EVALUATION OF CHILDHOOD (UNDER - FIVE) IMMUNIZATION COVERAGE IN BWARI AREA COUNCIL, FEDERAL CAPITAL TERRITORY, ABUJA

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BY

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CERTIFICATION

This work entitled: "Evaluation of Immunization coverage in age group 11 – 23 months in Bwari Area Council Federal Capital Territory Abuja meets the regulations governing the award of the Degree of Master of Public Health of Ahmadu Bello University Zaria.

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I, Dr Osy J. Anameze declare that this Thesis is an original work done by me under the supervision of my supervisor Dr. C.L Ejembi of the Department of Community Medicine ABU, Zaria.

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DEDICATION

To my wife and children for their support and love.

To all the children of Bwari Area Council for their struggle to live in the face of all odds

To my late parents for their love and care.

To God be all the honour and glory.

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To my Supervisor Dr. C. L. Ejembi for all her scholarly advice, her dedication and concern without which this project would not come through.

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AXIOMS

It is hard to think of any occupation more rewarding and any aspect of medicine more valuable than ensuring the health of a child

T. S. Mathew.

Health is not mainly an issue of Doctors, social services, and Hospitals. It is an issue of social justice.

Health and Disease have no political or geographical boundaries.

Infectious Diseases will last as long as humanity itself.

The test of any civilization is the measure of consideration and care which it gives to its weaker members.

ABSTRACT

An evaluation of childhood immunization coverage was carried out in Bwari Area Council between August and September, 2000 aimed of assessing mothers knowledge, attitude to and utilization of childhood immunization services. Resources availability for immunization services delivery was also assessed. The WHO 30 by 7 cluster sampling technique was used to sample 210 mothers of children aged 11 - 23 months for the knowledge, attitude and practice study wise.

The result shows that the immunization coverage of the children was low. Only 57.7% of the children were fully immunized compared to WHO target of 80% by the year 2000. 30.4% were partially immunized and 12% were not immunized.

Factors that were found to be significantly associated to the immunization status of the children includes distance from immunization centre, about 23.4% of children still live outside the 5km radius from vaccination points recommended by WHO, maternal education- 46.6% of children that are fully immunized belong to literate mothers, knowledge about immunization and childhood preventable diseases, 49% of the children that and fully immunized belong to the more knowledgeable mothers. Reasons given by mothers for non-utilization of immunization services includes no vaccines, no knowledge of purpose of immunization, distance from immunization points amongst others.

Overall drop-out rate is 42.3% and drop-out rate between OPV_1 and OPV_3 DPT, and DPT_3 was 28.6%. These figures are high. Reasons given by mothers includes, no vaccines in vaccination centres, forget fullness, no time as mothers were too busy, was not fold to come back, child took ill.

Analysis of the resource availability in the local government area shows problems in areas of transportation, shortages of needless and syringes, inadequate manpower, poor funding, inadequate vaccine supplies.

The study demonstrated some obstacles and constraints at all stages of programme implementation. In the light of the findings, recommendations were proffered on how to overcome these bottlenecks and achieve programme desired objectives.

TABLE OF CONTENTS

TITLE	PAGE
CERTIFICATION	i
DECLARATION	ii
DEDICATION	iii
ACKNOWLEDGEMENT	iv-v
AXIOMS	vi
ABSTRACT	vii-viii
TABLE OF CONTENTS	ix-x

CHAPTER ONE

Introduction	1-5
Aims and Objectives	6
Rationale for the Study	7-8

CHAPTER TWO

Literature review	9
Historical perspective	9-10
EPI target diseases and vaccines	11
Measles	11-12
Poliomyelitis	12-15
Diphtheria	15-16
Pertusis	16-17
Tetanus	17-18
Tuberculosis	19-20
Measles Vaccine	20-22
Polio Vaccine	22-24
Diphtheria Vaccine	24-25
Pertusis Vaccine	25
Tetanus Vaccine	26
BCG Vaccine	26-27
Rationale for immunization	27-29
Immunization strategies	29-30
Routine immunization	30

immunization schedule used in Nigeria..... 31
Factors affecting delivery of immunization services
and immunization coverage..... 32-40
Immunization programme coverage..... 41-42
Immunization programme coverage in Nigeria..... 42-48

CHAPTER THREE

Research Methodology 49
Study Area (Background Information)..... 49-50
Methods..... 50-54

CHAPTER FOUR

Results And Data Analysis..... 55-66
Factors affecting immunization coverage 66-68
Data Analysis (continued)..... 6973

CHAPTER FIVE

Discussion..... 74-82

CHAPTER SIX

CONCLUSION AND RECOMMENDATIONS 83-86

LIST OF REFERENCES..... 87-89

APPENDICES:
1. AREA COUNCIL LEVEL QUESTIONAIRE
2. QUESTIONAIRE ON COMMUNITY BASED STUDIES
3. DISTRICTS TOWNS AND VILLAGES IN BWARI AREA COUNCIL.
4. HOUSEHOLD SUMMARY FORM.
5. CLUSTER SUMMARY FORM.
6. PROGRAME COVERAGE EVALUATION FORM
7. MAP OF BWARI AREA COUNCIL .
8. HEALTH FACILITIES IN BWARI AREA COUNCIL BY OWNERSHIP

CHAPTER ONE

INTRODUCTION

Immunization still remains the most cost-effective public Health intervention especially in developing countries. A person is said to be immunized when he/she possess specific protective antibodies or cellular immunity as a result of previous infection or immunization [1].

The origin of Immunization dates back to ancient Chinese and Indian civilization during which time it was observed that who suffered from small pox never contracted it again if they survive. The demonstration of small pox vaccine in 1796 by Edward Jenner coupled with the works of Louis Pasteur and Robert Kocks ushered in the era of modern vaccination [2]. Since then more than 50 vaccines have been developed notably amongst them are measles vaccine BCG vaccine, Poliomyelitis vaccine, Tetanus vaccine, CSM vaccine, diphtheria vaccine [2].

Of the 14 million under-five deaths estimated to occur annually, over ¼ of these could have been prevented by immunization [3].

Concerned about the magnitude of mortality and morbidity attributable to childhood vaccine preventable diseases coupled with the success of small pox vaccination programme, the World Health Organisation (WHO) in 1974 launched the Expanded Programme on Immunization (EPI) aimed at providing universal immunization against the six childhood killer diseases, namely tuberculosis poliomyelitis, measles, diphtheria, pertusis, neonatal tetanus to all children by 1990 [4].

In developing countries where the potentials of vaccines have not been fully exploited and utilized WHO estimated that over 45 million cases and 1.1 million deaths occur annually from measles with complication such as blindness, chronic lung disease, encephalitis, diarrhea [3]. In 1974 poliomyelitis cases reported worldwide was put at 49,487. With the introduction of EPI in 1974, cases dropped to 6,587 by 1995, as reported to EPI but it is estimated that about 80,000 case of paralytic polio occurred. Estimated 20,000 children are crippled worldwide by poliomyelitis [5].

In African region about 1716 cases are reported in 1995 with an estimated 12,000 African children crippled [5]. The recent diphtheria epidemic in Ukraine and Russia has brought the worlds total number of cases to 50,000 with an estimated 1,500 deaths. With the introduction of massive immunization, cases have declined by 10% [5]. Global annual reported neonatal tetanus cases by 1998 was 30,000, but with increase immunization coverage with the relevant antigen, cases came down to 10,000 by 1995 [6]. About 4 - 5 million new cases of tuberculosis were reported worldwide annually with an estimated 3 million deaths of which 30,000 are children under five years [1]. The spread of HIV infection now accounts for about 1.4 million of TB cases [6]. By 1995 about 90% of children worldwide were immunized with BCG vaccine but Global programme in vaccine experts believe that BCG and current anti-TB drugs could cope with not more than 70% of world's TB burden, hence the search for a more reliable effective vaccine [6].

In Africa, coverage level of immunization in 58% compared to worlds average of 83%. In some African countries like Chad and Cameroon coverage is as low as between 20% - 33% [6]. So African region is far behind WHO target of 80% coverage by the year 2000.

In Nigeria, by 1996 coverage level dropped to 38% for most antigens especially measles and poliomyelitis after the initial coverage increase of 43% in 1992 [4]. This low level of coverage of course resulted in increase in the number of cases of measles which increased from 85,905 in 1992 to 88,675 in 1996 [4]. However in the case of poliomyelitis in 1996 cases reduced from 957 in 1992 to 942 in 1996 [4].

The latest survey by Nigerian Demographic and Health Survey (NDHS), 1990 and the Multiple Indicator Cluster Survey (MICS), 1995 and 1999 shows overall national coverage level to be below 50%. The coverage levels for the various antigens are as follows DPT 23%, poliomyelitis 19%, measles 35% and tuberculoses 43%. These figures remain well short of the World Summit for Children (WSC) goal for the vaccines by the year 2000 with polio eradication extended to year 2002 [7].

The EPI goal of providing universal immunization to all children of the world against the childhood killer diseases with the objective of reducing infant mortality and morbidity as well as promoting national self reliance in vaccine production and quality control was further reinforced in the World Summit for Children (WSC) in New York in 1990 [4]. This declaration established challenges for global immunization which includes:

i. Achieving 90% immunization coverage of all antigens by the year 2000

ii Reduction of measles incidence by 1999 to 80%

iii. Elimination of neonatal tetanus by 1995

iv. Global eradication of poliomyelitis by the year 2000 (since extended to (2002).

v. Introducing new and improved vaccine.

Nigeria is a signatory to this amongst also the declaration of the survival, Protection and Development of Children articulated by the 49th World Health Assembly in 1988 [5]. Nigeria and almost all countries of the world have embraced immunization programme according to WHO recommendations which also allows individual countries to fashion out their programmes according to local epidemiological disease pattern and resources available to her. Countries are also allowed to add other vaccines to the programme according to her needs. Inspite of this programme, the number of cases of EPI target diseases seen in developing countries by 1995 are as follows: I million cases of measles, 818, 800 cases of Neonatal tetanus, 554,000 cases of pertusis and 237,000 cases of poliomyelitis [5]. Thus to meet the target and achieve the goals of EPI and World Summit for Children, coverage levels of all antigen need to be increase, ensure the delivery of potent vaccine to the recipient among other things like improved standard of living and environmental sanitation.

In Nigeria with an estimated population of 120 million about 12% of this are children under 2 years who are of risk of contracting vaccine preventable diseases. The expanded programme on Immunization was initiated in Nigeria

in1978. It has witnessed varying stages of implementation, recording a coverage of 81.5% of all antigens between 1988 and 1990 due to Owo experience which was applied to all Local Government Areas. The years following 1990 then witnessed major decline in coverage due to problems such as:

i. Low political will and social support

ii. Inadequate funding

iii. Poor Community involvement and participation

iv. Poor cold chain facilities amongst other things [8].

In 1995 EPI was revitalized and renamed National Programme on Immunization (NPI) all in an attempt to improved the persistent low coverage levels, yet the coverage level by the latest survey - Multiple Indicator Cluster Survey 1999 (MICS) stands of about 43% [7].

This is a far cry from World Summit for Children target. Being now saddled with more responsibilities the NPI plan of action for the year 2000 includes.

i. Achieving 50% coverage for all routine antigen

ii. Conducting four rounds of Polio National Immunization Days (NIDS)

iii. CSM campaign in meningitis belt

iv. Urban measles campaign in cities

v. Construction and equipping of permanent cold stores in Minna, Warri and Enugu.

vi. Capacity building of various levels,

vii. Ensuring injection safety practices [8].

Thus for any immunization programme to achieve its desired impact of

reduction in infant morbidity and mortality the vaccine must be available and accessible and in potent condition to the target population. Problems in supply systems may head to poor availability and accessibility of services. In order to improve their immunization coverage therefore most countries have realised the need for effective management of the immunization services. Therefore carrying out surveys evaluation of this nature will help generate data which will aid the authorities in planning and monitoring immunization programmes. it will also help in identifying bottle necks which if removed by effective management and supervision will help programme acceleration and improve coverage to meet the desired objectives.

AIMS AND OBJECTIVES

AIM

To evaluate the childhood immunization coverage in Buari Area Council , Federal capital Territory, Abuja.

OBJECTIVES

1. To ascertain the immunization coverage levels among children aged 12-23 months and to find reasons why there is low or high coverage.
2. To determine access to immunization services.
3. To assess the knowledge of mothers about childhood immunization.
4. To assess mothers attitude towards childhood immunization.

5. To ascertain the availability of resources for immunization in the Local Government Area.

6. To determine factors effecting utilization of immunization services.

Rationale for the study

The study area Bwari Area Council is one of the six area council in Federal Capital Territory. It has an estimated population of 120,000 (1999) with infants about 5% of the population is equal to 31,908. This area is inhabited by the urban poor and rural dwellers who suffer from neglect due to lack of political will and challenging terrain.

The primary health care delivery system as a strategy, designed to be an entry point for immunization services is defective in most local government areas including Bwari and as such these services are not effectively delivered to the target population. Consequently this leads to high infant morbidity and mortality of EPI target disease which are preventable by immunization. About 14 million under-fives die from EPI target diseases and ¼ of these could have been prevented by efficient and effective immunization [3]. This has been achieved in the civilized world with some countries reaching 90% coverage. It is possible also to achieve this feat in developing country like ours where coverage level is 43% only if there is effective immunization coverage coupled with improved standard of living an environmental sanitation. Coverage level will not improve if constraints and obstacles to effective utilization of immunization services are not removed. Identification of these constraints and obstacles could only be achieved

by the evaluation of the ongoing programme especially in these neglected areas. The result of such studies will form the basis of a more rational planning which will aim at removing the constraints and obstacles and providing either alternative or better strategies to meet the desired goal. This is why this project is being carried out. Additionally an evaluation of this nature has never been carried out in Bwari Area Councils.

CHAPTER TWO

LITERATURE REVIEW

HISTORICAL PERSPECTIVE

From time immemorial man's preoccupation is to conquer his environment amongst which, is the control of disease. The herbalist, the medicine men, the priest, the magicians all undertook in various ways to cure man of his disease, control disease and relieve man of his sickness. The quest for this control of disease continued through the medieval ages when different theories were put forth as to the cause of diseases. Notable amongst them the contagion theory, the Miasma theory which attributes disease to noxious air and vapors (1).

It was not until 1873 that Louis Pasteur advanced the 'Germ theory of disease'. In 1877 Robert Kocks also confirmed this theory and this gave rise to bacteriology era which eventually gave birth to preventive medicine (1). Immunization is an aspect of preventive medicine. It is the protection of the susceptible individual from a communicable disease by the administration of a modified infectious agent, a suspension of killed organism or an inactive product of the agent. This will lead to development of immunity against the disease immunized against and this will in turn lead to reduced morbidity and mortality due to that disease.

In 1796 Edward Jenner a Briton developed 'small pox vaccine' and this marked the beginning of vaccine era for prevention of disease (1). By 1883. Pasteur develops the anti-rabies vaccine. Then Cholera vaccine was developed. In 1892, Diphtheria antitoxin in 1894 and anti-typhoid vaccine in 1898 and then

Kocks BCG vaccine. Dr. Salk's Poliomyelitis vaccine was developed in 1955 and in 1961. Dr. Albert Sabin's oral Polio vaccine was developed.

All these vaccines are now used world wide for the prevention of the EPI targeted six childhood killer diseases namely tuberculosis, pertusis, diphtheria, poliomyelitis, neonatal tetanus and measles which collectively claims the lives of about 3 million children yearly (5).

Before the EPI Programme was introduced in 1974 about 14 million children die worldwide yearly of which ¼ of these deaths were vaccine preventable. With the introduction and timely use of vaccines about 3 million children are saved from dying yearly (5).

The eradication of small pox in 1980 through small pox vaccination is one of the greatest triumph in preventive medicine (1). This success motivated World Health Organisation (WHO) to adopt the expended programme on immunization (EPI) aimed at either reduction, elimination or total eradication of the EPI targeted childhood killer diseases e.g. measles, poliomyelitis by the year 2000. Other EPI objective are to promote regional and national self reliance in vaccine production and quality control. The search for better and newer vaccine against malaria, leprosy, tuberculosis, syphilis, cancers and more recently HIV/AIDS infection continues.

EPI TARGET DISEASES AND VACCINES

Target Diseases

MEASLES

Measles is an acute childhood infectious disease caused by RNA paramyxovirus. Only one serotype is known [1].

The virus is transmitted from person to person through coughing or sneezing.

The disease is characterised by:

- A generalized reddish (Erythematous) blotchy (Maculopapular rash)
- The degree of fever usually above 38°C
- Cough, running nose, red eyes (conjunctivitis)
- Photophobia and sour red mouth (Stomatitis)

Differential diagnosis is rubella and scarlet fever.

The incubation period is usually 8 – 12 days. The prodromal phase is characterised by high fever, running nose, cough, conjunctivitis and koplik spot (tiny whitish blue spots on the gum of the inside of the cheek opposite the molar teeth.

These symptoms are followed by the typical red rash starting behind the ears and on the hairline and then spreading to the rest of the body, arms and legs. The temperature subsides after 3 – 4 days and rashes fade after 5 – 6 days. The skin often peel off and may continue so for weeks.

Measles is a common disease in children (9 months to 5 years). Recent estimates from WHO indicates that over 45 million cases and 1. 1 million deaths

occur annually (23) in developing countries. In these countries, measles is one of the leading causes of childhood death, mainly from complications such as pneumonia, Diarrhoea, malnutrition. Measles also cause complications such as like blindness, chronic lungs disease, failure to thrive, encephalitis and more rarely sub acute sclerosing panencephalitis.

In countries where immunization coverage rates are low virtually all unimmunized children will have been infected by measles by the age of five (5) years. Most cases occur in children below one (1) year and that is the age group in which most deaths occur. While in developed countries, measles now affect older children and young adults who are unimmunized or in whom primary immunization has failed.

The urban poor are more at risk in getting measles because they live in over-crowded condition and immunization coverage is low in that area.

POLIOMYELITIS

Poliomyelitis is a faeco oral infectious disease caused by poliovirus. The disease can strike at any age but affects mainly children under three (3) years (50 – 70%) and causes Acute Flaccid Paralysis (AFP), Bulbar polio. It is caused by infection of the three related enterovirus namely Polio types F (Brunhilde) Types II (Lansing) and Types III (Lem) (24). Man is the only known reservoir.

By 1996 about 20,000 cases of poliomyelitis were reported to WHO with about 7,000 deaths [1]. Prior to introduction of polio vaccine in 1954, countries like United States of America has about 2 million cases of poliomyelitis occurring

each year [1]. Today the virus has now disappeared from America due to effective immunization with polio vaccine.

Type I is mainly involved in epidemics and Types III invades the central nervous system (CNS) the virus enters through the mouth and multiples in the throat and intestines. The incubation period is 4 – 5 days and the initial symptoms include fever, fatigue, headache, vomiting, construction or atimes diarrhoea stiff neck and pain in the crumbs [24].

Once established, the poliovirus can enter the blood stream and invade the CNS spreading along the nerve fibre. As it multiplies, the virus destroys the motor neurons which activates muscle. These neurons or nerve cells cannot be regenerated and the affected muscles no longer function. Muscle pain, spasm and fever are associated with rapid onset of AFP (24)

Polio paralysis is almost always irreversible. The muscles of the legs are affected more than the arm muscles. More extensive paralysis involving the trunk and muscles of the thorax and also can result in quadriplegia. In severe cases, it affects the motor neuron of the brain, causes, difficulty in swallowing, breathing and causes 'Bulbar Polio' which causes death by asphyxia [24].

Only about 1% of Polio infection leads to AFP. About 90% of infection are asymptomatic. Some cases called Abortive Polio (4 – 8%) presents like flu common cold. About 5 – 10% of polio cases causes aseptic meningitis i.e. inflammation of the covering of the brain [24]. Polio can also be spread through contaminated food, water and by flies transmitting it from faces to food.

The problem with Polio is that most people affected are not aware of it but they continue to shed the virus in faeces for weeks and through there spread polio virus especially in areas where hygiene and sanitation are poor like in developing countries where defecation is done in bushes, around the house and children not toilet trained.

Poliovirus circulates 'silently' at first infesting up to 200 people before first case of Polio paralysis emerges. Because of the silent transmission and rapid spread WHO considers single confirmed case of AFP to be evidenced of an outbreak particularly in countries where few cases are occurring an where polio is eradicated like the USA.

In 1988 the World Health Assembly (WHA) resolved to eradicate poliomyelitis globally by the year 2000. This was re-enforced by the World Summit for Children in New York in 1990 and further supported by the Organisation of African Unity (OAU) Summit of Heads of State in Yaounde Cameroon in 1996. Nigeria is a signatory to this declaration [8]. Polio eradication initiative means complete interruption of wild polio virus transmission. The strategies adopted for polio eradication includes:

i. Strong routine immunization programme

ii. National Immunization days

iii. Acute flaccid paralysis surveillance

iv. Mopping up immunization [8]

Poliomyelitis eradication campaign is on course with about three hundred million children immunized in 51 countries during mass immunization and

coverage level going up to 83% by 1995 [1]. Eradication of polio is possible because no animal vector is involved. Man is the only known reservoir. Also the virus survives poorly in environment and polio vaccine is an effective tool. But where the problem lies is the inapparent infection that goes unrecognized which occurs in about 95% of polio virus infection [1]. Nigeria began a national effort towards polio eradication in 1996 to 1998 with implementation of NIDs using fixed post strategy and recently house to house strategy [8].

DIPHTHERIA

Diphtheria is an acute infectious disease caused by toxigenic strains of corynebacterium diphtheria. There are 3 major clinical types – anterior nasal, faucial and laryngeal [1].

The bacilli multiply to produce a powerful exotoxin, which causes:

1. Formation of a grayish or yellowish membrane ("false membrane") commonly over the fossils, pharynx, or larynx with well-defined edges and the membrane cannot be wiped away.

There are also congestion and order of local tissues, enlarged lymph nodes and sign of toxaemia. Fatality rate is 10% in untreated cases and 5% in treated cases [1].

The recent epidemics in the Russian Federation – Ukraine and others was largely due to decreasing immunization coverage among infants and adults (1)

(a) The causative agent is C. Diphtheria. It is gram-positive and non-invasive. It produces however powerful exotoxin. These three (3) types

gravis, motis and intermidious all pathological to man. Sources of infection may (case) be through infected person or through 'a carrier'.

The disease could also be acquired from Nasopharyngeal secretion or discharges from skin lesions. Period of infectivity last from 14 – 28 days. Children aged 1 – 5 months are mainly affected but recently a shift from pre- school to school age has been observed [1].

The pharyngotonsilar form presents with sore throat dysphagia and low-grade fever. Examination of the throat shows 'false membrane' covering the tonsils or hard palate.

The laryngotracheal forms is associated with horseness and croupy cough and mimicks viral croup or Epiglotitis. Cuteneous diphtheria is common in the topics. The schick intradermal test is used in confirming diphtheria if the reaction is positive. The control is through isolation and treatment of cases with Penicillin and active immunization of infants with Diphtheria vaccine. (DPT).

PERTUSIS (WHOOPING COUGH)

It is an acute infectious disease caused by Bordetela Pertusis. The clinical features are paroxysmal cough characterised with 'whoop' mild fever and insidious in onset [26]. It has a worldwide distribution with high case fatality rate 4 - 15% causing deaths in infants mainly under one (1) year [1]. Whooping cough is spread mainly by droplets infection and direct contact. Incubation period is 7 – 14 days.

Pertusis rivals measles in importance and severity among the childhood killer diseases. It is estimated that 40 million cases are reported each year with about 355,000 deaths worldwide most occurring in Africa and Asia [1]. The disease is lethal in infants who are not immunized and those with underlying malnutrition and respiratory infection such as pneumonia. The disease mainly affects infants and pre-school children under the age of five years with median age at 20 to 30 months in developing countries as compare to 50 months in developed countries [1]. Infants appear to be susceptible to infection from birth as maternal antibodies does not appear to give them adequate protection.

Sources of infection are infected cases through nasopharyngeal and bronchial secretions. Man is the only reservoir of infection. Secondary attack rate averages 90% in un-immunized household contacts [1]. The most susceptible age group is 20 – 30 months and below 6 months have the highest mortality.

Severe cases may lead to complications such as bronchopneumonia bronchectesis, subconjuctival haemorrhage (due to violence paroxsyms), Epistaxis, cerebral hemorrhage. Control is achieved by isolation and treatment of cases and contents and by active immunization of infants with DPT vaccine and three (3) doses. Family history of epilepsy, convulsion, or CNS disorder are some of the contra-indications [1].

TETANUS

By 1980, about 1 million deaths occur from neonatal tetanus globally with 25% of deaths occurring in developing countries [1]. Neonatal tetanus is a killer

disease second only to measles. In some countries annual incidence was over 60 per 1000 live births. The initiation of tetanus toxoid and DPT vaccine brought the death toll down to 480,000 annually by 1994, preventing about 700,000 deaths globally [1]. The World Health Assembly (WHA) resolve to eliminate tetanus by 1995 by reducing the incidence to 1 case per 1000 live births through increased immunization coverage and potent vaccine delivery [1].

Tetanus is an acute disease induced by the exotoxin of Clostridia Tetani, clinically characterised by muscular rigidity with spasm of the voluntary muscles especially masseter (trismus or lock jaw). The facial muscles (trisus sardonicus) the muscles of the back and neck (Episthotonus) [26]. The incubation period is 6 – 10 days. It may be as short as one day or as long as several months [1]. Commonly tetanus is a disease of the active age (5 – 40) years. They are prone to trauma during this period. Neonatal tetanus is contacted by infants during delivery under non aseptic conditions especially when the umbilical cord is cut with unsterilized instrument.

Infection is acquired by contamination of wounds with tetanus spores. There are range of injuries or accidents which may lead to exposure e.g. needle pricks, punctured wounds, septic umbilicus, burns, human bites, skin abrasion etc. incubation period is usually 6 – 10 days. There are different types of tetanus,- traumatic due to injury, puerperal – post-partum, otogenic from otitis media, idiopathic cause-unknown, may be from microscopic trauma and tetanus neonatorum affecting neonates and kills about 85% of those affected [1]. Most untreated cases of neonatal tetanus die around 7th day after birth. The mortality

rate is 1 to 18% per 1000 live births representing 23 to 72% all neonatal deaths while mortality rate for the other forms of tetanus is 40 – 80% [26].

TUBERCULOSIS

It is an infectious disease caused by mycobacterium tuberculosis. It is primarily a disease of the lungs but intestine, bones, meninges and lymph glands can be affected. Tuberculosis remains a worldwide health problem despite the fact that the causative organism was discovered 100 years ago.

It is preventable and curable as there exits potent vaccine (BCG) and affective drugs. In spite of this, we still have about 15 – 20 million causes of TB worldwide and 4 – 5 million new cases yearly with annual deaths of 3 million (1).

Out of this 3 million death. 300,000 of them are children under five years (10). About 22 million are suffering from TB by 1996 worldwide and WHO experts attributes this to the resurgence of TB as a result of:

1. Growing resistance of the causative agent to anti-TB drugs due to incomplete or inappropriate treatment and about 50 million people are infected with drug resistance strain [6].
2. The relatively spread of HIV infection which accounts for 1.4 million of TB cases (6). On the basis of the criteria laid down by WHO, no single country in the world has succeeded in reaching the point of control i.e. less than 1% tuberculin-positive among children in the age group 0 – 14 years [1].

Currently, research is going on to produce a new vaccine that will be better and more cost-effective than BCG Vaccine. Host factors. All age groups are affected with predilection for males and it is not hereditary. Malnutrition predisposes to TB and that is the bane of Africa and other developing continents. Man has no inherited immunity against TB. Immunity is acquired by natural infection or BCG vaccination and that is why the vaccination is given immediately after birth.

Sources of infection are (a) Human through infected persons with sputum positive smear or bovine source through infected milk. Transmission is by duplet infection by septum positive patients and coughing generates large among of these droplets. Infection is enhance by over-crowding and poor ventilation.

Control of disease consist of the:

1. Curative component – case finding and treatment with effective and appropriate Anti-TB drugs;
2. Preventive component – with BCG vaccine and ensuring good housing standards.

MEASLES VACCINE

The measles vaccine used in Nigeria is a freeze-dried attenuated virus vaccine – the Schwartz strain grown in embryo tissue. The vaccine is sensitive to light and if stored under optimal conditions, has a shelf life of 1 – 2 years.

Measles is a highly communicable disease but preventable by immunization. If vaccinated with a potent vaccine over 80% of children will be

protected against the disease as coverage rate increase, cases are expected to decrease.

In exceptional situations where measles morbidity and mortality in infants below nine (9) month of age represent a significant problem, give an extra dose of standard measles vaccine as early as six (6) months of age. This schedule is recommended for certain groups that are of high risk e.g. infants in refugee camps, infants in hospital admission, infants affected by disasters and during measles out-break. In this group, the 2nd dose of nine (9) months is important because the serological response is significantly lower before this age, resulting in low levels of protection.

All opportunities for immunization should be taken for instance the under fives attending out-patient clinics admitted in hospital for other condition. Once there is no documentation in their "immunization card" or "Road to Health card immunize child with all the appropriate antigens.

The major problem of measles immunization is timing. If given too early before the age of 9 months the recipients runs the risk of the vaccine been rendered ineffective by the natural antibodies acquired transplacentally from the mother. If the vaccine is given later than 9 months, it means most children will contact measles due to the wearing off of the natural antibodies [1]. WHO recommended 9 months as the age at which measles vaccine is given. But it could be given at between 6 – 8 months old in malnourished children or in communities where there is measles outbreak or in refugee camps [1]. For these group of children a second dose should be given if child reaches 9 months

provided the interval is up to four weeks. Due to the incidence of poor sero-conversion if give early some countries now give second dose of measles routinely a year later. The vaccine when given induces a 'measles-like' illness in some 15 – 20% of recipients. The vaccine confers immunity for life even to severely malnourished children [1]. Contra indication is during use of steroids or immuno suppressive drugs. One of the adverse effects of the vaccine is 'toxic shock syndrome' which occurs when the vaccine is contaminated or the same vial use for more than one session. The vaccine should not be used after four hours of opening the vial.

Eradication of measles through immunization is feasible if 96% immunization coverage is achieved in children under one year world wide and prevention of cumulation in immunity gap [1].

The Edmonstron Zagreb strain contains concentrated solution of live measles vaccine and when dissolved, the solution becomes rose pink colour. This strain is recommended in high risk area, but for now, the use of this strain is suspended in Nigeria. The dose of measles vaccine is 0. 5ml and route is 1m/sc. Both types confer 95% protection in the recipient.

POLIO VACCINE

Protective immunity against Poliomyelitis is established through immunization with polio vaccine or as a result of natural infection with polio virus note that polio virus infect protects long life immunity to the disease but the protection is limited to the particular types of polio virus involved in the infection

on the other hand vaccination with the trivalent OPV protects against the 3 types of polio virus.

Maternal antibodies gradually disappears during the first 6 months of life. Immunity following infection is not completely protective as infection with one type does not confer immunity against the other two types. Neutralizing antibody is widely recognized as an important index of immunity to polio after infection [1]. Paralytic polio may be precipitated in individual already affected by polio virus through intra muscular injection, trauma, surgical procedure such as tonsillectomy. It causes asymmetric flaccid paralysis.

Before the vaccine was introduced in 1954 about 2 million cases occur yearly in United States of America. Today the use of polio vaccine has resulted in the eradication of poliomyelitis in the Americas [1].

There are two (2) types of polio vaccine:

1. Salk (killed) vaccine: developed in 1955 by Dr. Jonas Salk this is inactivated polio vaccine (IPV). Thought it protects against the three (3) types of Poliovirus, it induces very low immunity for poliovirus it induces very low immunity for polio virus inside the gut. As a result, a child immunized with IPV still has some wild poliovirus multiplying inside the gut and can be shaded in stool. For this reason, IPV is not used for routine immunization. Other disadvantages include the relative high cost of the vaccine and the need for technical staff to administer it. This vaccine is given intra muscularly [24].

2. The second vaccine is the Sabin Vaccine (OPV) developed by Dr. Albert Sabin in 1961. It is a life attenuated vaccine administered orally. It affords protection against the three (3) types of Polio virus. It has both serum immunity and secretary immunity. It also provides individual and community immunity.

WHO recommended 4 basic doses of OPV to be administered (15)

- At birth
- 6 weeks of age
- 10 weeks of age
- 14 weeks of age.

During NIDs the vaccine is administered orally during house-to-house immunization. The other advantage over the Salk vaccine is that OPV is cheap about eight (8) US percent per dose (5 times cheaper than IPV) and so can be purchased in large quantity by government. It is also given orally not by injection so does not need any trained health worker of needle sterilization

The only down side of it is that it carries the risk of paralysis in both recipient and contract at the ratio of 1: 2 .5millon doses it is however rare.

The combination of IPV/OPV to reduce the risk of paralysis is now practiced in USA. It is costly and developing countries cannot afford it now.

DIPHTHERIA VACCINE (DPT)

Diphtheria vaccine is prepared from the toxoid of Diphtheria bacilli and is obtainable either as plain diphtheria vaccine or combined with other vaccine as in

DPT vaccine. All diphtheria vaccines are absorbed on a gel of aluminum phosphate and so should be given intramuscularly because if given subcutaneously, it will cause fat necrosis or sterile absess. It should not be frozen as freezing results in irreversible changes in the phosphate gel [25]. DPT vaccine is given for three (3) doses. DPT_1 at 6 weeks of age, DPT_2 at 10 weeks of age and DPT_3 at 14 weeks of age. It confers about 80% protection [1]. Severe complications such as encephalitis, prolonged convulsion may follow DPT vaccination. This is thought to be due to the pertusis component of the vaccine [1].

PERTUSIS VACCINE (DPT)

Whole cell pertusis vaccine (DPT) was introduced in 1940 though the efficacy rating was 47% its introduction led to the decline of the disease incidence of over 95% with number of death reducing from 12,000 to 11 annually [25]. The acellular form of the vaccine is currently undergoing testing and is believed to have efficacy rating of 84% - 85% [25].

Pertusis vaccine is given as DPT (triple vaccine) at 6 weeks, 10 and 14 weeks of age. About 75% protection is conferred which weans down to 34% after four (4) years. So to boost immunity two booster doses at three (3) years interval is given [1].

TETANUS VACCINE

No age is immune unless protected by previous immunization. Two injections protects for several years [1].

Tetanus could be prevented by active immunization with tetanus toxoid vaccine. Immunity lasting for six months can be transferred to infant if mother is immunized during pregnancy. The vaccine is given as follows:

First contact TT_1, 4 weeks after TT_1 give TT_2 which protects for three (3) years. 6 months after TT_2 or during subsequent pregnancy give TT_3 this protects for five (5) years. One year after TT_3 or during subsequent pregnancy give TT_4 this protects for 10 years. One year after TT_4 or during subsequent pregnancy give TT_5 this protects for live. Tetanus vaccine is prepared from the toxoid (killed organism in aluminum phosphate adsorbed) of the tetanus bacilli. The vaccine comes as either absorbed or non absorbed in combination with other vaccine like in DPT vaccine. Infants are given three (3) doses of the DPT vaccine 1 month apart beginning from 6 weeks of age. It is given 0.5 meal intramuscularly.

BCG VACCINE (Baccile Calmette Guerin)

BCG vaccine is a freeze-dried live attenuated vaccine made from special strain of Myc. Bovis. It is sensitive to heat and light and needs proper 'cold chain' storage. It gives high protection against the most severe form of TB in children but its protective efficacy in adults varies from 0 – 80% [6].

This is the standard Anti-TB Vaccine and has been around for 70 years it is safe and cheap and widely used. It is normally given to infant at birth and the mode is intradermal. Dose 0.1ml.

RATIONALE FOR IMMUNIZATION

The rationale for immunization is basically to protect susceptible individuals against infectious diseases by active immunization. Communicable diseases results from interaction between the host infectious agents and the environments. The most appropriate method of control depends on the epidemiology of the disease. Control is achieved either by modifying the environment so that it will unfavourable to the infectious agents or breaking the chain of transmission at its weakest point or including the host resistance. Immunization is all about increasing the host resistance to infectious agents. Specific defenses come into play once micro organisms have breached local defense mechanisms. The host is able to recognize by virtue of these defenses foreign bodies e.g. bacteria, virus etc. and destroys it [1]. A person is said to be immune when he possess specific protective antibodies or cellular immunity as a result of previous infection or immunization. There exists general and specific. Specific immunity is either genetic or acquired. Genetic like in the protection of persons with AS genotype against severe falciparum malaria. Acquired immunity is either actively or passively acquired. Active immunity may be acquired in three ways:

i. Following clinical infections like in measles or rubella

ii. Following sub-clinical or apparent infection like in poliomyelitis and diphtheria

iii. Following immunization with an antigen which may be killed vaccine, life attenuated vaccine or toxoid that causes antigenic stimulus which leads to the production of antibodies.

This type of immunity is confirmed by production of IgM or IgG antibodies through humoral immunity or cell mediated immunity like in BCG vaccine which offers protection against tuberculosis. It confers life long immunity. If toxoid is used it requires repeated booster doses.

The other type is the passive artificial immunity which could be maternally acquired trans-placentally (IgM and IgG) if mother is immunized. The antibodies passes straight to the baby and confers immediate protection but generally short lived 3 – 6 months. In this case infants require active immunization with specific antigen after 6 months which will confer life long immunity.

The target group for the EPI programme is the 'under-fives' who are more vulnerable to the EPI target diseases. Immunizing this infants/children at the appropriate time with potent vaccines reduces morbidity, mortality and disability among this group leading to promotion of good health and vitality. The infant mortality rate is used as a measurement or indicator of the health status of any nation and if by immunization this is brought down drastically, then the nation is on her way to attaining a healthy status. This will have a multiplier effects both economically, politically, socially and otherwise. The pressure on curative medicine will be low as prevention is better than cure. The huge financial

investment on curative medicine will be minimized and funds diverted to more pressing social and environmental needs that will further improve the living standard of the people. Also immunization programme in developing country is to reach children as early in life as possible and to attain as high as possible, thus the rationale for immunization.

IMMUNIZATION STRATEGIES

(a) **Fixed Strategy:** – with these strategy, immunization services are provided in the clinic. Children are then taken to the clinic for immunization. The major advantage of these strategy is the comparatively low cost of service delivery. However distance may deter mothers from brining the children to the clinic. Other limitations may include no vaccine, poor communication as to when to come back, long queue etc.

(b) **Outreach Programme:** – Health workers take vaccine and cold chain equipment to health centres/health post and vaccination centres in the village. It is expensive to maintain in terms of personal, storage equipment, transportation but the advantage is that it increases access to immunization services especially in rural areas and reduces transportation cost on part of the mothers.

(c) **Mobile Strategy:** – With the mobile strategy, health workers travel to areas where outreach programmes cannot reach or where health

centres are not available. It is also expensive in terms of additional personal, transportation and equipment.

(d) House-to-House Strategy:- These is a new strategy different from mobile strategy. This strategy is normally embarked on during NIDS for polio eradication. With this strategy, health officials and trained staff go from house to house with cold boxes containing OPV vaccine and vitamin A to immunize eligible children especially below five (5) years. Booster doses of OPV are given irrespective immunization status of the child. This strategy boost coverage and creates political awareness.

ROUTINE IMMUNIZATION

The Alma Ata declaration included immunization against the EPI target among the eight essential components of Primary Health Care (two new ones mental and oral health has been added recently). This makes it imperative that routine immunization is carried out in all the primary health centres in all the local government areas in Nigeria on a daily basis. Outreach and mobile immunization services are done on fixed days. Immunization is give to eligible infants as per the immunization schedule in Nigeria and this are recorded in the Childs immunization card. Cold chain facilities are maintained and generators are provided to support electricity supply. Attempts are now being made to immunize any eligible child that comes to the hospital except the child is very ill that he/she requires hospitalization. Now yellow fever vaccine, Hepatitis B vaccine, and

Vitamin A supplement are being given at 9 months of age in addition to the routine vaccination against the six childhood killer diseases. Women of child bearing age are immunize with tetanus toxoid vaccine up to 5 doses which confers immunity for live (see immunization schedule).

Immunization schedule use in Nigeria

Immunization for Children Age 0 – 11 Months

Time of Administration	Vaccine/Micronutrient
At birth	BCG, OPVO), HBV 1
6 weeks of Age	DPT1, OPV 1, HBV 2
10 Weeks of Age	DPT 2, OPV 2
14 Weeks of Age	DPT 3, OPV 3
9 months	HBV 3, Measles, Vit. A, Yellow Fever

Women of Child Bearing Age

Time of Administration	Micronutrient/Vaccine	Duration of Protection
Soon after Deliver	Vitamin A to mother	
At 6 weeks after deliver	Vitamin A to mother	
First contact T.T.1		None
Four weeks after T.T.1	T.T.I	Three years
Six months after T.T. 2 during subsequent pregnancy	T.T.3.	Five years
At least one year after T.T.3 or during subsequent pregnancy	T.T.4.	Ten years
At least one year after T.T4 or during subsequent pregnancy	T.T.5.	For life

Source: National Programme on Immunization.

FACTORS AFFECTING DELIVERY OF IMMUNIZATION SERVICES AND IMMUNIZATION COVERAGE

Nigeria decided to accelerate the immunization of its children in the face of considerable odds. The share size of the undertaking is daunting approximately 120 million. Nearly one out of five African Children in Nigeria; many of Nigerians states have a population larger then the entire population of some neighbouring nations. Most part of the country is difficult to reach due to bad roads and some impassable during rainy season.

The economic difficulties and poverty stricken communities coupled with inflation and scarcity especially of essential drugs and vaccines are among the numerous set backs we have. Other are:

a. Resources /Funds - both human and material resources are in short supply both Nurses and EPI personnel. This poor showing in manpower prompted the Kano group that reviewed the EPI progress in 1986 to state in one of its specific action plan that deals with training that no trained personnel in EPI will be transferred until a replacement is gotten. The manpower issue is been redressed now for example in 1985. 2,250 people were trained in various courses as EPI Manager Technical officers, Storekeepers, Vaccinators and Supervisors [10].

Material resources are also in short supply Syringes, Needles, and Equipments for maintaining the 'Cold Chain' Vehicles, Driven etc.

b. **Funds:-** Budget for health is Small until recently it was 3% of Gross National Product (GNP) then it was increased to 5% GNP but for adequate funding of health sector its should receive about 10 – 13% of GNP. Nigeria has received assistance from WHO, UNICEF, UNSAID, Rotary plus international etc. both technically, personal and financially. Funding of immunization programme in Nigeria now is borne by the three tiers of government federal, state and local government.

c. **Cold Chain Maintenance:-** After Owo pilot study in 1983 and subsequent evaluation of immunization programme in Nigeria it was discovered that failure and low coverage was due to failure in cold chain maintenance in addition to vaccine supply and vaccine delivery. When these deficiencies were corrected the converge shot up from 10 – 80% a year after the project started [9].

d. **Availability and Accessibility to help services:-** Non availability hinders utilization. The degree of access limits the demand and utilization of the services, beyond 5 km walking distance mothers are unlikely to use the service most developing countries still have problems here.

Also in 1960's when immunization for Measles was first introduced and included in the small pox vaccination campaign; even after small pox was eradicated in 1970 measles still persist. Tests on samples of vaccine showed that they are worthless due to failure in the cold chain system.

Investigation revealed that most of the refrigerator, freezers and cold store used were not working due to power failure and no backup generators. The equipment are substandard and the procedures also not standard. The personnel are also not skilled [10].

All these problem were taken into account when Owo a rural LGA in Ondo State was chose for pilot study for National EPI. The success story of that pilot study is now history.

COST – EFFECTIVENESS / COST BENEFIT OF IMMUNIZATION

Vaccines remain one of the most cost effective public health intervention in the control of diseases [1].

A study carried out in four states in Nigeria in early 1985 showed that salaries constitute the bulk of the expenses between two-third and three quarters. About one third goes on buildings vehicles, and equipment. Vaccines and accessory supplies account for between 5-11%. Information and mobilization activities take about one-fifth ([10].

From this study, we can see that interms of budgetary allocation only little is budgeted for health for health related issues yet we know that without good health economy as a whole will suffer and more money will be spent on curative services to the detriment of the poor masses. Timely intervention by immunization saves a lot interms of cost.

On the average the cost per dose have worked out at 1.30 naira or a total of 10.40 naira for the full series of eight (8) doses [10]. The Owo blitz campaign of

June 1985 cost approximately N1 per dose. The cost of curative services if a child gets ill for non immunization e.g. measles far outweighs the cost above.

In Nigeria immunization is free in most government health facilities except for payment of syringe N10.00 and card N10.00 which will eventually translate to N90 – N100.00 for full dose of immunization today. The WHO standard for full immunization per child cost $1. In studies carried out in Indonesia, Philippines and Thailand the cost per fully immunized child is between 3 - 10 US$. The above cost is nothing compared to the huge investment in curative services. The reduction in mortality, morbidity and disability as a result of immunization translates to economic gains at the long run on the part of the family and the nation at large.

MONITORING AND EVALUATION OF COVERAGE:

Monitoring is a management process, which seeks to supply to stake-holder information on the Progress of implementation of a programme. It entails continuous and periodic review and two important tools are necessary namely the Work Plan and Progress Review. The work plan usually indicates what will be done and progress review examines work actually carried out.

On the other hand Evaluation assesses the effect and impact of the programme performance focusing on the analysis of progress made toward achievement of the programme objectives in terms of effectiveness, efficiency, relevance, casualty, alternatives strategies, sustainability because most of these

programmes are donor driven. Evaluation is an important component of immunization programmes and should be given special emphasis.

Data from routine health information system are normally used to compile indicators for monitoring aspect of progress, efficiency and effectiveness of immunization programmes. This indicator can provide clues in programmes weakness and thus on areas for strengthening and improvement.

Effective immunization coverage is a multifaced measure. It can be conceived as being composed of a hierarchy of determinants (13).

(a) **AVAILABILITY OF RESOURCES:-** Resources must be adequate. For example there should be enough funds, manpower (EPI managers) material like vaccine syringes and needles, infrastructure (hospitals and clinics) etc. Non availability or limited resources limit the maximum capacity of the services as there will be little or no funds for example to buy vaccine, for training for equipment and maintaining the cold chain and health facilities etc. This will in turn decide the amount of services that will be available to the target population. Availability of resources also influences planning logistics social mobilization which is the key store of programme acceleration (13).

(b) **ACCESSIBILITY:** The services must be provided at such a place and time acceptable to the target population. WHO recommends 5km distance from the service point to the target population. To improve on access there may be needs to decentralize the services e.g. provide mobile/outreach clinics.

(c) **UTILIZATION:** A times the vaccine, the services may be available but the women are not bringing their children for immunization acceptability now becomes a problem either because of limited knowledge about immunization and its benefits or due to cultural and religious belief. It is here that social mobilization; community participation and effective communication will play a major role.

(d) **ADEQUATE UTILISATION:-** The target population must not only use the services but use them with proper timing and intensity e.g. a child must complete his or her 3 doses of oral polio vaccine.

(e) **EFFECTIVE COVERAGE:** - For the immunization to be effective the service must be standard and its use adequate. The vaccine must be potent up to the recipient. This is where cold chain maintenance comes in.

By routinely monitoring each of these coverage determinants and relating it to its underlying factors, bottlenecks can be identified and corrective measures taken. Some of the actions or measures that could be taken to remove the bottleneck of each level is shown below:

Level Of Coverage	Determinants	Investigation/Corrections
Impact	Efficiency	Improved selection of appropriate intervention.
Effective coverage	Quality of care	Improve supervision of cold chain
Utilization	Acceptability awareness	Assess attitude of health staff improve community participation investigate taboos
Accessibility (people who can use the service)	Distribution of resources	Decentralize the services mobile outreach
Availability	Quantity of vaccine and quality	Improve health education and information.

Sources – adopted from Knipperberg et-al

The ratio of the number of people making contact with the service to the total target population is a measure of service out put.

$$\frac{\text{No. of people served}}{\text{Total population}} = \text{Service out put}$$

Three (3) specific areas of action may be suggested for increasing immunization coverage.

(1) Provide immunization or information about immunization at every health contact communication activities in support of EPI have often focused an creating consumers demand.

Mass media have helped mobilize population and rapidly increase coverage. Health Communication can also address complex issues

such as sustainability, her to reach group and the diminishing concern about the seriousness of the disease (12).

(2) To reduce dropout rate between first and third dose of immunization, this could be achieved by:

(a) Provide immunization services at more convenient time and places as per the wish of the community and increase the use of regular outreaches.

(b) Clear information to parents as to when to return for the next dose and where.

(c) Put in more effort to identity children eligible for immunization and actively seek out those who are missed [11].

(d) Service barrier such as missed opportunities due to child ill health or consumer barrier due to fear of side effect or competing the belief system could be effectively manage through proper communication and correct information to the mothers and this will help In sustaining appropriate immunization behaviours [11].

(3). Improve immunization services to the disadvantaged in urban areas. Migration to urban cities due to neglected infrastructure in rural areas leads to population explosion in these cities and as a result slum and squatter settlements arise around these cities. Immunization coverage in these areas are often very poor. Increased priority and serious efforts should be made to extend immunization services to them pending when

government will provide equitable service to rural areas to stem down the migration to urban cities.

The following evaluation instruments are normally applied during evaluation surveys [14].

(i) Routine reporting of immunizations performed in all health units by dose, by age. This will give out vaccine requirement/ utilization.

(ii) Immunization coverage survey whether high or low and identification of reasons for inadequate coverage.

(iii) Morbidity/Mortality survey which help monitor disease incidence/prevalence and programmes impact.

(iv) Out break investigation, which could be used to determine measure of disease control, estimate vaccine efficacy etc.

(v) Cold chain logistic and evaluation, which ensures that generally vaccine, get to the recipient in potent form and also ensure effective cold chain maintenance.

(vi) Special programmes, which will give, rise to special immunization events like national immunization days (NIDS) or suspected programme weakness e.g. urban slum coverage.

(vii) Programme review or evaluation to validate current strategy or re-design programme.

Cost analysis, which will help in choice of immunization strategies, selecting the least cost effective vaccine or strategy.

IMMUNIZATION PROGRAMME COVERAGE

WHO since 1978 has carried out vaccination coverage surveys in 25 countries including one in Nigeria using the EPI 30 cluster technique. Some of these studies were carried out in Algeria and Sri-Lanka [24]. The age group usually used is 12 - 23 months as children are usually expected to complete their immunization by their first birthday. About ten communities were studied and the overall coverage rate varied between 60 – 70% (computer simulated result) the actual survey had observed coverage rate between 45 and 54% [15]. These surveys obtain information on vaccination status of children from either card or oral history and additional for BCG by checking for BCG scare. There is usually a discrepancy in coverage ways between these different sources.

In an EPI survey conducted in Colombia, Sri-Lanka in 1981 with doctors and nurses partaking and age group surveyed 12 – 21 month in population of 173, 732, data collected shows a drop out rate between OPV $_1$ and OPV_2 to be 30% (high). The survey also identified government health facilities about 99% as the only source of vaccination centre (15). The study also identified inefficient technique and plenty of contra indication as barriers for achieving high vaccination coverage. After accepting WHO recommendation on these two gray areas – Immunization schedule and list of contra indication and evaluation done in 1986 in the same area, coverage level rose from 58% to 91% for DPT and OPV_3 from 58% to 91% [15].

At the 35th session of the WHO regional committee for Africa which was held in Lusaka Zambia in September, 1985, the committees highlighted problems in areas of default, (drop out), supervision, supplies, transport and maintenance of cold chain requiring attention of immunization programme is to be strengthened in the region.

They advocated national immunization days and other similar campaigns to boost immunization coverage to 75% by the year 1990. In the light of this WHO regional committee declared 1986 African Immunization year [16]. Between 1958 and 1990 coverage level of all antigens reached 81.5%. Thereafter coverage level decline such as low political will and social support, inadequate funding, poor community involvement and participation [8].

As a result of this declaration the Federal Epidemiology unit (Nigeria) in conjunction with the Federal Ministry of Health Nigeria (FMOH) proposed that all the local government area should make immunization available to both urban and rural area. It proposed also the introduction of NIDS amongst other strategies to achieve the objective of 75% immunization coverage by 1990.

IMMUNIZATION PROGRAMME/COVERAGE IN NIGERIA

Government first attempt at mass immunization dates back to 1966 during small pox vaccination with WHO/USAID assisting. Measles vaccine was also included and intended to be administered to only susceptible 6 months to 4 years old in 3yearly cycles.

There was an estimated 50% reduction in measles morbidity and mortality as a result. However nation wide evaluation showed that small pox vaccination was successful while measles failed due to loss of vaccine potency from failure of cold chain.

The role of immunization in communicable disease is not in doubt and the dramatic impact of this safe easy to administer and affordable medical intervention was amply demonstrated by the eradication of the dreaded small pox disease. The expanded programme on immunization (EPI) is one of the eight components of Primary Health Care (PHC), which Nigeria has embraced as an entry point to the attainment of health for all by the year 2000 AD [17].

Following WHO statement or EPI in 1974 Federal Government embarked on it in 1975 and launched it nationwide in 1978. The programme aimed at achieving 80% coverage in 1990. Assistance was received from UNICEF and WHO.

The implementation between 1978 – 1983 resulted in an estimated national coverage of 10% (18) and consequently the impact of the programme on EPI target disease was minimal. Constraints to effective coverage that was identified include poor planning, Irregular vaccine supply, failure of cold chain, Inadequate trained manpower, Inadequate utilization. Others include lack of intersectoral collaboration and community participation, inadequate supervision and monitoring, and non-sustainability [18].

Following the dismal coverage of 10% the programme was revised in 1983 with a filed test and EPI pilot project conducted in Owo Local Government

Area of Ondo State in collaboration with FMOH, Ondo State Government and UNICEF. To correct identified deficiencies in the previous programme, a new vaccine distribution system based on cold boxes and icepacks and back up generator was developed. During the first 12 months immunization coverage increase from 10% to 80% [19].

Based on the success of Owo, a national plan based on the Owo experience was developed and approved by the federal and state ministries of health.

The Babangida Administration launched this in 1984 in all 19 states then. The revised programmes was implemented between 1984 and 1987. An evaluation coverage survey conducted in the 19 capitals of the local government area showed 20% while Owo record 50% and the nation 20%. In 1986 second national reveal workshop on EPI was conducted. Strategies adopted are fixed strategies, outreach and mobile strategies, house-to-house strategy to bring immunization services to the grassroots.

In 1988, the Federal Ministry of Health, Rotary international, UNICEF and WHO introduced the National Immunization Days (NIDS) in the mouths of March, April and May as a strategy to accelerate coverage nationwide. This gave rise to State Immunization Days (SIDs) and Local Government Immunization days (LIDS) which accelerate Immunization coverage in states to 60% [7].

In 1987 there were 5,922 static centres and 3,744 out reach facilities providing vaccinations and by 1990 those numbers have grown to 12,000 static centres and 24,000 outreach facilities [22].

The year 1990 was the universal childhood immunization year and a huge success was recorded in immunization coverage due to over whelming government commitment, intensive social mobilization and the commitment of health personnel.

The 2nd National review workshop on EPI and ORT (Expanded programme on immunization and Oral Dehydration Therapy was held in Kano in 1986. All participants from all states including FCT met to review projects identify problems and develop recommendations for improvement on the ongoing EPI and ORT programme. They recommended that training of personnel should be given priority attention and that there should be more involvement of local government and community participation and that EPI should be integrated at all levels [21].

Local government EPI responsibilities are:

(i) Administer, manage and finance EPI at the local level.

(ii) Mobilize community resources

(iii) Procure vaccine

The government's national coverage objective for 1991 – 1995 is to:

(i) Maintain coverage for all antigens of 80% in all states.

(ii) Reduce EPI preventable disease by 25%

(iii) Reduce Polio to one case per 100,000 people.

The main partners working with government EPI are UNICEF, WHO, USAID, Rotary international and the Peace Corps with UNICEF being the key

government supporter private sector is also involved including hospital (Primary and Secondary care) and private practitioners.

A vaccination coverage survey conducted by the FMOH, UNICEF, WHO and USAID in February 1991 showed the following national coverage (vaccinated by card plus history by one year of age)

DPT_3/OPV	-	57%	
Measles	-	54%	
Fully immunized	-	44%	(22)

Given the current decentralization of EPI responsibility to states and local government it is important to note that coverage levels may show wide raging patterns.

National programme on immunization plan of action for the year 2000 includes:

i. Achieving 50% coverage for all antigens

ii. Conducting four rounds of Polio National Immunization Days

iii. Urban measles campaign in cities

iv. CSM campaign in meningitis belt

v. Construction and equipping of permanent cold stores in Minna, Warri and Enugu.

vi. Capacity building at various levels [8]

It also aim at routine immunization coverage for year 2001 to be 65%, 2002 to be 75%, 2003 to be 85% [8].

A survey conducted in Nigerian in 1985 by Dr. H.C.A.M. Van Vliet evaluated EPI as aspect of progress efficiency and effectiveness. In this report, he noted that provision of vaccine by FMOH was irregular (the total vaccine given was low about 4 million in 1984) the trend changed after EPI was reviewed in 1984 and the increase from 4 million to 16 million was recorded and started falling again by 1987. From the available data he reported that availability of vaccine was 100%, accessibility 50%, utilization 37%, effective or adequate utilization 23%, impact not quantifiable [20].

He stressed that the major bottleneck for EPI in Nigeria is the accessibility to the service as only 50% of target population has access to the services. He reported that the low coverage of between 25% to 50% recorded between 1985 – 1986, and 50% in 1987 was due to more adequate utilization than non-utilization as 74% of those who had access used the services and only 65% or the users used the services adequately i.e. completed the three (3) doses [20].

He observed that drop-out rate is a problem between 2nd and 3rd doses of DPT and OPV (Drop-out rate is 20 – 30%). The following indicators he said are useful:-

1. Number of vaccination performed
2. Vaccine utilization ratio
3. Rate of increase in vaccination
4. Drop – out rate
5. Percentage coverage.

The latest survey by Nigerian Demographic and Health Survey (NDHS), 1990 and the Multiple Indicator Cluster Survey (MICS), 1995 and 1999 shows overall national coverage level to be below 50%. The coverage levels for the various antigens are as follows DPT 23%, poliomyelitis 19%, measles 35% and tuberculoses 43%. These figures remain well short of the World Summit for Children (WSC) goal for the vaccines by the year 2000 with polio eradication extended to year 2002 [7].

CHAPTER THREE

RESEARCH METHODOLOGY

A. BACKGROUND TO THE STUDY AREA

Bwari Area Council is one of the six (6) Area Councils of the Federal Capital Territory, Abuja. It lies towards the northern part of the Federal Capital Territory. The headquarters of the Area Council is Bwari town. Gwaris, the natives are the main inhabitants of the place. Of recent there has been an influx of other non-indigenous tribes. It has a population of 12,000 spread in 112 villages divided into six districts.

The main occupation of the indigenes is peasant farming while the non-indigenes are mainly civil servants and traders. There is a sub-urban settlement called Kubwa mainly inhabited by civil servants and non-natives.

There are two main seasons – rainy season from April – October and dry season from December – March.

The Area Council has few health facilities. In Kubwa there is only one General Hospital serving a population of 60,555 inhabitants. Other health facilities include one Primary Health Care Centre, 13 Health Clinics, Five Health Posts, 28 mobile clinics, 9 private clinic including one Catholic Hospital.

Immunization services of all the antigens BCG, DPT, Oral Poliomyelitis, Measles and Tetanus Toxoid take place daily in all the static clinics. The under-five and pregnant mother are those mainly immunized.

In the Area Council there are same other Federal establishments like federal Government Girls College, Bwari, Nigeria Law School Bwari, Joint

Admission and Matriculation Board (JAMB) Office. Supply of electricity and water epileptic. In Bwari town, majority of the houses there did not meet the housing standard and only few roads are tarred with poor drainage and environmental sanitation.

COMMUNICATION

Bwari town has only one Federal high way linking to Abuja city. Within Bwari town, you have few tarred roads. Roads to other villages are untarred and some footpaths. Public transport is available within the town and available on market days to some villages while others are not motorable especially during the rainy season.

In Kubwa roads are tarred within and more activities take place both socially, economically, commercially and otherwise.

A radio transmitting station is located in Abuja City that is the ASO Radio Station. Its transmission gets to all the Area Council and broadcast are in Hausa, Ibo, Yoruba and English.

B. METHODS

i. Study Design

It is a descriptive cross sectional study with two components.

a. A community based study to assess the knowledge, attitude and practice of mothers in immunization coverage of their children age 12 – 23 months.

b. Area Council based study to assess immunization resource availability.

ii. Study Population

The study population are mothers of children age 12 – 23 months in Bwari Area Council for the community-based study.

1. AREA COUNCIL LEVEL

Immunization resource inventory to assess availability

To assess availability of immunization resources, information was collected through the administration of a questionnaire to the NPI Manager on the following:

i. Manpower – both administrative and technical

ii. Cold chain equipment – types, number

iii. Transport – types

iv. Vaccines – quantities by antigen, source of supply and how regular.

Accessibility to immunization services was calculated on the assumption that the population is evenly distributed and people living at a five kilometer radius as suggested by WHO have assess to services. The percentage of infants and women in the reproductive age group living within 5 kilometer radius of immunization centres was calculated and used as an indicator of accessibility.

2. COMMUNITY-BASED STUDIES

Sample size determination:-

The standard WHO probability Proportion to Size (PPS) cluster sampling technique which has 95% confidence limited plus or minus 10% was used [15]. This gives a sampling size of 210 with a confidence interval of –1.96 to + 1.96.

SAMPLING METHOD

I used the EPI – 30 cluster technique recommended by WHO [15] and which has shown to provided statistically valid data when valid data when used in surveys like this. I took the following step during the sampling:

i. Identification of the geographical area and the age group of interest (12 – 23 months).

ii. Listing of all the villages and main settlements and their population obtained from the head of the department of health, the Local Government Headquarters.

iii. Random selection of thirty (30) sites or clusters of this geographical area from which results are desired [15]. This was done using the calculated sampling interval [27].

iv. Random selection of a starting point (household) within each site and

v. Selection of seven (7) individuals age 12 – 23 months from each of the thirty (30) clusters. Selection begins in the starting household until a total of seven children are obtained. The immunization status of these children are then determined.

It is essentially a two stage sampling commonly referred to as a thirty by seven (30 by 7) sampling method.

Determination of household to be visited within each cluster

In each of the cluster visited, I find a central location and spin a bottle on even ground there. When the bottle stops, which ever direction the mouth points is the direction for my first household. The number of households in that direction were counted and the first house to be visited was randomly selected from the total number of houses counted. Consecutive households were entered and information sought from mothers whether there were children age 12 – 23 months in the house till at least seven (7) children in that age group were obtained. After explaining the of the survey, and consent sought and obtained from the mothers, questionnaires are then administered to them. Information was obtained on the following:-

- Socio – demographic information and parents
- Knowledge about immunisable diseases
- Source of information
- Information on availability, accessibility and utilization of immunization services and reasons for non-utilization of applicable.
- Mothers perception about the effectiveness of EPI vaccines
- Diseases child has received vaccines for, this was cross-checked with available immunization card with the mother.
- In case of drop-out and missed immunization reason was sought.

About 210 mothers were interviewed by administering questionnaire. Trained interviewers were used for the collection of datas and analysis of data was done manually and with computer.

ETHICAL CONSIDERATION

To secure the co-operation of the communities to be visited, I went with a letter of introduction from the Department to the Chairman Bwari Area Council. Consent was sought and obtained from the chairman of the area council, the village heads and the mothers. Indigenes and staff of the area council were used as an enumerators / interpreter. This really promoted acceptance and co-operation among the people.

LIMITATIONS

Bad terrain which made geographical access almost impossible especially those hinterland as study was carried out during the rainy season.

CHAPTER FOUR

RESULTS AND DATA ANALYSIS

RESULTS

The results of the study are presented in a tabular form with brief comment on each table. The discussion of the result follows in chapter five [5].

Below are the tabular presentations of the results.

SOCIAL – DEMOGRAPHIC VARIABLES OF THE RESPONDENTS

TABLE 1: AGE DISTRIBUTION OF MOTHERS

AGE IN YEARS	TOTAL	% TOTAL
16 – 20	26	12.4
21 – 25	56	26.7
26 – 30	88	41.9
31 – 35	25	11.9
36 – 40	15	7.14
TOTAL	**210**	**100**

Comment

As shown in table 1: Mothers age 26 – 30 years constitute 41.9% (largest group) while mothers aged 36 – 40 years constitute 7.14% (least group).

TABLE 2: DISTRIBUTION OF EDUCATIONAL LEVEL OF MOTHERS

LEVEL OF EDUCATION	TOTAL	% TOTAL
Formal education	148	70.5
Non formal education	62	29.5
TOTAL	210	100

Comments:

148 (70.5%) of mothers are literate and 62 (29.5%) are illiterates.

TABLE 3: DISTRIBUTION OF MOTHERS OCCUPATION

OCCUPATION OF MOTHERS	TOTAL	% TOTAL
House wives (full time)	48	22.8
Traders	67	31.9
Farmers	51	24.4
Civil servants	44	20.9
TOTAL	210	100

Comment:

Most mothers are traders and farmers (31.9% and 24.4% respectively). Civil servant mothers are least (20.9%).

TABLE 4: AGE DISTRIBUTION OF MOTHERS IN RELATION TO IMMUNIZATION STATUS OF CHILDREN

Immunization status

AGE OF MOTHERS IN YEARS	NOT IMMUNIZED	PARTIALLY IMMUNIZED	FULY IMMUNIZED	TOTAL	% TOTAL
16 – 20	2	10	14	26	12.4
21 – 25	5	19	32	56	26.7
26 – 30	13	22	53	88	41.9
31 – 35	2	9	14	25	11.9
36 – 40	3	4	8	15	7.14
TOTAL	25	64	121	210	100

X^2 = 4.74, (df = 8). Value at 0.05 level of significance = 15.5

4.74 < 15.5. So not significant.

Comment:

88 (41.9%) fully immunized children belongs to mothers age 26 – 30 years and 15 (7.14%) fully immunized belong to mothers age 36 - 40 years. There is significant relationship between mothers age and immunization status of their children.

TABLE 5: DISTRIBUTION OF EDUCATIONAL LEVEL OF MOTHERS IN RELATION TO IMMUNIZATION STATUS OF CHILDREN

Immunization status

AGE OF MOTHERS IN YEARS	NOT IMMUNIZED	PARTIALLY IMMUNIZED	FULY IMMUNIZED	TOTAL	% TOTAL
Formal education	10	38	100	148	70.5
Non-formal education	15	26	21	62	29.5
TOTAL	25	64	121	210	100

X^2 = 23.56, (df = 2). Value at 0.05 level of significance = 5.99

23.56 > 5.99. Therefore it is significant.

Comment:

100 (47.6%) fully immunized are children of mothers with formal education while 21 (10%) fully immunized are children of mothers with non-formal education. There is also a statistically significant association between mothers level of education and immunization status of their children.

TABLE 6: DISTRIBUTION OF MOTHERS OCCUPATION IN RELATION TO IMMUNIZATION STATUS OF CHILDREN

Immunization Status

OCCUPATION OF MOTHERS	NOT IMMUNIZED	PARTIALLY IMMUNIZED	FULY IMMUNIZED	TOTAL	% TOTAL
House wives (full time)	10	16	22	48	22.8
Traders	5	25	37	67	31.9
Farmers	5	16	30	51	24.2
Civil servants	5	7	32	44	20.9
TOTAL	**25**	**64**	**121**	**210**	**100**

X^2 = 11.74, (df = 6). Value at 0.01 level of significance = 10.6

11.74 > 10.6. Therefore it is significant.

Comment:

37 (17.6%) fully immunized are children of traders. Civil servants although small in number (44) has 32 (15.2%) of fully immunized children. Statistically there is association between mothers occupation and immunization status of children though the relationship is weak.

TABLE 7: DISTRIBUTION OF MOTHERS SOURCE OF KNOWLEDGE ABOUT IMMUNIZATION AND IMMUNIZATION STATUS OF CHILDREN

Immunization status

SOURCE OF KNOWLEDGE	NOT IMMUNIZED	PARTIALLY IMMUNIZED	FULY IMMUNIZED	TOTAL	% TOTAL
Television	2	15	25	42	20
Radio	4	14	23	41	19.5
During antenatal visits	2	24	58	84	40
Traditional birth attendant (TBA)	3	6	10	19	9
From friends	14	5	5	24	11.4
TOTAL	**25**	**64**	**121**	**210**	**100**

X^2 = 61.12, (df = 8). Value at 0.05 level of significance = 15.5

61.12 > 15.5. therefore it is significant.

Comment:

More mothers 84 (40%) got information about immunization during antenatal visits and through television broadcasts (20%). Statistically there is a strong association between mothers source of knowledge about immunization and the immunization status of their children.

TABLE 8: IMMUNIZATION COVERAGE

Immunization coverage of children age 12 – 23 months and pregnant women in Bwari area council Abuja. Number = 210

COVERAGE	FREQUENCY	PERCENTAGE (%)
BCG	182	87.1
OPV_1	165	79.2
OPV_2	182	87
OPV_3	160	76.6
DPT_1	166	79.5
DPT_2	172	82.2
DPT_3	162	82.3
Measles	172	82.3
TT1 & TT2	181	86.6
Fully immunized	121	57.7
Partially immunized	64	30.4
Not immunized	25	12

Comment

Coverage level for fully immunized is 57.7%

TABLE 9: DISTRIBUTION OF IMMUNIZATION STATUS BY DISTRICT

DISTRICTS	FULLY IMMUNIZED	PARTIALLY IMMUNIZED	NOT IMMUNIZED	TOTAL NUMBER OF CHILDREN	% FI	TOTAL POP	TARGET POP
Bwari	17	5	1	23	73	26,270	5,518
Kawu	9	3	2	14	64	10,570	2,114
Ushafa	17	10	2	29	58	12,885	2,571
Dutse	9	22	4	35	26	37,280	7,141
Shere	11	5	1	17	64	10,58	2,116
Kubwa	58	18	2	78	64	10,58	2,116
Rungin Fulani	0	1	13	14	0	1,770	754
TOTAL	121	64	25	210			31,908

Comment:

The Fulani settlement in spite of the small number of children surveyed there (14) has none of their children fully immunized. Kubwa a satellite town with 11,694 target population had 74% of their children fully immunized.

Knowledge about function of immunization and childhood diseases preventable by immunization

Functions of immunization

202 (96%) of 210 women interviewed know that immunization prevent diseases.

3 (1.4%) think immunization makes children to look healthy

5 (2.3%) think it is used for treatment of diseases

TABLE 10: DISTRIBUTION OF KNOWLEDGE OF CHILDHOOD PREVENTABLE DISEASES AND IMMNUNIZATION STATUS

NUMBER OF IMMUNIZABLE CHILDHOOD DISEASES NAME BY MOTHERS	NOT IMMUNIZED	PARTIALLY IMMUNIZED	FULLY IMMUNIZED	TOTAL	% TOTAL
Name	12	10	8	30	14.3
1 – 3	5	20	10	35	16.6
> 3	8	34	103	145	69.1
TOTAL	25	64	121	210	100

X^2 = 50.27, (df = 4). Value at 0.05 level of significance = 9.48

50.27 is >9.48. Therefore it is strongly significant

Comment:

69.1% of women who can name more than three vaccine preventable diseases had their children fully immunized showing that knowledge of the diseases helps in positive health seeking behaviour. Statistically there is a strong association between mothers knowledge of childhood preventable diseases and immunization status of their children.

ACCESSIBILITY

TABLE 11: GEOGRAPHICAL ACCESSIBILITY

DISTANCE IN KM	NOT IMMUNIZED	PARTIALLY IMMUNIZED	FULLY IMMUNIZED	% FI	TOTAL	% TOTAL
< 1	2	3	17	77.2	22	10.5
1 – 5	14	41	84	60.4	139	66.1
6 – 10	9	20	20	40.8	49	23.4
TOTAL	**25**	**64**	**121**		**210**	**100**

X^2 = 10.13, (df = 4). Value at 0.05 level of significance = 9.48

10.13 > 9.48. Therefore it is significant.

Comment:

22 (10.5%) of mothers had immunization facilities located at < 1 km from their houses. 139 (66.1%) between 1 and 5 km, 49 (23.4%) between 6 and 10 km. 17 out of 22 children that live at less than 1 km were fully immunized 77.2% of children who live less than 1 km were fully immunized.

60.4% of those who live within the 5 km radius (1 – 5km) were fully immunized.

40.8% of those who live outside the 5 km were fully immunized. Statistically there is significant association between distance and immunization status.

ACCESSIBILITY

For comparism geographical accessibility was calculated using WHO Formular

$$\text{Accessibility} = \frac{\text{Total No of Vaccination site} \times r^2}{\text{Total area of LGA}} = \frac{47 \times 25}{900} = 1.3$$

R = 5

No of vaccination sites = 47

Total area of LGA = 900 square meter

(data from HOD Health LGA)

Factors affecting immunization coverage

Resource availability

Manpower

Hospital staff render immunization services in clinics. For outreach services staff from Zonal Headquarters assist. The following staff are available at the zonal office, one medical officer, no store officer, one driver, three record officers and six field officers (co-ordinators) see table 13.

Cold Chain Equipment

The list of available cold chain equipment is shown in table 13.

Vaccines

In January 2000, the total vaccines supplied for all health facilities are as follows:

			doses
BCG	-	21 vials	(420)
DPT	-	27 vials	(540)
OPV	-	0 vials	(0)
Measles	-	12 vials	(240)
Total			**1200 doses**

For distribution of monthly vaccination performed per antigen in 15 Health facilities out of 19 from January – June (2000) see table 14.

Infant population - 31,908

Doses available for January - see above.

$$\text{Availability} = \frac{\text{No received}}{\text{Infant population}} \times 100\% = \frac{1200}{31,908} \times 100\% = 3.76\%$$

Syringes and needles - 50 packets x 100 = 10,000 pieces

$$\text{Availability} = \frac{\text{No received}}{\text{Infant population}} \times 100\%$$

$$= \frac{10,000}{31,908} \times 100\% = 31.3\%$$

TRANSPORT

One motor vehicle, that is not functional 21 motorcycles and 13 bicycles (see table 13) are available for distribution of vaccines to the peripheral clinics and out reach activities. This is motorcycles is inclusive among the ones given to some peripheral clinics which the Community Health Officers in charge uses.

The government recommends one four wheel drive vehicle, and two light vehicles. Availability here is zero since they don't have any vehicle.

Operating forms

Funds is gotten from the Area Council N3,000 monthly to the NPI section. The area council is now to manage and finance EPI at local level by the recent health policy, while the Federal Government is mainly concerned with procurement of vaccine and technical assistance. Manpower assistance also received from voluntary agencies, NGO's and international organisation./

Utilization of immunization services

25 (12%) of mothers never utilize the immunization services at all.

185 (81.1%) utilized the services though 64 (30.4%) partially and 121 (57.7) fully.

Reasons given by mother for non utilization (see table below)

TABLE 12: DISTRIBUTION OF REASONS FOR NON UTILIZATION BY IMMUNIZATION STATUS

REASONS	TOTAL	% TOTAL
Distance	11	5.2
No vaccines	30	14.3
Child took ill	5	2.4
No time (mother busy)	6	2.9
Family moves to new place	5	2.4
Forgot to return	8	3.8
Unaware of the need to return	2	0.9
No knowledge	15	7.2
Cost	1	0.5
Previous side effect	1	0.5
Was not told to come back	5	2.4

Comment:

Percentage did not total up to 100% because mothers gave multiple reasons and also there are some that utilized the facilities fully and so gave no reason. Those that did not utilize the facilities fully (89) are those that gave the above reasons. No vaccine reason top the list.

Drop out

The above reasons also account for the dropout. Of the 210 children surveyed 89 did not complete immunization schedule given an overall drop out rage of 42.3%. The dropout rate between OPV_1 and OPV_3, DPT_1 and DPT_3 is 28.6% (60 children failed to complete either 2^{nd} or 3^{rd} dose).

No vaccine (14.3%) top the list of reasons for non utilization of services fully. This is followed by no knowledge (7.2%) and instance (5.2%). Cost (0.5%) is certainly not a hindrance.

TABLE 13:

AREA COUNCIL DATA

COLD CHAIN FACILITIES/MANPOWER

EQUIPMENT	QUANTITY	REMARK	PERSONEL	NO.
Cold Room	1		Medical Officer	1
Cold Store	1		NPI Manager	1
Dry Store	1		Store Officer	-
Cold Boxes	18		Driver	1
Vaccine Carriers	70		Record Officers	3
Freezers	3		Field Officers (Coordinators)	6
Refrigerators	8			
Thermometers	23			
Syringes and Needles	50PKTS X100			
Ice Pack Freezer	1			
Generator	10			
Motor Vehicle	1		Non-functional	
Motor Cycle	21			
Bicycles	13			
Steam Sterilizers	12			

TABLE 14:

Distribution of monthly vaccination performed per antigen in 15 health facilities (out of 19 health facilities)

Antigens

Months	BCG	DDT_1	DDT_2	DPT_3	OPV_1	OPV_2	OPV_3	Measles	TT_1	TT_2
Jan. (2000)	999	213	168	154	51	39	32	132	98	100
Feb. (2000)	76	232	232	161	208	203	142	228	148	140
March (2000)	-	148	146	112	4	14	24	132	50	57
April (2000)	-	167	152	115	49	33	19	173	79	86
May (2000)	-	297	329	316	-	-	-	127	187	161
June (2000)	1053	309	308	256	9	3	3	301	170	140
TOTAL	2128	1366	1335	1114	321	292	220	1093	732	684

Comment:

A look at the area council data on vaccine supplies (table 25) will show why OPV Polio vaccine immunization recorded very low number. The vaccine was not supply at all in Jan. 2000. Even at that there is persistent 'drop out' for DPT_2 and DPT_3 and also OPV_2 and OPV_3 BCG was missed for some month because of no vaccine supplies.

TABLE 15:

AREA COUNCIL DATA

Centres offering immunization services by location in Bwari Area Council

LOCATION (DISTRICTS)	IMMUNIZATION CENTRES HEALTH FACILITIES	NO. OF STATIC CENTRE	OWNER-SHIP	FREQUENCY OF VACCINATION	OUT-REACH SERVICES	TOTAL
Bwari	Comprehensive H/Centre	1	State	Daily	5	9
	Baragoni H/Clinic	1	LG			
	Gaba Health Clinic	1	LG			
	Zliko Health Clinic	1	LG			
Ushafa	Ushafa Health Clinic	1	LG	Daily	3	6
	Jigo Health Clinic	1	LG			
	Usman Dam Health Clinic	1	LG			
Share	Primary Health Centre	1	State	Daily	10	15
	Igu Health Clinic	1	LG			
	Tikulo Health Post	1	LG			
	Piko Health Post	1	LG			
	Galuwuyi Health Clinic	1	LG			
Kawu	Kawu Health Clinic	1	LG	Daily	4	6
	Kute Health Post	1	LG			
Dutse	Dutse Health Clinic	1	LG	Daily	6	10
	Mpape Health Clinic	1	LG			
	Byazhin Health Clinic	1	LG			
	Dei – Dei Health Clinic	1	LG			
Kubwa	Kubwa General Hospital	1	Federal	Daily	-	1
	TOTAL					47

CHAPTER FIVE

DISCUSSION

The specific objectives of this study is to access mothers knowledge, attitude and practice toward childhood immunization and consequently factors affecting its utilization, which will invariable determine the coverage level.

The study also looked at the availability of resources and vaccines supplies and distribution and also the accessibility.

World Health Organisation proposes that five major areas be addressed while assessing a programme namely relevance, adequacy which covers utilization, progress which covers availability and accessibility, efficiency which covers vaccine supplies and administration and effectiveness which this study did not look into.

The data generated from this study will give clues for identifying major bottlenecks in the EPI programme in Bwari Area Council. A total of 210 children were survived. From table one (1) – 48% of the children studied are about 2years while 1 year and under 2 years is 51.4%. All are under fives and more valuable to EPI target diseases.

In table two (2) Kubwa villages II a sub-urban town has the heist fully immunized children 85.7% compacted to the other two interior villages. Kubwa villages II being a satellite town have the benefit of a General hospital with more regular supplies of vaccine and adequate staff. It also has a more enlightened population. Mpape village on the other hand is more remote than Zamayi and

has a less enlightened population and also poor vaccine supplied from available L.G.A data. It recorded the least fully immunized of 57.1%.

Table three (3) shows that more children between 18 – 22 months were fully immunized but in some of the selected villages studied more children aged 12 – 17 months were fully immunized in Kubwa village II than Mpape villages II. This might be because the mothers in Kubwa village II are more enlightened and immunize their children earlier.

Table six (6) and ten (10) shows mothers educational level and occupation as veritable tools to adequate utilization of immunization services. 80% of mothers with formal education has their children fully immunized while 20% with non-formal education had their children fully immunized. There is no argument that literacy level determines service seeking behaviour of mothers. When you educate a mother you have educated a nation. The infant mortality rate is inversely related to mother's education level.

Same thing goes with occupation. If a mother is gainfully employed she will always have the financial resources to take care of her health needs and that of the children. Majority of the men spend their resources on consumers goods but women spend more of theirs for family needs and health needs. In table ten (10) you see that 34.1% of the children who are fully immunized belong to mothers who are traders while 25% belong to mothers who are civil servants. These mothers are all gainfully employed. The least belongs to housewives and the nomadic Fulani women with 16% and 0% respectively. These two categories

are the least gainfully employed if at all. The nomadic Fulani women might also have problem of literacy and knowledge of immunization services.

In table eleven (11) more women got information about immunization during ante-natal visits and this group got their children fully immunized (31.9%) followed by those who got information from television (13.3%) people believe more - in what they see. Though more people have assessed to radio it came 3rd with (11.4%).

Table thirteen (13) shows that oral polio vaccine immunization recorded very low number. A look at the Area Council data on vaccine supplies (table 25) will tell you why e.g. the vaccine was not supplied at all in January, 2000. There is also a persistent 'drop out' for DPT_2 and DPT_3 and also OPV_2 and OPV_3. BCG immunization was missed for some months because of no vaccine supplies. All the same BCG recorded the highest number of children vaccinated (2128) for the period of six (6) months, followed by DPT_1 (1366) and the least OPV_3 (220).

In table fourteen (14) more children were vaccinated against for tuberculosis (90.5%) followed by measles (90.4%) in the three selected villages.

In table fifteen (15) 'No vaccine's reasons given for non- immunization scored 9.5% (highest) followed by forgetfulness (9.5%). Mpape village II recorded 28% for 'No vaccine' and 14% for 'forgetfulness' because of short supplies of vaccine and also has only one health clinic and six (6) mobile clinics which are not very reliable (see table 12) it also has the problem of being an interior village with les enlightened population.

Kubwa village II a sub-urban town scored the least (14%) reason that family moved to a new place 'No vaccine' reason was given probably because it has a general hospital with more regular vaccine supplies.

Table sixteen (16) shows that the percentage of children partially immunized for 'No vaccine' reason is 11.4% (highest) and the least is 0.5% for reasons due to cost and previous side effect. So on the whole shortage of vaccine is till a problem. Children not immunized at all has 6.7% due to family moved to a new place the nomadic Fulani's might be victims of this due to their nomadic nature.

Table seventeen (17) shows that 'drop out' rate in still a problem between DPT_2 and DPT_3 and OPV_2 and OPV_3 in the three selected villages study. Mpape village which is remote village shows poor adequate utilization compared to Kubwa village II which is within the sub-urban town of Kubwa a satellite town with more enlightened population and a benefit of a general hospital.

Table Eighteen (18) shows that mothers from Zamayi village and Kubwa village II got fully immunized with injection tetanus toxoid while Mpape village II still has problem of adequate utilization, only 85.7% were fully immunized on the whole mothers are complying well with tetanus toxoid immunization.

Table Nineteen (19) showing the location of health facilities in districts with the farthest distance from the target population shows an interesting scenerio. Looking at it surfacely we see that Shere with the highest coverage of 100% (FI) has the farthest distance of 8Km, While Ushafa with the least distance of 3Km has 50% (FI) here you will be tempted to conclude that distance is no factor. But

looking at the data deeply you see that Bwari with a distance of 8Km had 75% (FI) while Kawu with a distance of 7Km had 79% (FI) but further more you see that Dutse with 7Km has 64% (FI) and Kubwa with 4Km has 70% (FI) both still smaller than Bwari in terms of percentage coverage. So this still shows that distance is not an important factor. Well other variables like the population or the services provided or the skills of the personnel in the various health clinics and health posts might be contributory to the high percentage coverage (FI) in some of the districts with distance more than 5Km. The WHO standard is distance of 5Km of health facility from target population.

In table twenty (20) looking at selected villages studied we see that Kubwa village II with 2Km distance from health facilities has 85% (FI) as compared to Zamayi (71%) and Mpape village II (57%) both with ½ Km to health facility.

In table twenty-one (21) it shows that from all the villages studied 26 (12.9%) of those children of distance more than 5Km were fully immunized while 102 (50%) children at distance less than 5Km were fully immunized on the other hand more of the children (54) at distance less than 5Kmwere partially immunized compare to children (20) at more than 5Km. Here to some extent distance wants to prove it is a factor.

Table twenty-two (22) shows the overall percentage immunization coverage to be 58% for fully immunized. There is still 'drop out' rate between DPT_2 and DPT_3 and OPV_2 and OPV_3. This study took into account only the percentage coverage for fully immunized 'drop out rate is 49.5%.

Table twenty-three (23) shows the vaccination coverage target. The WHO set a coverage level of 80% for BCG, DPT and Tetanus Toxoid and 90% for OPV, and for fully immunized at 70%. This study shows that the objective percentage coverage were achieved except for OPV_1, OPV_3, measles and fully immunized. Fully immunized is 58% while the objective vaccination coverage is 70%.

Table twenty-four (24) shows the immunization status of children and there districts studied. Here Kawu district scored the highest coverage of 78.6% (FI) but has the least population and has three (3) static vaccination centres from L.G.A. data. Bwari district scored the scored highest coverage of 78.3% and Kubwa with the biggest population scored 78.2%. Kubwa has only one general hospital by the federal government and is not adequate for that population since this hospital was actually build as a comprehensive health centre which is supposed to cater for about 50,000 people by PHC principles and guidelines in Nigeria. Dutse district scored the least 34.3% and has the second highest population of 37,280 with four static vaccination health centres. By PHC principles and guidelines this centre is supposed to cater for 10,000 people. If you compare their performance to Kawu district with 10,570 people you will appreciate their handicap all the same there might be other factor contributing to the poor showing in Dutse.

Table twenty-five (25) shows the Area Council data on vaccines supplies with obvious lapses showing non-supply of some antigens – polio vaccine, measles vaccine and poor supply of BCG vaccine. We can see that al supplies

are utilized no vial was ever returned in all the antigens. So no vaccine wastage. Supplies we mainly from state and Federal Capital Development Authority (FCDA) cold stores.

Table twenty-six (26) shows the centres offering immunization services by location. Bwari has a population of 26,270 with three (3) Health Clinic and one (1) comprehensive health centre (CHC) so each health clinic or health post is suppose to take care of 2,000 people while CHC is to take care of 10,000 people. This shows that here facilities are inadequate for Bwari. Ushafa has a population of 12,885 while the facilities there are meant for 6,000 people. Share with a population of 10,580 has adequate facilities. Dutse has a population of 37,000 with four (4) health clinics that will cater for 8,000 people so the facilities are grossly inadequate that's why the district Dutse and the village Mpape under Dutse has performing badly in terms of immunization coverage.

AREA COUNCIL DATA

Table twenty- seven (27) shows area council data on cold chain facilities and manpower.

Manpower- There is no stave officer, which is necessary to take change of the inventory of vaccines and materials both in coming and out-going.

There are six field officers one for each district. Certainly for big districts like Kubwa more than one filed officer (Co-ordinator) is required for effective monitoring and coverage. Driver is only one because there is only one vehicle, which is not adequate.

Vehicle – Only one motor – vehicle is available and is non functional. This is grossly inadequate for the Area Council with six (6) districts to cover. Though motorcycles and bicycles are there to support we advocate a vehicle to be attached to each district.

COLD CHAIN FACILITIES

The ten (10) generators are not adequate. Each health facility should posses a generator for maintain the cold chain so a total of eighteen (18) generators are needed instead of ten (10). You need at least eighteen (18) refrigerator and eighteen (18) steam sterilizers one each for each of the health facility.

In summary a total of 210 children were surveyed in Bwari Area Council in six (6) districts including their mothers. In all the districts, there are centres offering immunization services as per primary health care delivery system guidelines, so availability is 100%.

About 66.6% of children surveyed still live outside the 5Km radius to vaccination centre as recommended by WHO while 33.3% live within the stipulated radius of 5Km. This can be redressed by building more health facilities within the 5Km radius. It is found that the health facilities are inadequate in almost all the districts studied. This will also affect accessibility.

About 90% of the children surveyed had access to vaccination but only 58% utilized it adequately.

The study showed that education, information knowledge, communication has a lot to do with adequate utilization of immunization services and so emphasizes must be laid on these aspects. Commodity mobilization will also go a long way in helping in this area.

The study also shows that 'drop out' rate is still a problem about 49.5% which is high for reasons ranging from no vaccine to forgetfulness, to child took ill and unaware of the need for return, to no knowledge. This rate could be brought down by improving the level of literacy of mothers, improved communication, information by electronic media and posters on the proper thing to do and above all intensify community mobilization and encourage community participation.

CHAPTER SIX

CONCLUSION AND RECOMMENDATIONS

A total of 210 under-fives were surveyed in this study and their immunization status shows only 57.7% were fully immunized with and overall drop-out rate of 42.3% and drop-out between OPV_1, and OPV_3 DPT_1, and DPT_3 was 28.6%.

The coverage level is low compared to the objective percentage coverage stipulated by WHO which is 80% to be attained by the year 2000. The drop-out rate is high and from other surveys it is a persistent problem.

Major obstacles and constraints identified are:

(i) Inadequate supplies of vaccines and in some cases complete lack of vaccines.

(ii) Transportation for immunization activities is not adequate and this hinders resources availability.

(iii) Syringes and needles are in short supply for immunization.

(iv) Cold chain facilities like Refrigerator and generators are in short supply.

(v) Limited accessibility to immunization services especially due to distance and poor terrain.

(vi) Poor funding and in adequate man power of the NPI unit in he Local Government Area.

(vii) Inadequate Information on immunization and its benefits and poor social mobilization.

(viii) Lack of knowledge of childhood immunization by mothers resulting in poor utilization of immunization services.

(ix) Low literacy level and poor economic status by mothers.

The following strategies are recommended:

(1) The Federal Government whose responsibility it is to procure vaccines should ensure adequate and prompt supplies to the local government area whose duty it is to ensure proper management and administration of these vaccines. They should ensure the provision of trained manpower to keep proper records and data. The NPI manager should also be able to estimate the vaccine requirement of the local government and make data available to the authorities.

(2) Effort should be made to create a culture of immunization demand by the community through social mobilization, community participation, improved communication and information.

(3) Federal, States and Local Governments should ensure that rural infrastructure are improved particularly access roads.

(4) To increase accessibility to services in addition to (3) above they should build more health facilities to meet with the WHO standard.

(5) Literacy level and economic empowerment should be intensified by all arms of government

(6) Strengthening routine immunization by strengthening PHC services.

(7) Sustaining political will at all levels.

(8) Sustaining financial support at all level and ensure adequate funding of health sector by government.

(9) Motivation of Workers in rural areas should be encouraged. Seminars, workshops to be organised to improve clinic procedures and re-orient staff to ensure quality care and better results.

(10) Constant supervision, monitoring and evaluation of the programme should be the watchword.

In conclusion, government through the huge investment and interest in primary health care delivery system which is an entry point to this immunization services has done well in establishing PHC in all the 774 local government areas in the country. The Government further demonstrated its keenness and commitment in this area by creating an independent parastatal to deal with immunization activities called NPI (National programme on Immunization). Though one might be tempted to say that its creation is a duplication of function since NPHCDA (National Primary Health Care Development Agency) is suppose to oversee this function; nevertheless it is a demonstration of eagerness and concern for the health of the children. Recently the President Chief Olusegun Obasanjo flagged off this year's National Immunization Days. All these are enough indications that government is committed to immunization programme. The commitment of World Health Organization to Immunization programme and most nations commitment shows that the

world is no longer willing to tolerate the deaths of her children to the tone of 3.5 million yearly and this is a good omen.

There is no doubt that the EPI has brought succor to many homes and put smiles on the faces of mothers by drastically reducing infant mortality rate through immunization. EPI will go down in history as the wisest singular decision ever taken by WHO since its inception as nothing else will compare to the lives of millions of children the hope of the world being saved yearly through immunization.

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APPENDIX 1

AREA COUNCIL LEVEL

TO ASSESS AVAILABILITY AND UTILIZATION OF IMMUNIZATION RESOURCES

(A) Manpower Capacity/Level of Training

S/NO	OFFICERS	NUMBER	QUALIFICATION	YEARS OF EXPERIENCE
1	NPI Manager			
2	Cold Chair officer			
3	Cold Chain officer			
4	Temperature Monitoring Officer			
5	Store Officer			
6	Drivers			
7	Others			

(2) Do you have offices and officers to man them in each District (Yes) (No)

(3) How many officers have you in each district .....

(B) Cold Chain Equipment/Facilities

(4)

TYPES	NUMBER	REMARKS
* Cold Room * Cold Store * Dry Store * Cold boxes * Vaccine Carriers * Freezers * Refrigerator * Thermometer * Syringes and Needles * Generator		

(C) Health Facilities

(5)

			Location		
Types	Number	Ownership	Village	District	Number of trained Staff

(6) Vaccine Supplies

Types	Quantity	How Frequent. Monthly or Weekly	From where do you get your supplies

(7) Is there at any time you have stock-out of Vaccine (Yes) (No)
Tick as appropriate

(D) Vaccine Utilization

(8) Do you carry out routine Immunization (Yes) (No0

If yes

(9) How frequent? ( ) Daily ( ) Daily ( ) Weekly ( ) Market days.

(10)

Types	Quantity Supplied	Quantity Returned	Health Facility

(11) Which of these outreach programmes are you involved in. Tick as appropriate:

( ) Static Clinic ( ) Mobile Clinic ( ) House to House
( ) None of the above ( ) All of the above

(12) Are you involved in conducting National Immunization Days (NID's) (Yes) (No)

If Yes

(13) How many rounds have you done.....

(14) Are there areas that are hard to reach (Yes) (No)

If Yes

(15) Name the areas.....

(16) How do you transport the vaccines to the Health Centres. By:

( ) Vehicle ( ) Motor Bicycle ( ) On foot.

(E) Transport Facilities

Vehicles

(17).

Number	Specify Types	Number of Drivers	Remarks

(18) How often do you maintain the vehicles.

( ) Weekly ( ) Monthly ( ) Yearly

(G) Funding of operation cost

(19) Where do you get your funds for operating cost from?

( ) Federal Govt. ( ) State Govt. ( ) Area Council

(20) How much do you get?

	Amount
Weekly	
Monthly.....	
Yearly.....	

(22) Do you receive assistance from any
Non governmental organisation (NGO),
Voluntary Agencies
International organisation (Yes) (No)

If yes

(23) What is the nature of the assistance

( ) Cash ( ) Materials ( ) Manpower ( ) Training of personnel.

APPENDIX II

QUESTIONNAIRE

Questionnaire on Mothers knowledge, Attitude and practice of Immunization.

(1) Name of Town/District.....

(2) Cluster Number:.....

(3) Household Number:.....

(4) Mother's Name (Informant).....

(A) **HOUSEHOLD INFORMATION**

(5) Name of Child:.....

(6) Relationship to household head:.....

(7) Age:.....(8) Sex: (a) Male, (b) Female (Tick as appropriate)

(a) How long have you lived in this village.....

(B) **SOCIO-DEMORAPHIC INFORMATION ON PARENTS**

(10) Age of Mother:.....

(11) Age of Father:.....

(12) Level of Education: (a) Formal (b) Non Formal (c) Others
(Husband) (Ticket as appropriate)
(Wife) (a) Formal (b) Non Formal (c) Others

(13) Occupation (Husband) .....
(Wife) .....

(14) Tribe (Husband) .....
(Wife) .....

(C) **AVAILABILITY AND UTILIZATION OF IMMUNIZATION SERVICES**

(15) Is there any health facility in your town (Yes) (No)

(16) If No is your answer in which town is the nearest health
Centre to you located. Name the Town:.....

(17) What is the distance:.....

(18) Is it Motorable (Yes) (No)
Tick as appropriate.

(19) Who is the owner of the Health facility:

Government	( )
Private	( )
Voluntary Agency	( )

(20) What type of services are offered there?

Immunization	( )
Maternal Health Services	( )
Treatment of minor ailment	( )
Ante-natal care	( )

(21) If Immunization is one of the services provided have you taken your child there before for immunization (Yes) (No)

(22) If No, why did you not take your child there?

*	You have no knowledge about immunization	(Yes)	(No)
*	It does not prevent diseases	(Yes)	(No)
*	It does not cure diseases	(Yes)	(No)
*	The Centre is far from my town	(Yes)	(No)
*	I can't pay for the service charge	(Yes)	(No)
*	Your husband did not allow	(Yes)	(No)
*	Unaware of need for Immunization	(Yes)	(No)
*	The Staffs are not friendly	(Yes)	(No)
*	Time of Immunization inconvenient	(Yes)	(No)
*	I am busy no time	(Yes)	(No)
*	Child ill-brought but not given Immunization	(Yes)	(No)
*	Long waiting time	(Yes)	(No)
*	Time of Immunization not known	(Yes)	(No)
*	Vaccines not always available	(Yes)	(No)
*	Fear of Injections and side effects	(Yes)	(No)
*	Against my Cultural/Religions belief	(Yes)	(No)
*	No Vaccinator most of the time	(Yes)	(No)
*	Others Specify		

Tick In the box ( ) as appropriate.

(23) Is there any Health facility in your town (Yes) (No)
If Yes

(24) Have you ever gone to another Health Centre for Immunization

Name the town in which it is situated.....

(25) How far is it from your Town:.....Km

(26) Why did you prefer going there?

*	Because Vaccines are always there	(Yes)	(No)
*	The Staffs are friendly	(Yes)	(No)
*	It is free	(Yes)	(No)
*	Immunization time is convenient?	(Yes)	(No)
*	Your friends go there?	(Yes)	(No)
*	Everybody is attended to there	(Yes)	(No)

(D) **Knowledge about Immunization**

Tick ( ) in the box ( ) as appropriate.

(27) Have you heard about Immunization before (Yes) (No)

(28) If Yes from which source

*	Television	(Yes)	(No)
*	Radio	(Yes)	(No)
*	From Your Friends	(Yes)	(No)
*	During Ante-natal Visits	(Yes)	(No)
*	From your older children in school	(Yes)	(No)
*	Village Health talk/Education	(Yes)	(No)
*	Your husband	(Yes)	(No)
*	Traditional birth attendants (TBA)	(Yes)	(No)

(29) What is Immunization used for

Treatment of disease	( )	( )
Prevention of disease	( )	( )

Tick as appropriate.

(30) Can you name the diseases your child take Immunizations for

* Tuberculosis .....
* Diptheria .....
* Poliomyelitis .....
* Whooping Cough.....
* Pertusis .....
* Tetanus.....
* CerebrospinalMeningitis.....
* Yellow Fever.....
* Rabies.....
* Measles.....
* Hepatitis B.....

Explain the disease in her local language if she is not conversant with the above names and tick the ones she names.

(31) Do you belief Immunization prevents diseases you take them for (Yes) (No)

(32) If yes is your answer indicate of what age you give the various vaccination, doses and of what interval.

Diseases	Age Given	Number of Times	At what interval
Tuberculosis			
Poliomyelitis			
Pertusis			
Whoopping Cough			
Tetanus			
Measles			

(33) Are you aware of the number of times you will give your child each Immunization to complete it (Yes) (No)

(34) Has your child (_____) received any Immunization. (Yes) (No)
Name
If Yes proceed to 35

(35) Did you complete the doses or number of times for your child (Yes) (No)

(36) If No, Why?

Child took ill (Yes) (No)
Unaware of the need to return for next dose (Yes) (No)
You forgot to go back (Yes) (No)
Because of previous side effect like fever, injection abscess, Convulsion (Yes) (No)
You were not told to come back (Yes) (No)
No Vaccines (Yes) (No)
Family moved to a new place (Yes) (No)

(37) Vaccination status of child (Name_____)

	Vaccines							
	BCG	Polio (OPV)			DPT			Measles
Immunization Card		1	2	3	1	2	3	
Verbal Recall								
Scar								

(38) Has your Child suffered from any of the diseases immunized against (Yes) (No)

If Yes

(39) How severe ( ) Mild ( ) Moderate ( ) Severe

(40) Has any of your child died before (Yes) (No)

If Yes

(41) From what disease

Measles	(Yes)	(No)
Tuberculosis	(Yes)	(No)
Whooping Cough	(Yes)	(No)
Tetanus (Neonatal Tetanus)	(Yes)	(No)
Diptheria	(Yes)	(No)

(42) Was the Child immunized against that disease (Yes) (No)

(43) Did you attend ANC when pregnant for this Child (Index name_ _ (Yes) (No)

(44) Did you receive Tetanus Toxoid Injection (Yes) (No)

(45) Which Site ( ) Buttocks ( ) Forearm Tick as appropriate.

DISTRICT TOWNS AND VILLAGES IN BWARI AREA COUNCIL, ABUJA

No.	District/Villages	Population	Cumulative Population	Location of Cluster
1.	**Bwari District** Zamayi	4694	4694	1
2.	Summit	4001	8695	
3.	Sabon Gari	2191	10886	2
4.	Hausawa	3434	14320	
5.	Kuduru	2595	16915	3
6.	Zuma	1970	18885	
7.	Kuchibuyi	2115	21000	
8.	Barau Goni	2887	23887	4
9.	Sarkin Pawa	1911	25790	
10.	Zhiko	472	26270	
	Kawu District			
11.	Kawu	3320	29590	5
12.	Kute	2845	29950	
13.	Runji	2405	34840	6
14.	Dokuma	2000	36840	
	Ushafa District			
15	Ushafa	1950	38790	
16.	Jigo	2700	41490	7
17.	War College	1955	43445	
18	Dutse Baupma	2765	46210	8
19	Dutse Sagwari	1835	4845	
20	Usman Dam	1650	49695	

No.	District/Villages	Population	Cumulative Population	Location of Cluster
	Dutse District			
21	Dutse 1st Gate	3365	53060	9
22	Dutse 2nd Gate	3150	56210	
23	Dutse Alhaji	3680	59890	10
24	Dawaki	1790	61680	
25	FCDA Quarters	365	62045	
26	Berger Camp	3990	66035	11
27	Mpape Ajegunle	3540	69575	
28	Dutse Koro	3180	72755	12
29	Mpape PW	3540	76295	
30	Mpape Village	1600	795	
31	Jigakuchi	1920	9815	13
32	Mpape Berger Camp	1070	80885	
33	Mpape Katampe	580	81465	
34	Mpape Jikoko	775	82240	
35	Mpape Village II	1665	83905	14
36	Mpape Ajegunle II	3070	8975	
	Shere District			
37	Shere Koro	2165	89140	15
38	Igu	1435	90575	
39	Panunuke	2185	92760	16
40	Gudupe	2135	94895	
41	Shishipe	2660	97555	17

No.	District/Villages	Population	Cumulative Population	Location of Cluster
	KUBWA DISTRICT			
42	FHA Kubwa	2035	99590	
43	INEC Quarters	2565	102155	18
44	3-3-1 Avenue	1660	103815	
45	Law School Quarters	1870	105685	
46	2-2 Kubwa I	2650	108335	19
47	Phase 4 I	1280	109615	
48	P. W.	1160	110775	
49	2-2 Kubwa II	2485	113260	20
50	PHS 2-1	1080	114340	
51	P.W. Moroco	1800	1161140	
52	Phase 4 II	1740	117880	21
53	P.W. Central Mosque	1535	119415	
54	P.W. Metro	660	120075	
55	Phase II Kubwa	780	120885	22
56	Ezuke School Quarters	900	121755	
57	S. S. Quarters	460	122215	
58	Maitama I	1225	123440	23
59	Maitama II	2850	126290	
60	Maitama Market	1950	128240	24
61	Old Maitama	2980	131220	
62	Kubwa Village (Gukwaba)	1970	133190	25
63	Kubwa Market	2820	136010	
64	Kubwa Village II	1970	137980	26

No.	District/Villages	Population	Cumulative Population	Location of Cluster
65	Kubwa	2660	14040	
66	Byazhi^	4115	144755	27
67	Gabazango	3525	148280	
68	Dei-Dei	2275	150555	28
69	Dakwa	1660	152215	
70	Shapari Quarters	2125	15430	
71	Fulani Settlement, Kawu	1150	155490	29
72	Fulani Settlement Kadashi	850	156340	
73	Fulani Settlement Ushafa	1120	157460	
74	Fishermen Settlement Usman Dam	650	158110	30

SAMPLING INTERVAL

$$\text{Sampling Interval} = \frac{\text{Total Cummulative Population}}{\text{30 Clusters}}$$

$$= \frac{158110}{30} = 5270$$

Sampling Interval = 5270

Random Number = 4585

HOUSEHOLD SUMMARY FORM

(1) Cluster Number _____

(2) Age Group Being Evaluated _____ To _____ Months

(3) Date of Interview _____

(4) Birthdate of Age Range To Be Evaluated _____ To _____

(5) Region _____

(6) City, Town, or Village _____

(7) Interviewer(s) _____

Person Number	(8) Household Number	(9) Name of Child In Age Range	(10) Birth-Date	(11) Vaccination Card (+,-)	(12) Vaccination Record (Record Date of Vaccination)								(13) Fully Vaccinated(+,-)
					BCG	Polio 1 (P_1)	Polio 2 (P_2)	Polio 3 (P_3)	DPT 1 (D_1)	DPT 2 (D_2)	DPT 3 (D_3)	Measles (M)	
1													
2													
3													
4													
5													
6													
7													
8													
9													
10													
												TOTAL FULLY VACCINATED	

CLUSTER SUMMARY FORM

(Summary of Vaccination Status for all children falling in the Age group being evaluated for all 30 clusters in the sample)

(1) Age Group Being Evaluated: _____ to _____ months

(2) Date: _____ (3) Region: _____

Cluster Number	Vaccination Cards	BCG		Polio 1		Polio 2		Polio 3		DPT 1		DPT 2		DPT 3		Measles		Fully Vaccinated
		0	+	0	+	0	+	0	+	0	+	0	+	0	+	0	+	
1																		
2																		
3																		
4																		
5																		
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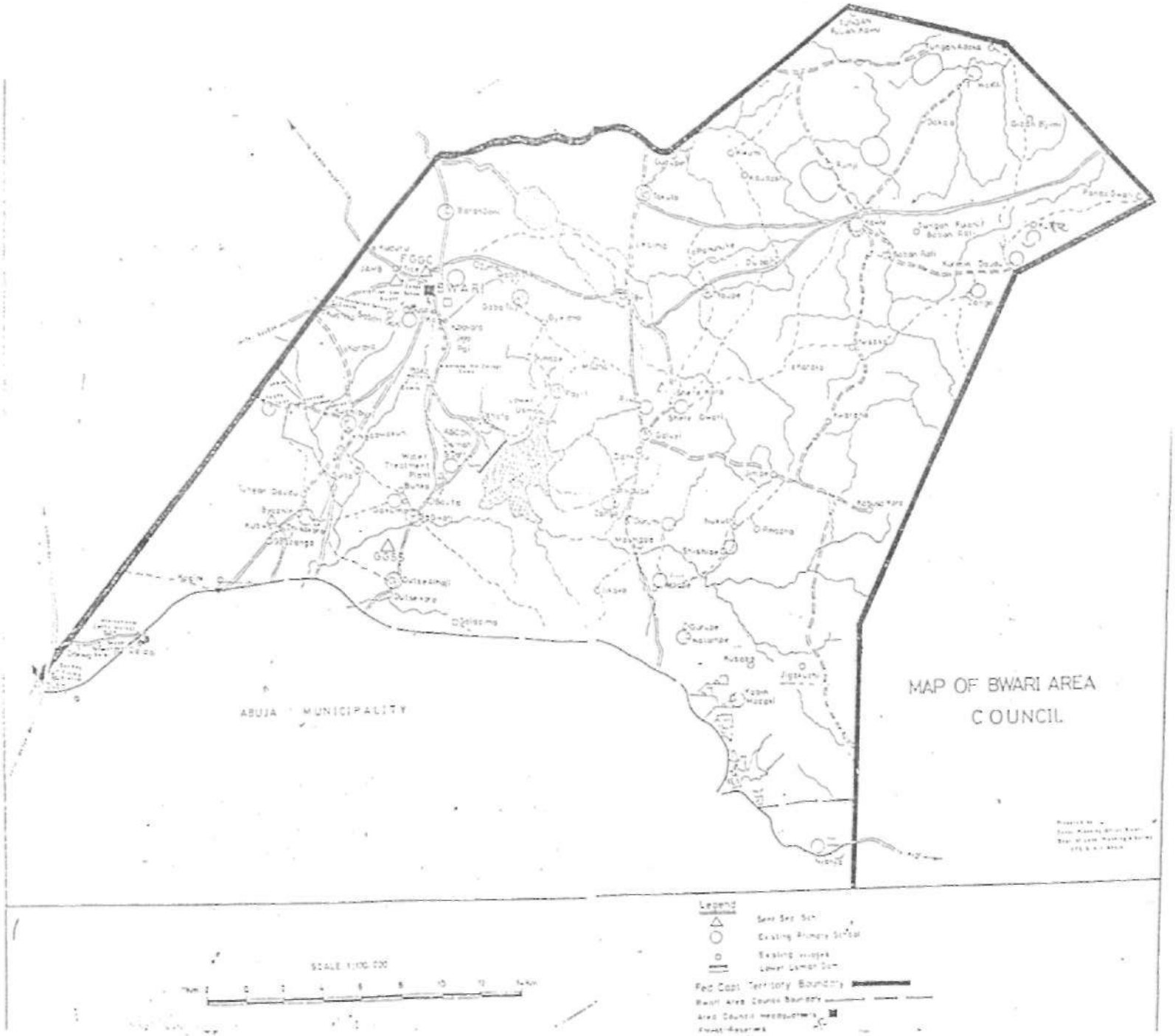

MAP OF BWARI AREA
COUNCIL
ABUJA MUNICIPALITY
BWARI
GOSA
Legend
Fed Capt Territory Boundary
Bwari Area Council Boundary
Area Council Headquarters

TABLE 1

HEALTH FACILITIES IN BWARI AREA COUNCIL BY OWNERSHIP

OWNERSHIP

TYPE OF FACILITY	LOCAL GOVT. (AREA COUNCIL)	STATE & FEDERAL GOVERNMENT	PRIVATE	VOLUNTARY ORGANISATION	TOTAL
Hospital (Gen)		1	9	1 (catholic) Hosp.	11
Comprehensive Health Centre	1				1
Primary Health Centre	1				1
Maternal & Child Health Clinic (MCH)	-				-
Dispensaries	-				-
Health Post	5				5
Mobile Clinic	28				28
Health Clinic	13				13