/a_r$

Where,

n_s = the compensated sample size

n_f = the calculated sample size (26)

a_r = anticipated response rate, set at 80% (0.8).

Thus,

$n_s = 26/0.8$

= 32.5

The calculated sample size was multiplied by a factor of 2 to give 65.

Therefore for this study 65 cases and 65 controls was interviewed

3.5. Sampling technique:

The sampling frame is the list of the non-compliant heads of households in Sokoto north and Sokoto south LGA in the last round of IPD in 2011 obtained from the respective LGA local immunization officer. The list was further adjusted to reflect the inclusion and exclusion criteria for the study and the two different lists were merged to form one sampling frame.

Thus the basic sampling unit for the study was household heads listed in the merged list. Systematic sampling technique was subsequently used to select the respondents to be interviewed for the study. This was done by dividing the sampling frame with the calculated sample size to determine the sampling interval. The first sampling unit was selected from the sampling frame using a table of random number and subsequently the sampling interval was added to it to choose the next respondent until the required sample size was reached. The control for each non-compliant house-hold was the closest house-hold in whom all the eligible children were vaccinated

3.6. Study instruments:

A pre-designed and pre-tested questionnaire was used for the study. Section A had questions on socio-demographics such as sex, age, educational background, occupation, marital status and religion. This was followed by section B which was designed to measure the knowledge of heads of house holds on topics such as Immunization and National Immunization Plus days in Nigeria. Section C and section D were designed to assess the attitude and practice respectively of heads of house holds toward Immunization and National Immunization Plus days in Nigeria. Finally the last section of the questionnaire assessed for other risk factors such as media habits and access to information on Immunization Campaigns that have the potentials to affect compliance during immunization campaigns

3.7. Data Collection method:

Interview technique was used for data collection. Interviewers were recruited, trained and supervised by the investigator. A pre-test of the questionnaire was carried out prior to the commencement of the study to assess the acceptability of the instruments and determine the duration of the interview. Heads of house holds who met the inclusion criteria were recruited for the study after excluding those who met the exclusion criteria. Systematic sampling

technique with proportional allocation of samples to the two local governments was used to select the cases and the controls were selected as previously stated. The first house hold to be sampled was selected randomly from the sampling frame and then other household was recruited until the required sample size was reached. The questionnaire was interviewer administered

3.8. Data management:

The questionnaire was translated into Hausa by the Department of Languages and Linguistics of the University of Maiduguri using the back translation method for the purpose of respondents who do not understand the English language Data was checked for its completeness and clarity by field supervisors and on the spot correction was made. Quality control by re-interviewing one percent of the sample size was done. The data was checked for double entry and other data cleaning issues addressed before commencement of analysis

3.8.1. Measurement of variables:

The variables were mostly categorical that have mutually exclusive categories. Continuous variables such as age were converted to categorical variables to study age as a risk factor

3.8.2. Statistical analyses:

Data was analyzed using Epi-Info version 3.3.2 and results were presented using descriptive and inferential statistical methods. For descriptive statistics tables, bar charts and pie charts were used to summarize the data. In inferential statistics categorical variable were compared by Odds ratio (OR) with 95% confidence interval.

3.9. Ethical consideration:

Permission was sort from the Sokoto state ministry of health before onset of the study and the proposal was submitted to Ahmadu Bello University Zaria ethical committee for approval. Participating households were required to give an informed consent before inclusion in the study. All potential subjects were presented with a consent form which described the type of study being done, the purpose of the study, and the subject's rights as a participant in the study, including the right to confidentiality and the right to withdraw from the study at any time with out any harm to the subjects. Names were not included in any of the findings and were only used for the consent form. No form of financial inducement was given to any subject and interviews were done at the most convenient place for the subjects

3.11. Limitation of the study:

Only two local government of Sokoto state was studied therefore it may not be possible to generalize the results to the whole state, but the result may be fairly representative of other parts of the state that share similar demographics and culture with the two local governments. The case definition of this study tried to minimize miss classification bias by requiring that the name of the non-compliant head of house hold should have appeared in three consecutive rounds of IPD but it can not be totally ruled out. As with all case control studies there could have been recall bias by the respondents

CHAPTER FOUR

Results

4.1. Baseline socio-demographic data

A total of 130 interviews were conducted out of which 9 (6.9%) were disqualified due to incomplete answers. The socio-demographic characteristics of those who did not complete the study were similar to those who completed the study. Of the 121(60 cases and 61 controls) valid questionnaires 88 (72.7) were from Sokoto north LGA while the rest were from Sokoto south LGA. The number of cases and controls was less than 60 and 61 respectively in some tables and figures due to omission of some questions in some questionnaire. The mean age of cases (47.7 years) and controls (44.3 years) were similar ($\chi 2$ = 1.81, p=0.179, df = 1). The minimum and maximum age of cases were 27 and 80 respectively while that of the controls were 25 and 72 respectively

Table 4.1: Socio-demographic variables of respondents

Variable	Cases n (%)	Controls n (%)
Sex		
Female	0 (0.0)	7 (11.5)
Male	60 (100)	54 (88.5)
Age		
40 years or less	22 (36.7)	26 (42.6)
> 40 years	38 (63.3)	35 (57.4)
Religion		
Islam	56 (94.1)	57 (95.0)
Christianity	3 (5.1)	3 (5.0)
Marital status		
Single	1 (1.7)	0 (0.0)
Married	57 (98.3)	60 (98.4)
Widowed	0 (0.0)	1 (1.6)
Level of education		
Primary	4 (6.7)	5 (8.3)
Secondary	25 (41.7)	13 (21.7)
Tertiary	12 (20.0)	29 (48.3)
Quranic	19 (31.7)	13 (21.7)
Occupation		
Agriculture (Farming and fishing)	15 (25.9)	4 (6.6)
Agriculture (Nomadic pastoralist)	4 (6.9)	3 (4.9)
Legislator, senior official and professional	1 (1.7)	14 (23.0)
Student	3 (5.2)	4 (6.6)
Service worker, shop and market worker	19 (32.8)	25 (41.0)
Technicians and associate professionals	6 (10.3)	4 (6.6)
Unemployed	10 (17.2)	7 (11.5)
Type of marriage		
Monogamous	22 (37.9)	31 (55.4)
Polygamous	36 (62.1)	25 (44.6)

Most of the respondents were males (Cases 100% vs. controls 89%), Muslim (Cases 94% vs. controls 95%), and married (Cases 98% vs. controls 98%). Secondary level of education was the most frequent among the cases (42%) while tertiary education was the most frequent for controls (48%). Market and service workers were the majority among the cases (33%) and controls (41%). Most of the cases (62%) had more than one wives while 55% of the controls had only one wife (table 4.1)

4.2. Socio – demographic correlates of Non – compliant House – holds (cases)

Table 4.2: Socio-demographic variables association of cases

Variable	Cases n (%)	Controls n (%)	OR
Age (years)			**0.78 (0.35-1.72)**
40 or less	22 (36.7)	26 (42.6)	
>40	38 (63.3)	35 (57.4)	
Religion			**0.98(0.15-6.44)**
Islam	56 (94.1)	57 (95.0)	
Christianity	3 (5.1)	3 (5.0)	
Level of education			**3.74(1.55-9.15)**
*No tertiary	48 (80.0)	31 (51.7)	
Tertiary	12 (20.0)	29 (48.3)	
Type of marriage			**2.03(0.9-4.60)**
Polygamous	36 (62.1)	25 (44.6)	
Monogamous	22 (37.9)	31 (55.4)	

***** No tertiary = Primary, secondary and Quranic school

Lack of tertiary education (table 3) was found to be more among the cases and this was found to be statistically significant OR=3.74 (1.55-9.15). Religion, age and number of wives were not significantly associated with being a case (table 4.2)

4.3. Knowledge of Immunization, VPD and IPD

Table 4.3: Knowledge of Immunization and VPD among respondents

Knowledge of	Cases n (%)	Controls n (%)	OR
Benefit of immunization			**35.32 (9.75-141.18)**
No	46 (92.0)	14 (24.6)	
Yes	4 (8.0)	43 (75.4)	
VPD			**0.63 (0.22-1.75)**
No	47 (78.3)	52 (85.2)	
Yes	13 (21.7)	9 (14.8)	
Signs and symptoms of VPD			**24.73 (8.6-74.2)**
No	51 (85.0)	11(18.6)	
Yes	9 (15.0)	48 (81.4)	
Signs and symptoms of polio			**9.24 (3.76-23.19)**
No	46 (76.7)	16 (26.2)	
Yes	14(23.3)	45 (73.8)	

Lack of knowledge of benefit of immunization (table 4.3) was significantly associated with cases OR= 35.32 (9.75-141.18). This was the case with lack of knowledge of signs and symptoms of VPD OR= 24.73 (8.6-74.2) and poliomyelitis OR= 9.24 (3.76-23.19). Knowledge of VPD without knowing the signs and symptoms was not associated with the cases OR= 0.63 (0.22-1.75)

Table 4.4: Knowledge of IPD among respondents and source of information

Knowledge of	Cases n (%)	Controls n (%)	OR
GPEI			**18.98(6.91-54.09)**
No	46(76.7)	9 (14.8)	
Yes	14(23.3)	52 (85.2)	
Age at which 1st dose of OPV is given			**15.68(5.06-52.02)**
No	35(58.3)	5 (8.2)	
Yes	25 (41.7)	56 (91.8)	
Age of ineligibility for OPV			**23.63(6.15-106.58)**
No			
Yes	33 (55.0)	3 (4.9)	
	27 (45.0)	58 (91.8)	
Source of information			**3.92(1.31-12.11)**
Town crier	16 (36.4)	7 (12.7)	
Electronic media	28 (63.6)	48 (87.3)	

Cases were significantly (table 4.4) more likely not to have knowledge of the global effort to eradicate polio OR=18.98 (6.91-54.09). They were also more likely not to have correct knowledge of the age of first dose of OPV OR= 15.68 (5.06-52.02) and age of ineligibility for OPV during IPD OR= 23.63(6.15-106.58). The cases were more likely to have gotten their information from the town crier compare to the controls OR= 3.92 (1.31-12.11)

Table 4.5: Knowledge of other antigens offered during IPD

Vaccines	Cases n (%)	Controls n (%)	OR
BCG			**2.11 (0.53-8.95)**
No	56 (93.3)	53 (86.9)	
Yes	4 (6.7)	8 (13.1)	
DPT			**3.86 (1.69-8.86)**
No	42 (70.0)	23 (37.7)	
Yes	18 (30.0)	38 (62.3)	
Hepatitis B			**5.86 (1.67-22.2)**
No		43 (70.5)	
Yes	56 (93.3)	18 (29.5)	
	4 (6.7)		
Measles			**0.03 (0.01-0.09)**
No	13 (21.7)	55 (90.2)	
Yes	47 (78.3)	6 (9.8)	
Yellow fever			**1.19 (0.54-2.60)**
No	35 (58.3)	33 (54.1)	
Yes	25 (41.7)	28 (45.9)	

Table seven showed that cases were more likely not to know that the antigens DPT OR= 3.86 (1.69-8.86) and hepatitis B OR=5.86 (1.67-22.2) were offered to children during IPD at fixed post however cases were less likely not to know that measles vaccines were not offered at fixed post OR= 0.03 (0.01-0.09). Generally less than 50 percent of the cases and controls knew that they can get yellow fever and hepatitis B at the fixed post during IPD while Only 9.8 percent of the controls knew that measles was available at the fixed post. Less than a third of the cases knew that DPT was available in the fix post during IPD (table 4.5)

Table 4.6: Knowledge of other incentives offered during IPD

Incentives	Cases n (%)	Controls n (%)	OR
Biscuit			**1.36 (0.42-4.44)**
No	9 (15.0)	7 (13.0)	
Yes	51 (85.0)	54 (87.0)	
De-worming tablets			**13.66(5.26-36.48)**
No	49 (81.7)	15 (24.6)	
Yes	11 (18.3)	46 (75.4)	
LLIN			**2.04 (0.92-4.51)**
No	38 (63.3)	28 (45.9)	
Yes	22 (36.7)	33 (54.1)	
ORT			**3.16(0.54-23.78)**
No	58 (96.7)	55 (90.2)	
Yes	2 (3.3)	6 (9.8)	
Soap			**4.94(1.60-15.10)**
No	21 (35.0)	6 (9.8)	
Yes	39 (65.0)	55 (90.2)	
Vitamin A			**1.37(0.61-3.12)**
No	23 (38.3)	19 (31.1)	
Yes	37 (61.7)	42 (68.9)	

Cases were more likely not to know that de-worming tablets and soaps were incentives given to households during IPD (table 4.6).

4.4. Attitude towards Immunization Plus Days (IPD)

Table 4.7: Attitude of respondents towards IPD

	Cases n (%)	Controls n (%)	OR
Are OPV Safe?			**22.4 (7.11-75.56)**
No	40 (66.7)	5 (8.2)	
Yes	20 (33.3)	56 (91.8)	
Are OPV effective in preventing polio?			**53.17(13.3-248.46)**
No	44 (73.3)	3 (4.9)	
Yes	16 (26.7)	58 (95.1)	
Can OPV cause infertility			**18.09 (4.71-81.36)**
Yes	29 (48.3)	3 (4.9)	
No	31(51.7)	58 (95.1)	
Government promote IPD for selfish interest			**4.36 (1.81-10.67)**
Yes	31 (51.7)	12 (19.7)	
No	29 (48.3)	49 (80.3)	

Table 4.7 showed that cases were more likely to believe that OPV are not safe OR= 22.4 (7.11-75.56), that OPV are not effective in preventing polio OR=53.17(13.3-248.46), OPV can cause infertility OR= 18.09 (4.71-81.36) and that government promote IPD for selfish interest OR= 4.36 (1.81-10.67)

4.5. Practice regarding Immunization Plus Days

Table 4.8: Reasons for non-compliance among cases (n = 60)

Reason	Number (%)
Polio vaccine safety	30 (50)
Child sick during rounds	2 (0.03)
No felt need	43 (71.7)
Not happy with interviewer	14 (23.3)
Political difference	2 (0.03)
Religious belief	31 (51.7)
Too many rounds	38 (63.3)

The most frequent reason for non-compliance among the cases was “no felt need” chosen by nearly two thirds of the cases (table 4.8). More than 60 percent had problems with too many rounds and more than half were non compliant. More than half of the cases were non compliant for religious reason (table 4.8)

Table 4.9: Persons that take decision regarding immunization

Person	Cases (n=60)	Control (n=61)
House hold head	43 (71.7)	37 (60.7)
Wife	0 (0)	1 (1.6)
Jointly with wife	2 (3.3)	8 (13.1)
Parents of care giver	0 (0)	1 (1.6)
Religious leaders	5 (8.3)	0 (0)
Others	10 (16.7)	14 (23.0)
Total	**60 (100)**	**61 (100)**

In majority of the cases (71.7) and controls (60.7), the head of the household takes the decision on whether to immunize the child or not during IPD (table 4.9).

Table4.10: Persons that convinced respondents to allow immunization in previous IPD

Persons	Controls (n=34)
Traditional rulers	21 (61.8)
Religious leaders	5 (14.7)
Community leaders	3 (8.8)
Other	5 (14.7)
***Not Applicable**	**26**
Total	**60 (100)**

*Not applicable: 28 controls had never refused vaccination

Of the 34 controls that had been non – compliant in any past IPD 21 (61.8) was convinced by a traditional ruler to allow the child to be vaccinated (table 4.10).

4.5. Media habits

Table 4.11: Media habits of respondents

Media habits	Cases n (%)	Controlsn(%)	OR
Access to functional radio			**4.43 (1.39-15.02)**
No	17 (28.3)	5 (8.2)	
Yes	43 (71.7)	56 (91.8)	
Access to functional TV			**9.39 (1.88-63.22)**
No	14 (24.1)	2 (3.3)	
Yes	44 (75.9)	59 (96.7)	
Access to newspaper			**1.39 (0.62-3.12)**
No	40 (66.7)	36 (59.0)	
Yes	20 (33.3)	25 (41.0)	

Cases were more likely to lack assess to functional radio OR= 4.43 (1.39-15.02) and television OR= 9.39 (1.88-63.22). Access to newspaper was not a different between the cases and controls (table 4.11)

CHAPTER FIVE

Discussion

This was a case-control study with the general objective of determining the risk factors associated with non-compliant households in Sokoto north and Sokoto south LGA of Sokoto state. Cases were more likely to lack tertiary education but religion, age and type of marriage was not statistically significantly different among the cases and control. The cases were more likely to lake satisfactory knowledge of immunization and IPD and were more likely to have a negative attitude towards OPV. Also they were more likely to lack the knowledge of other childhood survival strategies attached to IPD. They significantly lack the knowledge that polio eradication was a global initiative and were more likely to lack access to functional television, radio and source there information from town criers.

In this study all the cases and nearly 90 percent of the controls were males. The respondents of the study were heads of households which in Sokoto due to cultural factors are mostly males. Both the religion and culture dictates that the males should head house holds in that part of Nigeria. Majority of the cases and controls were Muslims which is in keeping with the population demographics of Sokoto where Islam is the predominant religion. Religion was not significantly different between the cases and control (table 4.2) as Islam predominates in both cases and control. The fact that majority of the respondents were married (table 4.1) reflect the choice of the study population. Lack of tertiary education was identified as a risk factor for non-compliance (table 4.2). This results is in keeping with the findings of the study done in Turkey[28] which demonstrated that both father and mother educational background could have effect on whether parents choose to vaccinate their children or not. Mother and father's level of education was also found to be associated with non vaccination during mass campaign in India[30]. The findings is similar to that of other

studies conducted in Zaria, northern Nigeria[10] which found that education plays an important role in acceptance of polio vaccine during IPD. The finding is not in keeping with the study in USA[27] which concluded that un-vaccinated children were associated with parent with college education. This difference may be due to the higher level of literacy in the USA compared to other developing countries. It is interesting that while in developing countries refusal of vaccination is associated with lower levels of education[10] those in the more developed countries like the US did not have this association or even an association with college education[27]. Those over the age of 40 were as likely to be non compliant as those below that age (table 4.2). This may suggest that factors responsible for non compliance cut across different generations and therefore may affect the type of media campaign and type of communication targeted at the at risk group

The results showed that lacking the knowledge of benefit of immunization was a risk factor for non compliance during IPD (table 4.3). The knowledge of the benefit of immunization may be important especially when parents are required to immunize their children repeatedly as is the case with IPD. This is particularly important considering that the parents might prioritize preventing other diseases such as measles compared to polio considered by them to be a rare disease. Caregivers' apathy to immunization against a disease due to perceived low risk of infection had been demonstrated in the USA[43] where parents refuse measles vaccine because of low measles burden. In a cross sectional study to determine the determinants of immunization coverage in Zamfara state of Nigeria[51], the researchers found that parents' knowledge of immunization was a significant determinant of immunization status of the child. Though the methodology of that study (cross sectional) differs from this one it may be safe to conclude that care givers knowledge of immunization is an important risk factor for immunization among the children Lack of knowledge of the global effort to eradicate polio and age of eligibility for OPV was a risk factor for non-compliance (cases) in this study (table

4.4). It is possible that the knowledge that polio eradication is not restricted to Nigeria alone but a global effort much like the small pox mass campaign several years ago may give the process added credibility that might reduce non compliance. It is particularly important that parents and guardian of eligible children are made to understand this otherwise they will question the rational for spending huge sums of money on polio eradication when "there are other more pressing health concern". It is not surprising that non compliant heads of house holds were more likely to lack knowledge of the age of first dose of OPV and that of ineligibility for OPV. This may just reflect their (cases) general apathy to IPD related activities. The finding that decision on immunization was mostly taken by the household heads is significant for polio communication. This may require special communication sessions targeted at the heads of such house holds because they are usually the bread winners of the family and in most cases may be away at work or farms when other targeted polio communication activities are implemented

The cases were more likely to get their information about IPD from the town crier (table 4.5). This might be due to their lower level of education as demonstrated earlier (table 4.2) but may point to the need to critically examine the communication skills of town criers saddled with polio communication. The findings in table seven suggest that there is generally low knowledge of existence of vaccines in fixed post during IPD. The knowledge of availability of other vaccines in Fixed post during mass campaign may help reduce the perception that polio is been singled out for mass campaign because of the selfish interest of the government. The fixed post has the added advantage of strengthening routine immunization. Cases were more likely to lack the knowledge of DPT and hepatitis B vaccines being available in the fixed post (table 4.6) which might indicate the generally low level of knowledge of those antigens among the cases. The finding that cases were less likely to lack knowledge of measles vaccine been available at fixed post (table 4.6) is quite

surprising but may be due to frequent absence of the antigen in the fixed post during the campaigns.

Several studies have shown that caregivers who refuse vaccination or have unvaccinated children after mass campaign were significantly associated with having the wrong attitude towards mass campaign. The findings of this study strongly support this pattern. Table 4.7 indicated that cases were more likely to belief that OPV was not safe and that it may be responsible for infertility is similar to that found by some researchers working in neighboring Cameroon[46]. Parents concern about the safety of vaccines is not restricted to developing countries like Nigeria and Cameroon alone but had been established in developed countries such as USA[43]. A case control study done in the US[33] concluded that attitudes, beliefs, and behaviors indicative of vaccine safety concerns contribute substantially to under immunization in the United States. Although concerns were significantly more common among parents of under immunized children, many parents of fully immunized children demonstrated similar attitudes, beliefs, and behaviors, suggesting a risk to the currently high vaccination levels.

The most common reason for non compliance is no "felt need" and too many rounds (table 4.8). An evaluation of polio mass campaign in India found the most common reason given by parents for refusing vaccination as too many doses[39] which is similar to the too many rounds found in this study. No felt need had also been demonstrated as a reason for vaccine refusal by other researchers[47]. Too many rounds as a reason for non compliance may be due to the many rounds of IPD necessary to break transmission of polio virus. Table 4.9 showed that the head of the households is mostly the one that takes the decision about immunization related issues. This is in keeping with the culture of the people of Sokoto state were the head of the household is mostly the husband. This study showed that among controls who had ever been

non compliant in the past, majority were convinced to start immunizing their children by the traditional rulers (table 4.10). This seems to confirm the general belief that traditional rulers' involvement in IPD is working but it might require sustenance of the effort

The cases were more likely not to have access to functional television or radio (table 4.11). This might suggest that cases were more likely to get their information from sources other than mass media. This has implication in the design of effective communication targeted at the non compliant heads of house holds.

CHAPTER SIX

Conclusion and Recommendation

6.1. Conclusion

1. This study concluded that lacking tertiary education was a risk factor for non compliant head of house holds,
2. Non compliant heads of house holds had unsatisfactory knowledge of immunization, and negative attitude towards immunization compared to other members of the community
3. There was a general lack of knowledge among the non compliant house holds about the global nature of polio eradication initiative and they also have insufficient knowledge about other IPD initiatives for child survival
4. Sourcing information about IPD from town crier and lacking access to functional radio and television were other risk factors associated with non compliance
5. Traditional leaders involvement in IPD had help reduced non compliance

6.2. Recommendations

The following recommendations were made

1. Community dialogue targeted at identified high risk group preceding every round of IPD. The key communication message should be practical but simple focusing on benefits of vaccination, global nature of the eradication of polio, health gains for the children, reasons for multiple rounds and other messages that might be deemed important
2. Involvement of traditional rulers had been demonstrated to be useful by this study and it should be scaled up. Monitoring and evaluation mechanism should be set up to

determine the lasting impact of the intervention which should be communicated to the traditional rulers to ensure use of best available practice

3. Religious leaders should be involved in IPD planning, implementation and monitoring and evaluation to improve acceptability and thus reduce non-compliance. Local religious leaders such as the local imams are pivotal to ensuring lasting change in attitude of the high risk group to immunization
4. In addition to use of electronic media, alternative media such as use of mobile phone text messages and town crier should be employed. The Majigi village play can be scaled up so as to reach as many high risk groups as possible. Also the timing of such interventions should be adjusted to ensure that busy house hold heads who may be away to their place of work are not missed during such interventions
5. The communication message of the town criers should be standardized with focus on key polio communication messages that include benefits of immunization, global nature of polio eradication, other child survival strategies attached to IPD and why it is necessary to have repeated rounds of polio immunization to achieve eradication. The town criers should be trained in communication skills necessary to deliver this messages in a culturally acceptable manner

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Non –vaccination of children against poliomyelitis during the Immunization Plus Days (IPD) in Sokoto, Sokoto state. A case-controlled study of non-compliant heads of house-hold

Section A. Socio-demographic information of head of house-holds

1. How old are you? _____

2.Sex

☐ Male ☐ Female

3. What is your religion (*Read list. Check only one)*

☐ Islam

☐ Christianity

☐ Traditional religion

☐ Other (Specify)_____

4. What is your marital status now? (*Read list. Check only one)*

- ☐ Single (Go to question 6)
- ☐ Married
- ☐ Divorced (Go to question 6)
- ☐ Separated (Go to question 6)
- ☐ Widowed (Go to question 6)
- ☐ Other (Specify)_____ (Go to question 6)

5. How many wives do you have? _____

6. What is your highest level of education? (*Read list. Check only one)*

- ☐ None
- ☐ Primary
- ☐ Secondary
- ☐ Tertiary
- ☐ Quranic School
- ☐ Other (Specify)_____

7. What is your occupation now? (*Read list. Check only one)*

- ☐ Agriculture (Farmer and fishing worker)
- ☐ Agriculture (Nomadic fulani)

☐ Clerk

☐ Legislator, senior official and manager

☐ Service worker, shop and market worker

☐ Technician and associated professional

☐ Professional

☐ Student

☐ Unemployed

☐ Other (Specify)_____

8. How many children aged 0 – 59 months (that are alive) do you have?
_____

Section B. Knowledge of Immunization and National Immunization Plus days in Nigeria

9. Do you know about childhood vaccination

☐ Yes ☐ No (Skip to ques 11)

10. What is the benefit of vaccination (*Do not read list, check only one*)

☐ No benefit

☐ To cure diseases

☐ To prevent diseases

☐ Other (Specify)_____

11. Do you know of any childhood diseases that are preventable by immunization?

☐ Yes ☐ No (skip to ques 13)

12. What are the childhood diseases that are preventable by immunization

13. What are the signs/symptoms of vaccine preventable diseases?

14. What are the common side effects of vaccination known to you?

15. Do you personally know any child that experienced a **serious** side effect after receiving immunization?

☐ Yes ☐ No (skip to ques 17)

16. What serious side effect did the child experience?

17. What is poliomyelitis

18. What are the signs/symptoms of poliomyelitis?

_____

_____

_____

_____

19. At what age should a child be given the first dose of Oral polio vaccine

☐ At birth

☐ 9 months

☐ 1 – 5 years

☐ Other (Specify)_____

20. Do you know of the Global effort to eradicate poliomyelitis in the world

☐ Yes ☐ No (Skip to ques 22)

21. What was your source of information for the global eradication of poliomyelitis?

☐ Electronic media (TV and radio)

☐ Print media (Newspaper)

☐ Town crier

☐ Traditional institution

☐ Religious institution

☐ Neighbors/friends

☐ Other sources (Specify)_____

22. Do you know of the nationwide house to house immunization campaign days selected for immunization of children

☐ Yes ☐ No (Skip to ques 24)

23. What was your source of information for the nationwide house to house immunization campaign days selected for immunization of children?

☐ Electronic media (TV and radio)

☐ Print media (Newspaper)

☐ Town crier

☐ Traditional institution

☐ Religious institution

☐ Neighbors/friends

☐ Other sources (Specify)_____

24. Which of the following vaccinations to your knowledge is given during the nationwide house to house immunization campaign days for immunization of children?

Vaccines	Yes	No

OPV	☐	☐
BCG	☐	☐
DPT	☐	☐
Hepatitis B	☐	☐
Measles	☐	☐
Yellow fever	☐	☐

25. For how many days does the house to house campaign last? _____

26. Which of the following incentives to your knowledge is given during the nationwide house to house immunization campaign days for immunization of children?

Incentives	Yes	No
De-worming tablets	☐	☐
ORT	☐	☐
Long lasting insecticide net (Mosquito net)	☐	☐
Vitamin A	☐	☐
Soaps	☐	☐

Biscuits	☐	☐	
Other specify (Including "NONE")			

27. At what age will a child no longer be eligible for oral polio vaccine during the nationwide house to house immunization campaign days

☐ After 9 months

☐ After 2 years

☐ After 5 years

☐ Other (Specify)_____

Section C. Attitude towards Immunization and National Immunization Plus days in Nigeria

28. Are Oral Polio Vaccines safe for children?

☐ I strongly agree *(skip to Que 30)* ☐ I agree *(skip to Que 30)*

☐ Neither agree nor disagree ☐ I disagree*)* ☐ I strongly disagree

29. How did you come to belief that Oral polio vaccines are not safe for children?

_____

_____

_____

30. Are Oral Polio Vaccines effective in preventing polio disease?

☐ I strongly agree *(skip to Que 32)* ☐ I agree *(skip to Que 32)*

☐ Neither agree nor disagree ☐ I disagree ☐ I strongly disagree

31. How did you come to belief that Oral Polio Vaccines are not effective in preventing polio?

_____

_____

_____

32. Governments promotes house to house polio immunization campaign because of their selfish interest

☐ I strongly agree ☐ I agree ☐ Neither agree nor disagree

☐ I disagree *(skip to Que 34)* ☐ I strongly disagree *(skip to Que 34)*

33. How did you come to belief that government is promoting polio immunization because of there selfish interest?

_____

_____

_____

34. Oral Polio Vaccine can cause infertility later in the life of the child

☐ I strongly agree ☐ I agree

☐ Neither agree nor disagree

☐ I disagree *(skip to Que 36)* ☐ I strongly disagree *(skip to Que 36)*

35. How did you come to belief that Oral Polio Vaccine can cause infertility later in the life of the child

_____

_____

_____

Section D. Practices regarding Immunization and National Immunization Plus days in Nigeria

36. Have you ever refused polio vaccination for your child during the house to house immunization campaigns?

☐ Yes ☐ No *(skip to Que 39)*

37. What where your reasons for the refusal of polio vaccination for your child during the house to house immunization campaigns?

Reason for refusal	Yes	No

A	Polio vaccine safety	☐	☐
B	Child sick during rounds	☐	☐
C	Religious belief	☐	☐
D	Political differences	☐	☐
E	Not happy with immunization personnel	☐	☐
F	No felt need	☐	☐
G	Too many rounds	☐	☐
H	Other (specify)		

38. Can you tell me how you prevented your child from receiving Oral Polio Vaccine when the vaccinators visit your home?

39. If you have ever refused Oral Polio Vaccine for your child/ward in the past but you now allow vaccination of your child/ward; what/who convinced you to start accepting polio vaccine

☐ Traditional rulers (eg Emir, Hakimi, Mai ungwa)

☐ Religious leaders (eg Imam, Malam)

☐ Community leaders

☐ Other (Specify)_____

40. Who decides whether to immunize or not to immunize your child during the immunization campaigns?

☐ Self

☐ Wife

☐ Jointly with wife

☐ Parents

☐ Religious leaders

☐ Other (specify) _____

SECTION 6: Media habits and access to information on Immunization Campaigns

41. Do you have access to a functional radio? (That is, if you wanted to listen to radio, is there one that you could listen to?)

☐ Yes ☐ No *(skip to Que 44)*

42. How often do you listen to radio?

☐ Every day

☐ At least once a week

☐ Once a month

☐ Never

☐ Other (specify) _____

43. Which radio stations do you often listen to?

☐ Local stations only

☐ Foreign stations only

☐ Both foreign and local stations

44. Do you have access to a functional television? (That is, if you wanted to watch television, is there one that you could watch?)

☐ Yes ☐ No *(skip to Que 47)*

45. How often do you watch television?

☐ Every day

☐ At least once a week

☐ Once a month

☐ Never

☐ Other (specify) _____

46. Which television stations do you often watch?

☐ Local stations only

☐ Foreign stations only

☐ Both foreign and local stations

47. Do you have access to Newspapers

☐ Yes ☐ No (End of survey)

48. Which language does the newspaper usually use for publishing?

☐ English

☐ Hausa

☐ Both English and Hausa

☐ Other (specify) _____

49. What is your state of Origin?

_____

_____

_____

Thank you for participating in this interview.

END OF SURVEY