

Improving Routine Immunization coverage through strengthening Interpersonal
Communication skills of primary health care workers in rural Local government areas
in kebbi state Nigeria



A Dissertation Submitted in Partial Fulfillment of the Requirements
for the Degree of Doctor of Philosophy in Public Health

Common Course

COLLEGE OF PUBLIC HEALTH SCIENCES

Chulalongkorn University

Academic Year 2020

Copyright of Chulalongkorn University

การพัฒนาทักษะในการสื่อสารของบุคลากรในสถานบริการสุขภาพปฐมภูมิเพื่อเพิ่มความครอบคลุมของ
องการให้วัคซีนในเขตปกครองท้องถิ่น รัฐเคบิ ประเทศไนจีเรีย



วิทยานิพนธ์นี้เป็นส่วนหนึ่งของการศึกษาตามหลักสูตรปริญญาสาธารณสุขศาสตรดุษฎีบัณฑิต
สาขาวิชาสาธารณสุขศาสตร์ ไม่สังกัดภาควิชา/เทียบเท่า
วิทยาลัยวิทยาศาสตร์สาธารณสุข จุฬาลงกรณ์มหาวิทยาลัย
ปีการศึกษา 2563
ลิขสิทธิ์ของจุฬาลงกรณ์มหาวิทยาลัย

ชาวแคท อับดุลกา บาเซอว์ :

การพัฒนาทักษะในการสื่อสารของบุคลากรในสถานบริการสุขภาพปฐมภูมิเพื่อเพิ่มความครอบคลุมของการให้วัคซีนในเขตปกครองท้องถิ่น รัฐเคบปี ประเทศไนจีเรีย. (Improving Routine Immunization coverage through strengthening Interpersonal Communication skills of primary health care workers in rural Local government areas in kebbi state Nigeria)
 อ.ที่ปรึกษาหลัก : รศ.ดร.รัตนา สำโรงทอง

บทนำ ในปี 2558 รัฐเคบปีเป็น 1 ใน 4 รัฐทางตะวันตกเฉียงเหนือ ของประเทศไนจีเรีย ที่มีการดำเนินงานของการรับวัคซีนอยู่ในระดับต่ำ จากรายงานการสำรวจด้านโภชนาการและสุขภาพแห่งชาติประจำปี 2558 พบว่ามีเพียงร้อยละ 7.8 ของเด็กได้รับวัคซีน DPT / Penta สามครั้ง และร้อยละ 14.7 ได้รับวัคซีนโรคหัด ซึ่งการศึกษาวิจัยในเรื่องการพัฒนาทักษะการสื่อสารระหว่างบุคคลที่ส่งต่อการสร้างภูมิคุ้มกันโรคในรัฐเคบปีประเทศไนจีเรียยังไม่มีปรากฏ การศึกษาค้นคว้ามีวัตถุประสงค์เพื่อประเมินผลโปรแกรมการสื่อสารระหว่างบุคคล ต่อ ความรู้ทัศนคติเรื่องการรับวัคซีนในมารดา และการรับวัคซีนของเด็ก ในรัฐบาลท้องถิ่น รัฐเคบปี. วิธีการวิจัยการวิจัยกึ่งทดลองครั้งนี้ดำเนินการในสองรัฐบาลท้องถิ่น ในรัฐเคบปีระหว่างเดือนตุลาคม 2559 ถึงมีนาคม 2560 เจ้าหน้าที่สาธารณสุขศึกษาและเจ้าหน้าที่สาธารณสุขมูลฐานได้รับการฝึกอบรมทักษะการสื่อสารระหว่างบุคคล ได้มีการเก็บรวบรวมข้อมูลก่อนและหลังการฝึกอบรมฯ โดยใช้แบบสอบถาม สำหรับการรับวัคซีนของเด็ก เก็บข้อมูลจากบัตรฉีดวัคซีนของเด็กและการบอกเล่าของมารดา การวิเคราะห์ ใช้สถิติเชิงพรรณนา, Chi-square และ t-test เพื่อวัดผลของโปรแกรมการฝึกอบรมฯ ต่อความรู้ทัศนคติและการรับและการรับวัคซีน ระหว่างกลุ่มควบคุมและกลุ่มทดลอง. ผลการศึกษา หลังการจัดโปรแกรมการฝึกอบรมบุคลากรคณะแผนเปลี่ยนความรู้ที่เปลี่ยนแปลงไปในกลุ่มทดลอง ($M = 2.01$, $SD = 2.99$) เมื่อเปรียบเทียบกับคะแนนเฉลี่ยความรู้ที่เปลี่ยนแปลงไปในกลุ่มควบคุม ($M = 5.42$, $SD = 3.35$) ซึ่งหลังการฝึกอบรมฯ พบว่าความรู้มีความแตกต่างกันอย่างมีนัยสำคัญทางสถิติ โดยมีค่าเฉลี่ยที่แตกต่างกัน (ก่อน และหลังการฝึกอบรมฯ ในกลุ่มทดลอง) = 3.40 และพบว่า ในกลุ่มทดลอง การรับวัคซีนครบถ้วน เพิ่มขึ้นหลังการฝึกอบรมฯ จากร้อยละ 66 เป็นร้อยละ 29.5 และในกลุ่มควบคุมเพิ่มจากร้อยละ 7.6 เป็นร้อยละ 9.5 นอกจากนี้ยังพบว่า การไม่ได้รับวัคซีน ในกลุ่มทดลอง ลดลงมากจากร้อยละ 66.6 เป็นร้อยละ 29.5 และในกลุ่มควบคุม ลดลงเล็กน้อยจากร้อยละ 66.1 เป็นร้อยละ 57.6 โดยมีความแตกต่างอย่างมีนัยสำคัญทางสถิติ $p < 0.001$ และพบว่าการเปลี่ยนแปลงของทัศนคติของมารดา ระหว่างกลุ่มทดลองและกลุ่มควบคุม โดยมีความแตกต่างอย่างมีนัยสำคัญทางสถิติ $p < 0.001$. บทสรุป ผลการศึกษาค้นคว้าครั้งนี้ชี้ให้เห็นว่าการฝึกอบรมทักษะการสื่อสารระหว่างบุคคล สามารถปรับเปลี่ยนความรู้ทัศนคติ และการรับวัคซีน อันนำไปสู่ประสิทธิภาพการสร้างภูมิคุ้มกันที่ดีขึ้น

สาขาวิชา สาธารณสุขศาสตร์
 ปีการศึกษา 2563

ลายมือชื่อนิสิต
 ลายมือชื่อ อ.ที่ปรึกษาหลัก

5679179853 : MAJOR PUBLIC HEALTH

KEYWORD: Immunization Status, Knowledge, Attitude, Practice, Mother, Primary Health Care Workers,
Interpersonal Communication Skills

Saudat Abdullahi Basheer : Improving Routine Immunization coverage through strengthening Interpersonal
Communication skills of primary health care workers in rural Local government areas in kebbi state Nigeria.

Advisor: Assoc. Prof. Ratana Somrongthong, Ph.D.

Background: In 2015, Kebbi state was among the four (4) states in northwestern Nigeria that have low routine immunization performance in the country. National Nutrition and Health Survey 2015 report indicated that only 7.8% of the eligible children have received three doses of DPT/Penta and measles coverage was 14.7%. There was no documented research to investigate the effect of interpersonal communication skills on routine immunization services in Kebbi state Nigeria. The objective of this study, therefore, was to examine the effect of vaccination education on improving mothers' knowledge and uptake of routine immunization services among children in the rural LGAs of Kebbi State. Methods: The study was a quasi-experimental one was conducted in two Local Government Areas (LGAs) in Kebbi State, between October 2016 to March 2017. Health Education Officers and Primary Health Care workers trained from the intervention centers were trained on interpersonal communication skills. Data were collected using a questionnaire on the vaccination status of the children after intervention from children's vaccination cards and mother's verbal reports. The knowledge, attitude, and practice of mothers were also analyzed. Descriptive statistics, Chi-square, and student t-test were used to test the effect of the intervention on knowledge, attitude and practice, and immunization coverage between the control group and intervention group. Results: There was a significant difference in the mean scores for knowledge at baseline in the intervention group ($M = 2.01$, $SD = 2.99$) compared with mean knowledge at the end line ($M = 5.42$, $SD = 3.35$). The mean difference of 3.40 between baseline and end-line indicated that knowledge of mothers/caregivers on routine immunization has increased after the intervention. 53.8% of children in the intervention group were fully immunized while in the control it was 9.5% increasing only by about 2%. The percentage of unimmunized children was high in both groups at pre-intervention (66%) but this decreased to 29.5% in the intervention group and 57.6% in the control group. There was a statistically significant difference of change of attitude between intervention and control group after intervention with $p < 0.001$. Conclusion: The results of this study suggest that the use of IPC skills intervention could improve Knowledge, Attitude, and Practice consequently improving routine immunization. Such improvement could translate into better immunization performance.

CHULALONGKORN UNIVERSITY

Field of Study: Public Health

Student's Signature

Academic Year: 2020

Advisor's Signature

ACKNOWLEDGEMENTS

I am very grateful to Almighty for giving me this opportunity to pursue and complete this Ph.D. in Public Health. The support of my parents, family, and friends was immeasurable in strengthen my resolve to continue the studies in spite of the rigors involved. I offer my deep gratitude, thanks, and appreciation to all of them.

I am highly grateful to my advisor, Associate Professor Ratana Somrongthong for her encouragement, supervision, guidance, and support at all stages during my studies and research work. I also appreciate the support of Professor Surasak Taneepanichskul, Professor Sathirakorn Pongpanich, Dr. Alessio Panza, and Dr. Nanta Auamkul who are members of my dissertation committee for their guidance and invaluable suggestions.

I acknowledge the support and suggestion of Dr. Pramon Viwattanakulvanid in the statistical analysis of my data, and to all those that offered me suggestions and help or give direction on any aspect of the study, that are too numerous to mention, I say thanks to you and all your efforts have been greatly appreciated.

Special thanks to my husband Muhammad Basheer Yahya for his continuous moral, social support and with whom we toiled together for the Ph.D. studied. I deeply appreciate him. To Mother Hajiya Aishatu Abdullahi (Yabi), my Son Muhammad Al-Muhassan Abdullahi, and my Partners Fatima Usman and Kulthum Ibrahim for their prayers for my success in the study. I appreciate them all.

Saudat Abdullahi Basheer

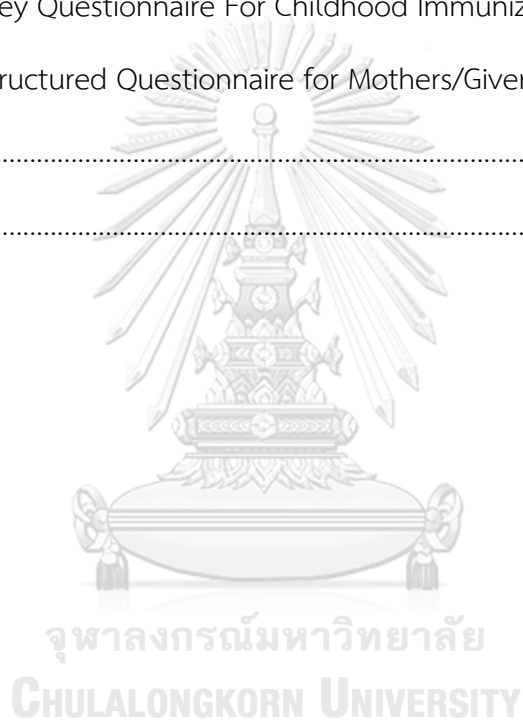
TABLE OF CONTENTS

	Page
.....	iii
ABSTRACT (THAI)	iii
.....	iv
ABSTRACT (ENGLISH)	iv
ACKNOWLEDGEMENTS	v
TABLE OF CONTENTS	vi
Chapter 1	10
1.1 Background/Rationale	10
1.2 Expected Benefit/Application.....	16
1.4 Research Objectives.....	17
1.4.1 General Objective.....	17
1.4.2 Specific Objectives	17
1.5 Research Hypothesis.....	18
1.6 Conceptual Framework.....	19
1.7 Operational Definitions	20
Chapter 2	1
Literature Review	1
2.1 Overview of Global Routine Immunization Coverage	1
2.2 Routine Immunization services in Nigeria.....	5
2.2.1 Routine dose criteria.....	8
2.2.3 Immunization System and Policy in Nigeria.....	9

2.3. Factors affecting utilization of routine immunization services	11
2.4. Effect of interpersonal communication skills on routine immunization services	14
Chapter 3	17
Methodology.....	17
3.1. Research Design.....	17
3.2. Study Area.....	19
3.3 Study Period.....	21
3.4 Study Population	21
3.5 Sampling and Sample size.....	21
3.5.1 Sample size calculation.....	21
3.5.2 Sampling technique.....	23
3.6 Study procedure.....	24
3. 7 Measurement Tools	31
3.8 Content of validity and Reliability of the instrument.....	33
3.8.1 Validity.....	33
3.8.2 Reliability	34
3.9 Data collection.....	34
3.9.1 Recruitment and Data Collection Procedures.....	34
3.9.2 Data Retrieval	35
3. 10 Data Analysis.....	35
3.11 Ethical considerations	36
Chapter 4	37
Results	37

4.1 Descriptive findings	38
4.1.1 General and socio – economic characteristics at Baseline	38
4.1.2 Immunization Status at Baseline	41
4.2.1 Knowledge about Routine Immunization before intervention	43
4.2.2 Knowledge level between intervention and control group at baseline.....	44
4.2.3 Attitude level towards routine immunization at baseline.....	45
4.2.4 Supporting environment toward vaccination uptake about routine immunization at baseline.....	48
4.4 PART 2: Post Intervention Findings and effectiveness of IPC Skills.....	49
4.4.1 Knowledge of mothers/caregivers regarding Routine immunization post intervention	49
4.4.2 Knowledge level regarding routine immunization between intervention and control group after intervention	51
4.4.3 Attitude of mothers/caregivers regarding routine immunization after intervention	53
4.4.4 Supporting environment towards vaccination uptake on routine immunization between intervention and control group before and after intervention	54
4.4.5 Overall immunization status before and after intervention	55
Chapter 5	57
Discussion.....	57
5.1 Pre-intervention characteristics.....	58
5.3 Knowledge regarding routine immunization.....	61
5.4 Vaccination Coverage	65
5.5 Attitude towards routine immunization	67

5.6 Supporting environment towards vaccination uptake	68
5.7. Conclusion	70
5.9. Strengths	73
5.10. Limitations.....	73
APPENDICES	75
Appendix A : Household Survey Questionnaire	75
Household Survey Questionnaire For Childhood Immunization.....	75
Appendix B – Structured Questionnaire for Mothers/Givers	84
REFERENCES.....	85
VITA	109



Chapter 1

1.1 Background/Rationale

The Expanded program on Immunization (EPI) was launched in 1974 by WHO with a mandate to build on the success of the global smallpox eradication program and ensure that all children worldwide have access to routinely recommended vaccines (Bland & Clements, 1998). It is a global effort of Communities, Government, United Nations agencies and civil societies/NOGOs to immunize the world's children to prevent them from suffering, disability, and death due to vaccine preventable diseases (VPD). These are Tuberculosis, Poliomyelitis, Diphtheria, Whooping cough, Tetanus, Pertussis, Measles, Haemophilus Influenza Type b, Hepatitis A Hepatitis B, Pneumococcus, Rotavirus, Yellow fever and Meningitis, Rubella and Chickenpox (WHO, 2009).

Globally, Child health and more importantly, the rates of neonatal and under 5 mortalities are significant indicators to measure level of development across countries. With the end of the Millennium Development Goals (MDGs) era, the international community has agreed with a new framework - Sustainable Development Goals (SDGs) - where the target is to end preventable deaths of new-borns and children under five years of age by 2030. The aim is for all countries to reduce neonatal mortality to at least as low as 12 deaths per 1,000 livebirths and under five mortalities to as low as 25 deaths per 1,000 livebirths (You et al., 2015). Currently, seventy-nine (79) countries have less than 5 mortality rates to at least as low as rate above 25 per 1,000 live birth while, 47 of them seem not meeting the proposed Sustainable Development Goals (SDGs) target of 25 deaths per 1,000 live birth by 2030. If progress is accelerated to achieve the SDGs

target by 2030, 38 million less than the 94 estimated million children under the age of 5 are expected to die between 2016 to 2030 (You et al., 2015).

Immunization programme has been described as one of the greatest public health interventions and constitute a cost-effective strategy to reduce morbidity and mortality associated with infectious diseases among infants. It is recorded as the great achievement of the twentieth century. Immunization is also an important means of controlling diseases and has been considered the most cost-effective health intervention worldwide. The programme reduces the burden of serious childhood infectious diseases and deaths more than other health interventions globally and serves as a building block for health systems in the developing world (Awosika, 2012). In another report from (WHO, 2013) indicated that, globally immunization is a proven tool for controlling and eliminating life-threatening infectious diseases saving up to 3 million children from death each year.

The Global Vaccine Action Plan (GVAP) set a roadmap to all countries to achieve 90% national immunization coverage of all vaccines minimum 80% coverage among all districts by the year 2020 (GVAP, 2014). In 2015, the estimated global DPT3 coverage among children under 1 year of age was 86% (116 million) with 77% coverage in WHO Africa region to 96% coverage in the western pacific region (WHO, 2014). Coverage with the third dose of DPT vaccine (DPT3) by 12 months of age is a key indicator of immunization performance because it reflects completion of the basic infant immunization schedule, coverage with other vaccines, including the third dose of polio vaccine (OPV3) and first dose of measles containing vaccine is also assessed (WHO, 2014).

Immunization has not realized its full potential; however, in 2015 the proportion of children who received first dose of DPT vaccine but did not receive third dose of DPT vaccine ranged from 0%

to 61%. Among the 19.4 million children under 1 year of age worldwide who did not receive the three basic doses of diphtheria-pertussis tetanus (DPT3) containing vaccine. 11.7 million (60%) lived in 10 countries: Angola, the Democratic Republic of the Congo, Ethiopia, India, Indonesia, Iraq, Nigeria, Pakistan, Philippines and Ukraine. Among all children who did not complete the 3 dose DPT vaccine, 12.8 million (66%) never receive the DPT dose and 6.6 million (34%) started but did not complete the vaccine (WHO, 2015)

Despite decades of progress in improving the availability of childhood immunization services, many countries including Nigeria experience high level of infant and child mortality rates. Globally, approximately 7.6 million children die before their fifth birthday every year, about 16,000 children die each day from preventable diseases such as measles and tuberculosis. Nearly half of the global children under 5 deaths occurred in only 5 countries: India (21%), Nigeria (13%), Pakistan (6%), Democratic Republic of the Congo (5%) and China (4%) (UNICEF, 2014). These deaths could have been prevented if children had been fully immunized.

Previous studies have cited several factors as possible mitigating factors of poor vaccination coverage in developing/low income countries including Nigeria such as: parental attitude and knowledge gap towards immunization benefits, ignorance, cultural/religious aversion to vaccine acceptance or use, misconception of vaccine safety, communication and information and family characteristics (Rainey et al., 2011), (Wiysonge, Uthman, Ndumbe, & Hussey, 2012). Other factors include poor communication between health workers and mothers, low literacy level of the parents and distance from the health facilities (Ibnouf, Van den Borne, & Maarse, 2007). When immunization rates are high, it is much less likely for the transmission of diseases. Decline in vaccination rates allow diseases to emerge in the population again.

A lot of substantial investments have been made to enhance access to basic vaccine services in developing countries. However, there are few studies that investigate the quality of interpersonal communication which shows that health counselling and provider-client communication seem to be weak across health services. Even when providers know messages to communicate, they do not have interpersonal skills to communicate most effectively with mothers. There were a large number of studies that showed mothers consistently cite health workers as their important source of information in improving immunization coverage. Yet, health workers received limited training and supervision on interpersonal communication skills and its importance (Shen, Fields, & McQuestion, 2014). Evidence of positive health outcomes associated with effective communication in improving immunization coverage from developing countries is strong. Mothers' knowledge, attitude and practice, communication between health worker and mother, recall of information and enhanced community ownership have all been linked to provider-mother communication (Bartlett et al., 1984).

Nigeria is one of the West African countries and is divided administratively and geographically into 37 states (Province) including federal capital and 6 geopolitical zones (Regions) which are again sub-divided into 744 Local Government Areas (LGAs). The projected total population is estimated at 195.9 million as at 2018 (National Bureau of Statistics). It six geo-political zones are: Northwest, North east, North central, South east, South west and South-south. The health system in Nigeria consists of both public and private sectors. The public health care system is divided in three levels of government (Tertiary-Federal, Secondary-State and Primary Health Care-Local Government). The Nigerian government embarked on the expanded programme on Immunization (EPI) in 1979 with the support from WHO/UNICEF. Its aim was to achieve 80 percent of routine immunization coverage by the year 1990. Though, significant progress was achieved in Universal

Immunization coverage during 1980 to 1990 (Salako & Oluwole, 2009). Consequently, Nigeria is among the countries having not met the GVAP target of 90% national immunization coverage. Though there is a slight drop in both neonatal mortality rate (NMR) - from 40 per 1000 livebirths in 2008 to 37 per 1000 livebirth in 2013, infant mortality rate (IMR) from 75 deaths per 1000 livebirths in 2008 to IMR 69 death per 1000 livebirth in 2013 and under 5 mortality rate (U5MR) from 157 deaths per 1000 live births in 2008 to U5 128 per 1000 live birth in 2013 (NDHS, 2013). While both mortality rates are declining, Nigeria still does not seem to be meeting the proposed Sustainable Development Goals (SDGs) target of 25 deaths per 1,000 livebirths by 2030 (You et al., 2015).

Though immunization coverage in Nigeria increased in the last decade, only 49% of eligible children had received third dose of DPT/Penta across Nigeria in 2015 (NNHS, 2015). This represented a further reduction compared to 2014 findings where 52.2% of children had received DPT/Penta (NNHS, 2015). Similar pattern of drop was also observed with measles from 63.7% in 2014 to 50.6% in 2015 (NNHS, 2015). However, of the six geo-political regions in Nigeria, the South-West and South-East regions had consistently high DPT/Penta coverage between 76.4 and 79.9 percent whereas the North – West and North-East regions had been persistently least performing below the national average with 16.9% and 25.6% respectively (NNHS, 2015). These low rates have been attributed partly to low quality of primary health care system, weak governance, inadequate funding and poor performance of staff at State and LGA levels (Wonodi et al., 2012)

According to the findings by (Wonodi et al., 2012) the northern regions which occupied 64% of the total population of Nigeria have serious routine immunization demand challenges. Some of the reasons include cultural and religious barriers, ignorance of the potential benefits, illiteracy,

poor attitude of health workers, lack of motivation and poor interpersonal communication (IPC) skills among the health workers.

In 2015, Kebbi state was recorded among the 4 states in the North-Western Nigeria that has low routine immunization performance in the country. These indicate that only 7.8% of the eligible children had received 3 doses of DPT/Penta vaccine and measles coverage was 14.7% in 2015 (NNHS, 2015). Under 5 mortality rates in the state was 185/1000 live births and the National was 128/1000 live birth, infant mortality rate was 89/1000 live births and the national was 69/1000 live birth. These attributed in recording high rate of vaccine-preventable diseases in the state (NDHS, 2013).

In recent studies by “Communicate to Vaccinate” (COMMVAC) project conducted in 2015 in mapping of vaccination communication use in Nigeria, the findings show that, there was limited attention in training of RI service providers in the context of communication skills. Whereas, most of the communication interventions directed to health workers were in the context of campaigns and few of such interventions appeared to be used in the context of routine immunization (Oku et al., 2016). Although, studies to test intervention on the effect of training of health workers on communication skills were carried out in other low resourced countries, there was lack of attention in training of primary health care (PHC) workers on interpersonal communication skills at the state level. Other findings, indicate that primary health care workers are the main source of information for the general public and are the main drivers of vaccination programme (Dubé et al., 2013).

However, there were no documented research to investigate the effect of interpersonal communication skills on routine immunization services in Kebbi state north-western Nigeria. The

general objective of this study, therefore, is to examine the effect of strengthening interpersonal communication (IPC) skills of PHC workers on the uptake of routine immunization services among the rural LGAs of Kebbi State. The scope of this study includes assessment and strengthening of IPC skills of PHC workers on improving routine immunization, assessment of the knowledge; attitude and practice towards immunization services by mothers/care givers. It is believed that after 6 months of intervention; there would be an increase in the number of mothers/care givers in accessing immunization services in Kebbi State.

1.2 Expected Benefit/Application

1. The study will be of benefit to policy makers, civil societies, non-governmental organizations and communities to better understand the local context of how to improve routine immunization services and its drivers, so as to plan better for supportive and sustainable interventions.
2. Targeted IPC skills strategies can be employed in addressing the barriers that prevent mothers/caregivers from accessing and utilizing routine immunization services which lead to preventable child death. This will help to address the poor child health indicators in the region and consequently contribute to the reduction of infant and child deaths.
3. The training of primary health care workers will also build their capacity and improve their knowledge and skills on interpersonal communication skills. This will also lead to increase demand on the uptake of immunization services and health system strengthening as a whole.

4. The findings of the study would provide evidence for scaling up the training of primary health care workers on effective interpersonal communication skills to all routine immunization service providers in the State and Nigeria.

1.3 Research Questions

1. Does IPC improve the knowledge of mothers/care givers on routine immunization services?
2. Does IPC improve the attitude of mothers/care givers towards routine immunization services?
3. Does IPC improve the practice of mothers/care givers towards routine immunization services?

1.4 Research Objectives

1.4.1 General Objective

To assess the effects of interpersonal communication skills (IPC) intervention to improve uptake of routine immunization services among mothers and caregivers in rural LGAs in Kebbi state, Nigeria.

1.4.2 Specific Objectives

1. To assess the knowledge of mothers/care givers on routine immunization services before and after IPC intervention between intervention and control group.
2. To assess the attitude of mothers/care givers towards routine immunization services before and after IPC intervention between intervention and control group.
3. To assess the practice of mothers/care givers towards routine immunization services before and after IPC intervention between intervention and control group.

1.5 Research Hypothesis

H_0 : There is no significant difference in knowledge of mothers between intervention and control groups after training of PHC workers on IPC skills.

H_1 : There is significant difference in knowledge of mothers between intervention and control groups after training of PHC workers on IPC skills.

H_0 : There is no significant difference in attitude of mothers on routine immunization between intervention and control groups after training of PHC workers on IPC skills.

H_1 : There is significant difference in attitude of mothers on routine immunization between intervention and control groups after training of PHC workers on IPC skills.

H_0 : There is no significant difference in practice of mothers on routine immunization between intervention and control groups after training of PHC workers on IPC skills.

H_1 : There is significant difference in practice of mothers between intervention and control groups after training of PHC workers on IPC skills.

1.6 Conceptual Framework

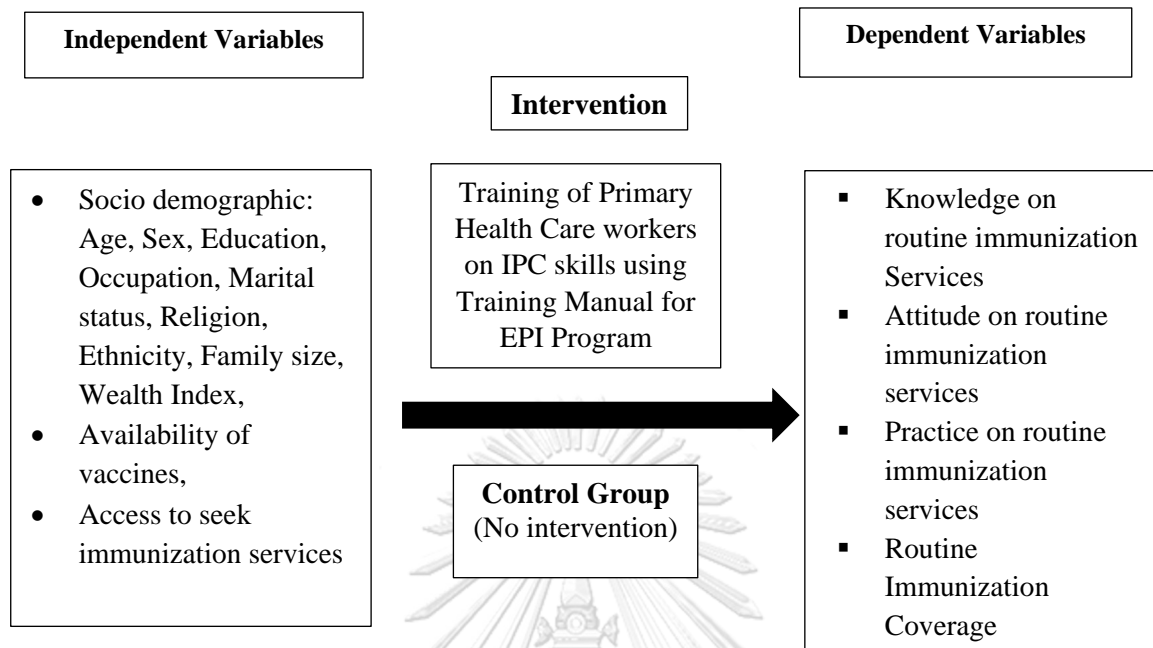


Figure 1: Conceptual Framework

1.7 Operational Definitions

Age:	Refers to the current age of the mother/caregiver and the child at the period of the study.
Sex:	This refers to the sex differential of the child (Male or Female).
Occupation:	The work that a mother does or job or profession.
Educational level:	means level of education of mothers/caregivers according to the years of education of Nigerian context of 6 years primary will be considered primary education, 6 years for completion of secondary education and 4 years will be considered completion of Higher/Tertiary institution.
Marital Status:	This refers to the current status of mother/caregiver in terms of whether she is married, divorce, separated or widowed.
Ethnicity:	Refers to the language and culture of the mother/caregiver
Family Size:	refers to the number of children in the household
Wealth Index:	Is the household's relative economic status that will affect child vaccination
Availability of vaccine:	Availability of bundled routine antigens (vaccines) at the time mother/caregiver visited health facility for routine immunization.
Access to seek immunization services:	Refers to travel cost, waiting time and distance to the health facilities
Decision Making Power:	Persons that authorize access to health or immunization services of the child e.g. father, mother, father/mother in law or relatives
Knowledge about immunization:	Mothers understanding regarding type of vaccination, EPI targeted diseases that can be prevented by immunization, immunization schedules and visits, adverse effect following immunization and action to be taken.
Attitude towards immunization services:	Refers to beliefs, feelings or perception of the mother/care giver towards childhood immunization and vaccine safety.
Practice towards immunization:	Means starting immunization at the right time, at appropriate interval and timely completion of the vaccine series of the child within 12 to 23 months of age. Details of completion of vaccines were: <ol style="list-style-type: none"> 1. At Birth – (BCG, Oral Polio 0 and Hep B), 2. At 6 weeks- (Oral Polio 1, Penta 1 and PCV 1) 3. At 10 weeks – (Oral Polio 2, Penta 2 and PCV 2) 4. At 14 weeks- (Oral polio 3, Penta 3, PCV 3 and IPV)

	5. AT 9 months (Measles and Yellow Fever)
Routine Immunization coverage:	Means the proportion of studied children aged 0-23 months who had completed immunization schedule, 'Children were considered fully immunized if they had completed their schedule of vaccines. While partially immunized means incomplete doses of DPT/Penta, Hep-B, Oral Polio, PCV, and IPV vaccines.
IPC training manual:	means an intervention which a health care provider applies One-on- One communication or two-way communication involving mothers/caregivers, their families and communities to improved their health practices become normal parts of their way of life. It also ensures that mothers/caregiver's avail of immunization services for their children and complete their immunization schedule.



Chapter 2

Literature Review

This chapter consist of the Overview of Global Routine Immunization Services, Routine Immunization Services in Nigeria, Factors affecting Utilization of Routine Immunization Services and the Effect of Interpersonal Communication Skills (IPC) on Routine Immunization Services

2.1 Overview of Global Routine Immunization Coverage

Globally, every year 1.5 million under five children lose their lives due to vaccine preventable diseases. (WHO, 2014). Recent available statistics reveal that, each year about one in five children die from vaccine preventable diseases before their fifth birthday. Measles alone kills more children each year than HIV/AIDs, sudden infant death syndrome, traffic accident or drowning worldwide (Christopher Ingraham, 2015). In 2013, four vaccine preventable diseases (Measles, diphtheria, pertussis and tetanus) were responsible for an estimated 218,400 deaths worldwide. Three quarter of these deaths were children under 5 year (Abubakar, Tillmann, & Banerjee, 2015). These deaths could have been prevented if children had been fully immunized.

Every year more than 10 million children in low middle –income countries die before they reach their fifth birth day. Most of them die because they do not access effective interventions that would combat common and preventable childhood illness (Lee, 2003). As highlighted in the literature, when immunization rates are high, it is much less likely that a pathogen will be carried and transmitted from person to person. Decline in vaccination rates allows diseases to emerge in the population again. A case in point is the fact that measles is now endemic in United Kingdom, after vaccination rates dropped below 80% (Awosika, 2012). Vaccine preventable diseases remain the most common cause of childhood mortality with an estimated three million deaths each year (Odusanya, Alufohai, Meurice, & Ahonkhai, 2008). The study also observed that, uptake of vaccination services is dependent not only on provision of these services but also on other factors including knowledge and attitude of mothers, density of health workers, accessibility to vaccination centers and availability of vaccine and supplies.

As a result, stalled progress on immunization, vaccine preventable diseases remain a global problem. Globally, vaccine preventable diseases still remain a problem. In 2013, four of the vaccine preventable diseases (Measles, diphtheria, tetanus and pertussis) resulted in nearly half a million illness and more than 200, 000 deaths occurred (Christopher Ingraham, 2013).

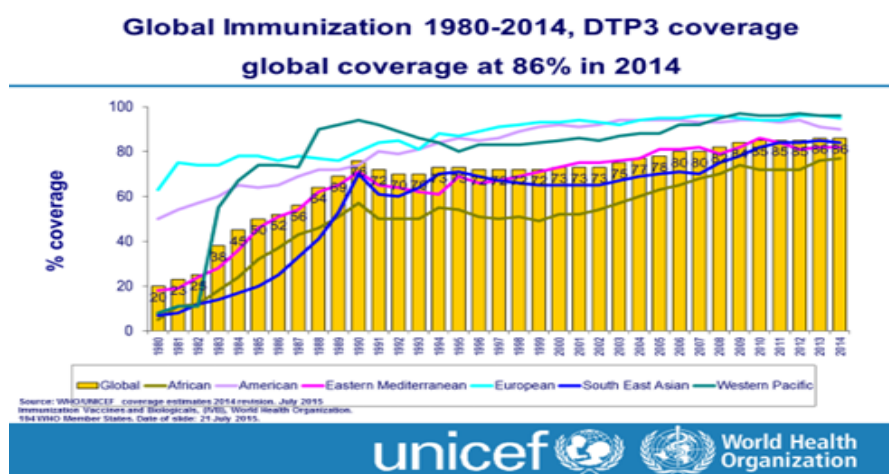
According to (WHO, 2013) report, each year nearly one million children (868,000) under the age of five year died in Nigeria. This places Nigeria in second position of global annual childhood deaths after India. Many of these deaths occurred where their immunization has not yet realized its full potential. However, as at the end of 2015, 19.4 million children under 1 year of age worldwide had not received the three recommended doses of vaccine against diphtheria, tetanus and pertussis containing vaccine (DTP₃), and 21.6 million children in the same age group had failed to receive a single dose of measles-containing vaccine. Given an estimated annual cohort of 133.6 million surviving infants, an additional 11.2 million children would need to have been reached during 2013 to attain 90% DTP₃ coverage globally (UNICEF, 2014).

Expanded programme on immunization (EPI) was launched in 1974 due to the momentum generated by small pox eradication efforts. At that period, less than 5 percent of the world's children were vaccinated against six vaccine preventable diseases: Diphtheria, pertussis, tetanus, measles, poliomyelitis and tuberculosis (Chan, 2014). The aim of EPI was to ensure all children benefit from life-saving vaccines and to protect every child against high incidence of vaccine preventable diseases, for which affordable vaccines were available. As a result of smallpox eradication effort, many countries were encouraged to develop and establish routine immunization system to effectively implement EPI. Globally routine immunization system was established from 1970s and 1980s with a required multiple programme component to provide for the child to be successfully vaccinated (Mitchell V. et al., 2013).

Globally, immunization coverage continues to increase dramatically. Current estimate of 2013 show that 6.3 million children under the age of 5 died worldwide (UNICEF, 2014). Among the top 26 countries shouldering the burden of under 5 mortality rate, 12 countries are in Sub-Saharan Africa and 10 of these are in West and Central Africa. Nearly half of the global children under 5 deaths occurred in only five countries: India (21%), Nigeria (13%), Pakistan (6%), Democratic Republic of the Congo (5%) and China (4%) (UNICEF, 2014). In response to challenges in global immunization, WHO and the United Nations International Children's Emergency Fund (UNICEF) set up the Global Immunization Vision and strategy (GIVS) in 2003. The main goal of GIVS is primarily to reduce illness and death due to vaccine preventable diseases by at least two-thirds by 2015

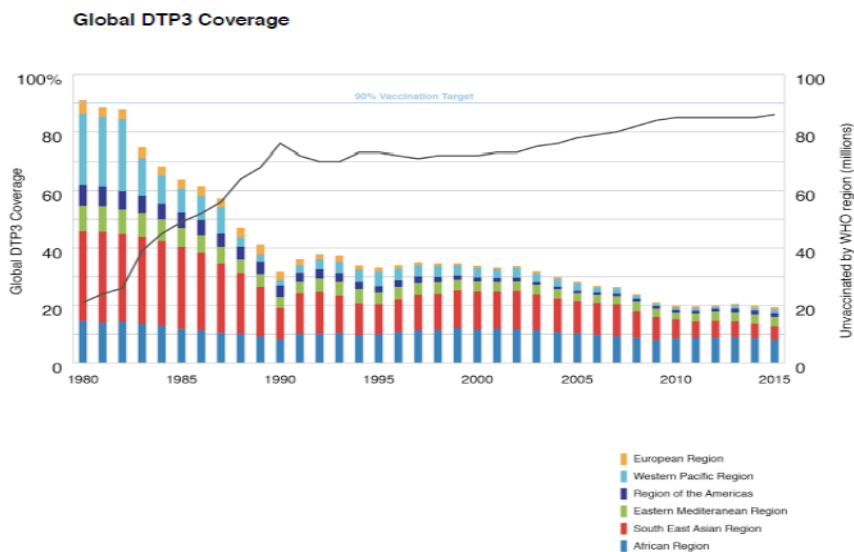
or earlier. Again, the African Task force on Immunization (ATFI) recognized from the outset the need for high vaccination coverage to counter the disproportionate burden from vaccine preventable diseases in African Region, and therefore set challenging goals for 2001-2005. These goals aimed to ensure that the immunization performance of the African Region rose with another regions' performance (WHO/UNICEF, 2005).

Over the years, there have been several international efforts to increase EPI coverage, including childhood immunization. The global partners on immunization such as GAVI, MDGs, GIVS and GVAP in collaboration with WHO African regions developed a strategic plan of action to see that all national EPIs have reached global coverage with three doses of Diphtheria-tetanus-pertussis vaccine for children within 12 months of age from 5% in 1974 to 85% in 2010. However, Sub-Saharan Africa has only reached 77% DPT3 coverage in 2010. Complete immunization is essential to achieve the Millennium Development Goals (MDG4) of substantially reducing child mortality rates (Okwo-Bele & Cherian, 2011). Lack of awareness among mothers as the most important cause for dropout in vaccination series. In many cases, children in rural and remote areas in particular have less access to immunization. (S Waisbord & Larson, 2005) concluded that African immunization is a mix of success and failure, where 17 sub-Saharan African countries have immunization coverage level under 50%.



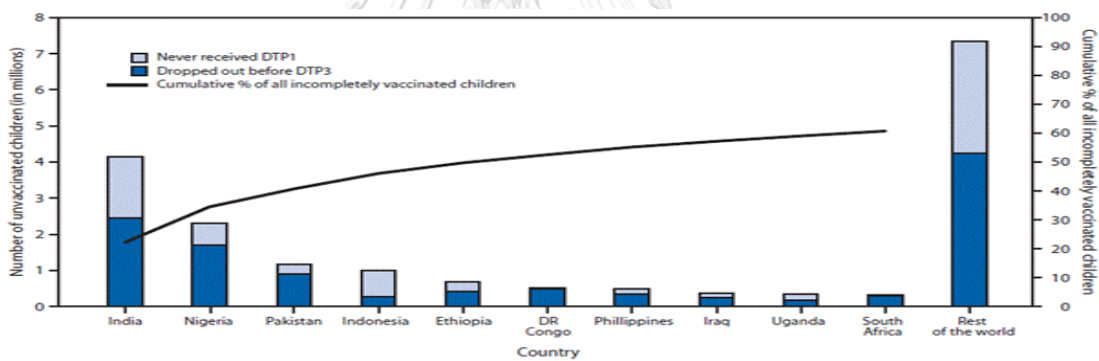
Source: WHO/UNICEF: Coverage estimates 2014 revision, July 2015

Figure 2: Global Immunization coverage 1980- 2014



Source: WHO/UNICEF estimates of National Immunization coverage 2015
www.who.int/immunization/monitoring_surveillance/who-immuniz-2015

Figure 3: DPT 3 Coverage



Source: Global Routine vaccination coverage 2014

Figure 4: Estimated Number of children who do not received 3 doses of DPT in 10 countries with high largest number of in-completed vaccinated children

2.2 Routine Immunization services in Nigeria

Expanded programme on immunization was initiated in Nigeria in 1979 with the support from WHO/UNICEF with emphasis to be an essential component of primary health care. The programme aimed at providing routine immunization to children below the age of two years. The vision of the EPI in Nigeria is to improve the health of the children in Nigeria by eradicating or eliminating all the six killer diseases: Tuberculosis, Poliomyelitis, diphtheria, pertussis (whooping cough), yellow fever and measles. It was targeted to achieve 80% coverage by the year 1990 (Imoh, 1991).

The programme recorded initial but intermittent successes. A significant progress was made in the 1980's with the Universal Child Immunization (UCI) days (1986-1990s) when 80% coverage for all antigens was recorded. Since that period of success, the performance of routine immunization in the country has been gradually consistent on reduction and improvements of routine immunization coverage in the last decade ranging from 27% to 114% with a drop in DPT3 from 74% in 2010 to 52 in 2012 (FMOH, NPHCDA, 2014). This good performance was not sustained in the years that followed as the introduction of National Programme on Immunization (NPI) in 1997 which replaced the EPI and mainly focused on polio eradication weakened the routine services in the country (Analysts, 2005). Since then, the country has progressively demonstrated the political will in strengthening the health system and routine immunization services particularly to reduce the burden of vaccine preventable diseases, but success towards achieving the target of having 80% or above of children fully immunized is still a problem. The coverage in many parts of Nigeria falls below 50% (Kunle-Olowu, Kunle-Olowu, & Emeka, 2011). The NDHS (2013) has shown that immunization coverage in Northern Nigeria zones ranged from 14% to 44%, while in Southern Nigeria Zones the range was 70% to 81%.

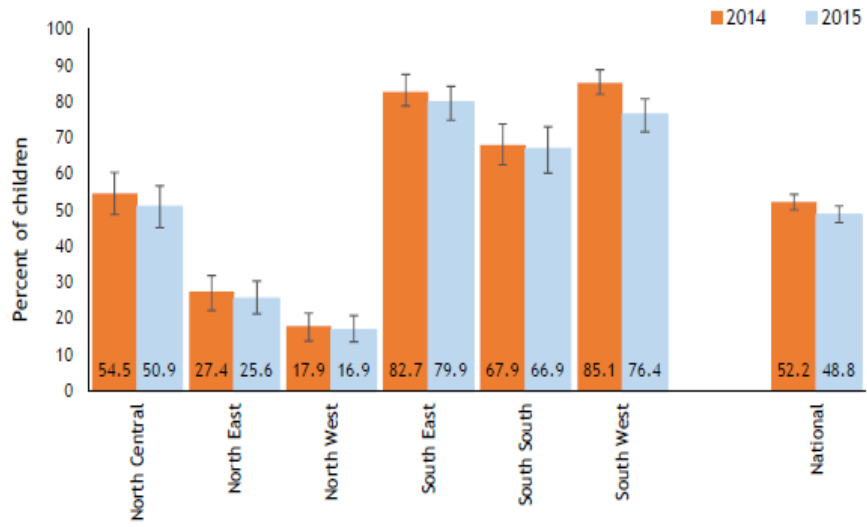
NDHS (2013) indicated that urban children are nearly three times more likely than rural children to receive all basic vaccination (43 percent versus 16 percent). Children whose mothers have more than secondary education are more likely to be fully immunized than those born mothers with no education (64 percent and 7 percent). The coverage varies with regions, immunization coverage in the South East and South 52 percent of children of 12 months are fully immunized compared with 10 percent in the North West (NDHS, 2013). Recent survey conducted in 2015 also indicated that North-west and North-East regions were persistently recording low performance of routine immunization coverage below the national average with 17% and 26% respectively. At State level, coverage ranged between 2% in Sokoto to 92% in Osun State. In 2014, only 11 states out of 37 states in Nigeria met the target of 80% coverage, while coverage was below 25% in 9

states. In 2015, only 5 states from Southern part of the country achieved the target of 80% DPT/Penta 3 coverage, and coverage was particularly low in Kebbi 8%, Sokoto 4.4%, Yobe 8% and Zamfara states 6%, where less than one in ten children was immunized (NNHS, 2015)

Findings from several studies refer to a wide range of issues hampering the proper implementation of immunization programme in Nigeria including weak governance, inadequate cold chain equipment (CCE) and poor staff performance at state and LGA level, weak demand and cultural and religious beliefs (FMOH, NPHCDA, 2014).

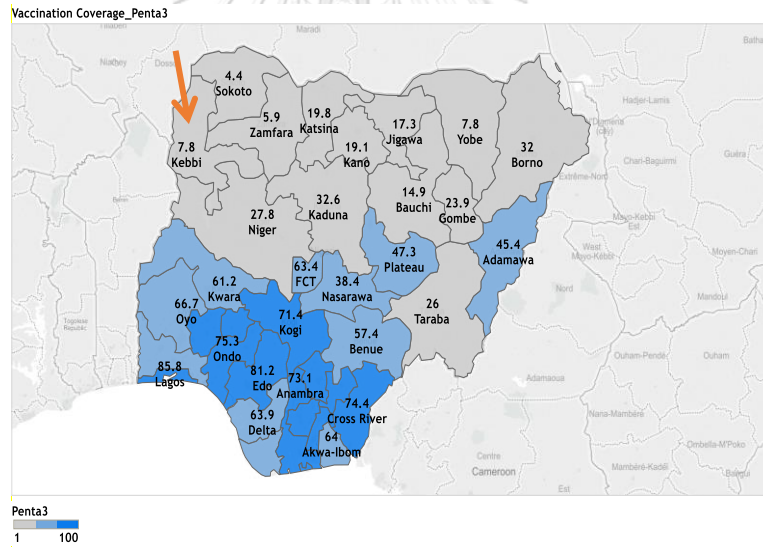
Table: 1 Revised Nigeria Immunization Schedule

Vaccine/Supplement	No of Doses	Age	Minimum Interval Between Doses
Bacillus Calmette-Guerin (BCG)	1	At birth or as soon as possible after birth	NIL
Hepatitis B vaccine (Hep B)	1	At birth, within 24 hours of birth	NIL
Oral Polio vaccine (OPV)	4	At birth and at 6, 10 and 14 weeks of age	4 weeks
Pentavalent vaccine (contains DPT, HEP B and HIB)	3	At 6, 10 and 14 weeks of age	4 weeks
Pneumococcal Conjugate vaccine (PCV)	3	At 6, 10 and 14 weeks of age	4 weeks
Inactivated Polio vaccine (IPV)	1	At 14 weeks of age	NIL
Measles vaccine	1	At 9 months of age	NIL
Yellow Fever vaccine	1	At 9 months of age	NIL



Source: National Nutrition and Health Survey (Smart Result, 2015)

Figure 5: DPT/Penta 3 National Immunization coverage by Zones 2014 and 2015



Source: National Nutrition and Health Survey (Smart Result, 2015)

Figure 6: Map of Nigeria showing Location of Kebbi State and Penta 3 Vaccination coverage

2.2.1 Routine dose criteria

There are three criteria for immunization which is defined and counted as routine dose (WHO weekly epid, 2011)

1. Screening for the child age, immunization history and contraindication of using vaccination card/or caregivers recall and making the decision to immunize the child when due according to national immunization schedule.
2. The dose of vaccination and data administered is recorded in the following; Child health/immunization card, immunization register and session tally sheet. While the vaccination dose is reported on the monthly summary.
3. The vaccination administered is reported in the LGA/State/National administration data collection system.

2.2.2. Provision of routine immunization services

2.2.2.1 Health Facilities

There are many strategies for delivery of routine immunization services at health facilities. Fixed post refers to the regular delivery of immunizations in a health facility on specified days of the week and hours of the day. While in larger facilities (General Hospital or Teaching Hospitals) may vaccinate the eligible child whenever he/she comes.

Outreach is the delivery of services to children/clients who are more than 5km away from the health facilities or in a living in difficult area and mobile strategy is usually described as trips of more than one day by health worker for the purpose of delivering services to the clients living in the remote areas (Wortley P, 2012).

2.2.3 Immunization System and Policy in Nigeria

Policies and strong immunization system are needed to ensure that potent vaccines are provided safely to eligible child or person who needs them. The main component of a well immunization system includes: service delivery; capacity to maintain vaccines at the appropriate temperature and deliver them in a timely manner; monitoring and surveillance; trained health workers; and planning and management (WHO, 2012). The Federal government of Nigeria develops policies and guidelines, provides technical support and is responsible for delivery of tertiary health care, while secondary and primary health care (PHC) are under the purview of the states and local governments, respectively. In relation to immunization, the federal government purchases vaccines, develops immunization guidelines and provides technical support to sub-national government through the National PHC Development Agency. However, states and local governments provide infrastructure and logistics to deliver routine immunization services. The Nigerian policy is to “provide immunization services and potent vaccines free to all eligible population at risk” and also to ensure equitable access, by having routine immunization services available within 5km of any community (NIP, 2009).

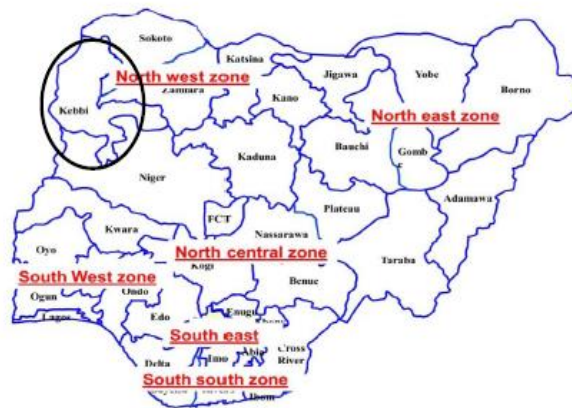
Between 1985 and 1990 the national health plan outlined the objectives of the EPI through strengthening immunization, accelerating disease control and introducing new vaccines, relevant technologies and tools. In 1995, Nigeria became a signatory to the World Health Assembly and adopted the World Health Assembly Resolution (WHAR). In 1998, Nigeria laid out core activities of EPI policies by ensuring all districts of the country were well covered with vaccination (Ophori, Tula, Azih, Okojie, & Ikpo, 2014). In 2000, following the African Regional Summit on EPI held in Harare in 1999 the Federal Ministry of Health specified its EPI policies with a vision to be achieved by the year 2004 as follows: To achieve EPI district plan and attain 80% DPT3 coverage in all states and increase EPI funding, eradication of wild polio virus and reduction of measles morbidity by 90% and measles mortality by 95% while yellow fever to be increased at least 80%, and to include vitamin A and hepatitis B into national immunization schedule and vaccination coverage should not be less than 80% with other antigens (Obioha, Ajala, & Matobo, 2010).

Nigeria also adopted the millennium development goals (MDG) calling for a two-thirds reduction in child mortality as compared to 1990 to the year 2005 (Ophori et al., 2014). In addition to that, Nigeria also ratified the United Nations General Assembly Special Session (UNGASS) goals urging the country to ensure: full immunization of children less than one year of age at 90% coverage nationally with at least 80% coverage in every district and elimination of vitamin A deficiency by 2010. In an effort to meet the global challenges and enhance the effectiveness of the

immunization programme, the EPI in Nigeria was restructured and renamed National Programme on Immunization (NPI) in 1997 as a way of promoting national consciousness and ownership of the programme by the State and Local Government Areas (LGA) (FMOH, NPHCDA, 2014). Following the Health Sector Reform, in 2007, NPI was merged with the National Primary Health Care Development Agency (NPHCDA) with the mandate to protect Nigerian children from vaccine preventable diseases through the provision of vaccines, devices and technical support to the State/Local Government levels (FMOH, NPHCDA, 2014). The NPHCDA vision is also to achieve Polio eradication, reaching every ward (REW) or Reaching every District (RED) to deliver more vaccines to its people through different innovations and strategies in an integrated approach, driven and owned by the State/LGA levels in line with global vaccine action principles (FMOH, NPHCDA, 2014). While the support provided by WHO along with other partners to national authorities in routine immunization contributed to the improved access to and coverage of routine immunization services. Prior to the 1990s, the coverage of routine immunization services was reported as high as 81.5% coverage (Babalola S. and Olabisi A, 2004). However, recent estimate by WHO indicate that each year close to a million (868,000) children under the age of five years die in Nigeria. Many of these deaths are caused by vaccine –preventable diseases which place the country second after India (WHO, 2013).

Nigeria has witnessed gradual but consistent reduction in immunization coverage. By 1996, the national data showed less than 30% coverage for all antigens, and this decreased to 12.9% 2003 (Babalola S and Olabisi A, 2004). The vision of EPI in Nigeria is to improve the health of Nigerian children by eradicating all six killer diseases, which are polio, measles, diphtheria, whooping cough, tuberculosis and yellow fever. The continued low uptake of immunization threatens Nigeria's effort at meeting the Millennium Development goals 4, which aims to significantly reduce child mortality rate (Analysts, 2005).

The drop-in immunization coverage in Nigeria from 52% in 2012 to 49% in 2015 has left more than 3.25 million children at the age of 12 months unimmunized (FMOH, NPHCDA, 2014). Adding to already existing huge pool of susceptible under 5 children which may result in the occurrence and spread of vaccine preventable diseases outbreak.



Source: National population commission, 2008: online

Figure 7: Map of Nigeria showing Location of Kebbi State and Zone

In spite of narrow range of antigens currently available to the average Nigerian child from Government schedule, routine vaccination coverage still remains very low (Advisory, 2012). This is a reality especially in some states in northwest Nigeria. The low immunization coverage for Nigeria has meant an increase in deaths of susceptible children before the age of 5 from diseases like measles. In 2003, DPT3 in Kebbi remained far below (1.7%) national average. Despite radical reforms at the National level, funding for routine immunization activities in Kebbi state remained far from adequate.

2.3. Factors affecting utilization of routine immunization services

Immunization rates in northern Nigeria are some of the lowest in the world. According to 2015 National Immunization schedule, the percentage of fully immunized infants in targeted states in northern Nigeria was below average ranging from 4.4% in Sokoto, 6% in Zamfara, 8% in Kebbi and 8% in Yobe. As a result of these, thousands of children are victims of vaccine preventable diseases. Many factors have been recorded as possible mitigating factors of low immunization coverage in developing/low income countries including Nigeria. These factors include lack of political will, poor work attitude and mal-orientation of Health workers, ignorance, cultural/religious average aversion to vaccine acceptance or use, misconception about vaccine safety and lack of awareness about availability of vaccination services, inadequate cold chain facilities and vaccine stock-outs among others (B. N. Tagbo et al., 2014) and (B. Tagbo, Uleanya, & Omotowo, 2013b)

Parent's beliefs about immunization risks and benefits may be the most common reasons for partial vaccination. Several reasons for these low rates are: Primary health care are highly inefficient, and low demand for immunization due to lack of understanding of its value (Analysts, 2005). Incorrect knowledge as the preventive role of routine immunization is widespread in Nigeria. A quantitative research conducted in six states in 2004 revealed that in rural Katsina and rural Kano a number of immunization decision-makers and caregivers stated that only polio immunization was required - that once a child has received its polio "drop", is immunized against all childhood illness (Analysts, 2005).

Knowledge and practice about children vaccines, communication about the risk and benefits of vaccines and other vaccine information are key issues underlying the factors determining the uptake of immunization. Several studies show that, various factors that are related to parental immunization knowledge and practice are also associated with childhood immunization compliance. These factors include education of the parents, mother's age at the time of delivery, mother's race, and number of pre-school children, child birth order, and family income. In addition, immunization providers' influence parental knowledge, practice and decisions regarding immunization of children (Al-lela, Bahari, Al-abbassi, Salih, & Basher, 2012).

In Nigeria, the greatest challenge to the acceptance of immunization is a religious one especially among the northern Nigerian Muslims. Generally, north has low immunization coverage, the least being 6% (northwest) and highest being 44.6% (southwest) (Ankrah & Nwaigwe, 2005). A 2003 study in Kano State found that 9.2% of respondents (Mothers aged 15-49) had no faith in immunization, while 6.7% expressed "fears of side effects" (Brieger, Salami, & Ogunlade, 2004). The level of parental education is the most important factor related to immunization knowledge and practices of parents. Most of the information regarding immunization risks and benefits is related to the level of parents' education (Wang, Wang, Zhang, Kang, & Duan, 2007). If parent received good information about immunization, their worries and fears about vaccination will be eased. Previous studies reported that mothers' knowledge was found to be strongly associated with their educational level (Wang et al., 2007), while, other studies found no correlation between immunization knowledge, attitude, or practice (KAP) and the educational level of parents (Hariweni, Ali, Sofyani, & Lubis, 2004).

The effect of mothers' age on immunization knowledge and practice were estimated. Mother's knowledge was found significantly greater among mothers who were older at the time of their child birth. A previous study on immunization knowledge and practice indicated that race or ethnicity may be a contributing factor to inadequate knowledge, attitude and practice of mothers

(Al-lela et al., 2012). Vaccination knowledge, attitude and practice were correlated with family size and the number of siblings in each family. It was found that those parents were less likely to have adequate knowledge or positive practices about immunization of their children (Wang et al., 2007) while various studies found that economic status of families was having a strong association with immunization knowledge, attitudes and practice (Al-lela et al., 2012), (Wang et al., 2007).

In Malawi, Ethiopia, India, Bangladesh and Philippines, a multiregional study conducted showed that, there was a very significant high demand for vaccination services and the damage was being done to immunization programme by poor communication skills between health workers and the clients (Streefland, Chowdhury, & Ramos-Jimenez, 1999). As regard to the determinant of complete immunization among 12-23 months old in Nigeria, previous studies carried out in Nigeria have been particularly limited to a specific area such as states, LGA or settlements. No studies were carried out on full immunization which could apply to the whole country. Amongst the studies carried out locally on child immunization were researches by (Abdulraheem, Onajole, Jimoh, & Oladipo, 2011) and (Oduşanya et al., 2008). Some of the factors identified in their studies were place of birth, age of the child in months, current age of the mother, marital status, occupation, religion, level of education, number of children, retention of immunization card, place of vaccination, gender and knowledge score.

Another study conducted by (Abdulraheem et al., 2011) identified reasons for low coverage rates as mothers' poor knowledge of immunization against targeted diseases, parents' concern about immunization safety, long waiting time at the health facility and long distance from the health facility. Apart from these problems, false contraindications like catarrh and mild fever in the child at the time of immunization, failure to administer simultaneously all vaccines for which the child was eligible and lack of information on the vaccination schedule are reported causes of missed opportunities to immunization in Nigeria (Anah, Etuk, & Udo, 2006). Many studies show that, a socio-demographic characteristic of mother/caregivers is a determinant for full immunization status of children. Poor service delivery, parent who has low levels of education and lack of information about immunization are major reasons for low coverage among children. Result of study in Ambo district indicates that, maternal socio-demographic characteristics such as educational status, religion, occupation, place of residence and average monthly income and family size were the factors that have been shown to increase completion of immunization among children between 12-23 months (Etana, 2011).

Unavailability of vaccines on the appointed dates of immunization session due to vaccine stock-outs was another factor affecting immunization services. Vaccine unavailability was described by

most of the mothers as the reason for postponing the immunization schedule. A study done in southeast Ethiopia also reported that, 52.1% of mothers returned home without immunizing their children due to lack of vaccines in health facilities (Legesse & Dechasa, 2015). When mothers came to immunize their children and were denied the services because of shortage or unavailability of vaccines, they are unlikely to return back for vaccination (Bofarraj, 2011). Ethiopian national survey indicates that, unawareness of the need for immunization and unawareness of the need to return for subsequent doses were reasons given by parents/caregivers for not immunizing children of age 12-23 months (Kidane et al., 2008). (Ransome-Kuti, 1986) stated that historically, uneducated woman is subject to enormous social and cultural constraints that prevent her from utilizing the services effectively and is also subjected to confronting advice from ancient and modern health system regarding the care of her child. He concluded that the father's role in health decisions is often dominant in most instances.

2.4. Effect of interpersonal communication skills on routine immunization services

Definition of Interpersonal Communication is face to face verbal or non-verbal exchange of information and feelings between two or more people. Each time a service provider has contact with a client, communication is taking place. Interpersonal communication helps the providers ability to understand client concerns, to explain health issues and engage in shared decision-making. Effective interpersonal communication (IPC) between health care provider and client is one of the most important elements for improving client satisfaction, compliance and health outcomes (Nicholas, Heiby, & Hatzell, 1991).

Evidence of positive health outcomes associated with effective communication from developed countries is strong. (Nicholas et al., 1991). Studies in many countries have shown serious communication problems are common in clinical practice. Improving interpersonal communication between providers and client is an important health policy. Most concerns by public about health care services are not about competencies, but about communication (Simpson et al., 1991).

Effective Communication begins when a health worker starts thinking about what keeps people from coming to a health facility or what prevent them from returning. Most of the reasons attributed to (lack of supply, distance). In India, intensive and repeated Interpersonal Personal Communication activities are conducted by trained health workers and communicators in

conducting House to house visits as well as systematic and sustained creating awareness of the community (Obregón et al., 2009).

In marginalized communities where routine immunization is weak and vaccination is still not a social norm, Inter Personal Communication strategies are used as a “persuasion tactic”, effective shifting of people’s knowledge, attitude and beliefs about immunization and practice (UNICEF, 2004). Evaluation studies have unanimously supported these findings, concluding that Inter Personal Communication provides the most culturally and linguistically appropriate communication channels, particularly in rural areas without access to mass media (Silvio Waisbord, 2004). Effective communication strategies can address some of the vaccination issues by making people aware of the benefits of immunization; correcting false beliefs, rumours, or concerns that prevent people from getting immunised; and informing people where and when to get immunised, thereby potentially increasing vaccination rates (Willis et al., 2013).

A critical factor shaping parental attitudes towards vaccination is the parents’ interaction with health workers. An effective interaction can address the concerns of vaccine supportive parents and motivate a hesitant parent towards vaccine acceptance (Kennedy, LaVail, Nowak, Basket, & Landry, 2011). Conversely, poor communication can contribute to rejection of vaccinations dissatisfaction with care. Such poor communication often resulted from belief by the health providers that vaccine refusal arises from ignorance which can simply be addressed by persuading or providing more information (K. F. Brown et al., 2010). A study done by (Lewandowsky, Ecker, Seifert, Schwarz, & Cook, 2012) indicated that, such approach is counter –productive because it fails to account for the complexity of reasons underpinning vaccine refusal and may even result in a backfire effect.

Health workers have a central role maintaining public trust in vaccination; this includes addressing parents’ vaccine concern (Kempe et al., 2011). Few studies have addressed how health workers should engage with parents. Since it is clear that parents wants an improved dialogue about vaccinations, it is essential to focus on communication process that build rapport and trust between the health worker and the parent (Cooper, Larson, & Katz, 2008), (Sturm, Zimet, & Klausmeier, 2010).

Good parental practice regarding immunization will be able to reduce the incidence of infectious diseases. The most important factor affecting parental practice towards immunization is communication between parents and source of information or immunization providers. Improving

communication skills will improve parents' perceptions of the benefits and risks of vaccines (Stewart, 1995) and (Al-lala, Bahari, Al-abbassi, & Basher, 2011).



Chapter 3

Methodology

This study aimed to demonstrate the effect of interpersonal communication skills (IPC skills) through primary health care workers on improving routine immunization services in rural LGAs of Kebbi State

3.1. Research Design

The study used quasi-experimental study design consisting of consisted of pre -intervention, intervention, and post intervention components. Intervention and control groups were selected to assess the effectiveness of the interpersonal communication skills (IPC) through Primary healthcare workers to improve immunization services in two selected LGAs, Kebbi State, Nigeria

The intervention group was where the IPC skills was implemented, and the control group was where the program was not implemented. Assessment was conducted at baseline observed prospectively before and after intervention as shown below.

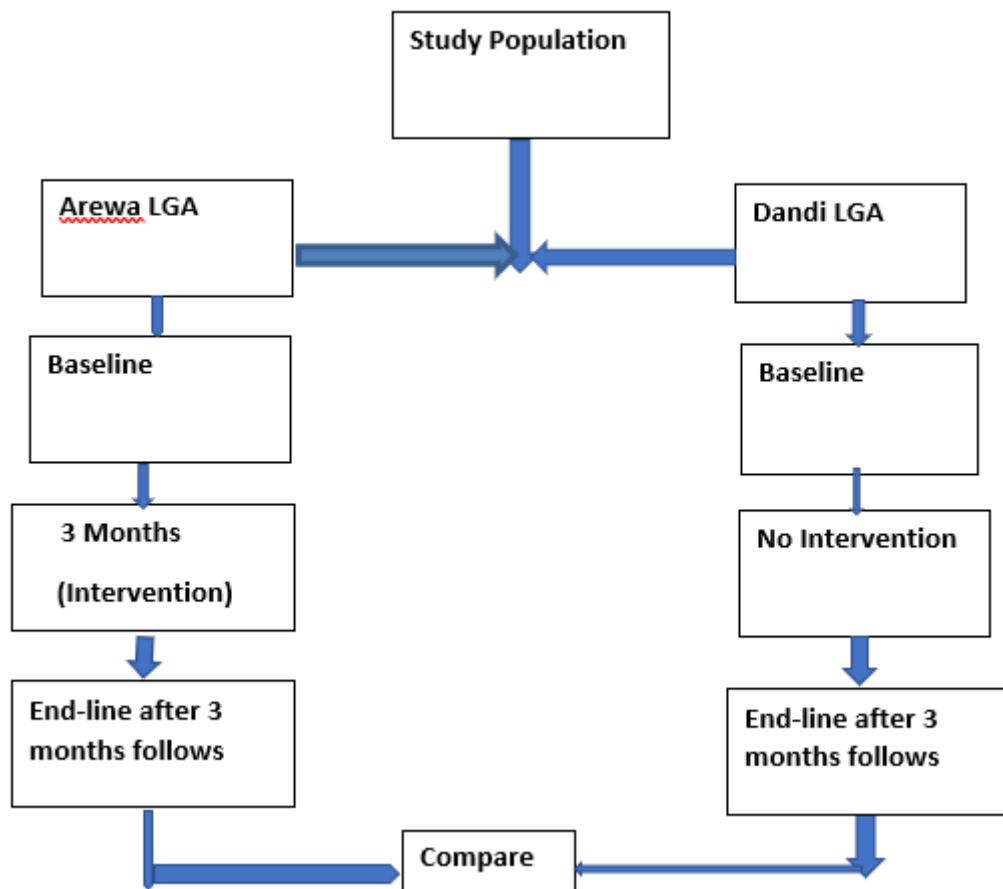


Figure 8 Frame work of the study design

The study was conducted for 6 months between 2nd October 2016 and 31st March 2017. The duration of the first stage which consisted of an initial survey and intervention approach which lasted 6 months. Subsequently, a training program of IPC skills was developed which took about 4 hours/day for 2 days (8 hours). Finally, the IPC training was implemented. The duration of the quasi - experimental study was 6 months within which data collection, follow-up and evaluation and report writing followed.

3.2. Study Area

Arewa LGA located at the North Western part of Kebbi State, Nigeria was purposively selected as the intervention area to test the effectiveness of IPC skills training while Dandi LGA was selected as the control group. The purpose of selecting these two LGAs is that they are both rural LGAs and have common background in terms of population characteristics and prevalence of low coverage of Routine immunization and high dropout rate.

1. Arewa LGA has a total population of 249, 733 based on (2006 national census) and the target population of EPI under 1 year is 9, 989; under –five-year population is 49,947; Pregnant ANC women 12,487 and women of childbearing age 54, 941 (SPHCDA). It has 11 political wards with 1 General Hospital, 10 PHC centres, 30 PHC clinics, 4 Doctors, 20 Nurses, 30 Midwives, and 190 primary health care workers across the health facilities. The LGA offers weekly routine immunization services in all the health facilities and two outreach sessions per month in hard-to-reach settlements. Arewa LGA was among the six LGAs in Kebbi that was found to have low routine immunization coverage of less than 50%. Additionally, this low RI performance was as a result of poor accessibility, weak demand of RI services, ignorance and poor communication and information by health workers to reach the rural communities, scattered geographical areas, hard to reach settlements some of which have limited access to mass media messages (DQS result, 2015). Moreover, it was found that most of the women in Arewa LGA are illiterate. The primary health workers at the primary health care centre/clinics have not been trained on interpersonal communication skills and so do not possess the technical skills necessary to interact optimally with the mothers or care givers. The researcher selected the LGA due to low RI coverage and factors attributed to the low immunization coverage.

2. Dandi LGA was selected as the control group to compare with Arewa LGA because it is among the LGAs having Low RI coverage similar to Arewa LGA study area. The distance between Dandi and Arewa LGA is 82 Kilo-meters and two wards from Bunza LGA separated between both LGAs which can eliminate the distance confounder between the intervention and the control group. Dandi LGA has a total population of 195,782 - under 1year children 7,831, under 5year children 39,156; pregnant women 9,789 and women of child bearing 43,070. It has 11 political wards, 1 General hospital, 9 PHC centres, 17 PHC clinics. It also had 4 Doctors, 19 Nurses, 27 Midwives, 173 Primary health care workers across the LGA.

However, for proper control of the confounding variables in the communities of research observation, the researcher randomly selected two Political wards in both intervention and control LGAs and 2 PHC centres and 2 PHC Clinics in each ward of the study LGAs.



Source: National Population Commission, 2008

Figure 9 showing the locations of intervention and control LGAs on Kebbi State map

3.3 Study Period

The study period was between October 2016 and March 2017

3.4 Study Population

The target population for this study was mothers/caregivers of children 0-23 months of age.

Inclusion Criteria

- a) Mothers/Care givers of children 0-23months of age in the study area of Arewa and Dandi LGA
- b) Willingness to participate
- c) Resident in the study area at least for the 6 months of intervention

Exclusion Criteria

- a) Plan to leave community within the intervention period
- b) Unable to communicate
- c) Severe sickness

3.5 Sampling and Sample size

3.5.1 Sample size calculation

1. The sample size was calculated by using the following formula:

$$n = D \times \frac{\left[z_{1-\alpha/2} \sqrt{P_0(1-P_0)} + z_{1-\beta/2} \sqrt{P_a(1-P_a)} \right]^2}{(P_0 - P_a)^2}$$

Source: (Organization, 2005)

Where:

$$D = 2 \text{ (design effect)}$$

$$\alpha = 0.05 \text{ (5\% level of significance)}$$

$$\beta = 0.20 = 1 - \beta = 80\% \text{ (Power)}$$

$$Z_{1-\alpha/2} = 1.960$$

$$Z_{1-\beta/2} = 1.645$$

$$P_0 = 0.08 \text{ (8\%)} = \text{Coverage before intervention (Pre - intervention)}$$

$$P_0 = 0.92$$

$$P_\alpha = 0.2 \text{ (20\%)}$$

$$1 - P_\alpha = 0.8$$

$$n = 2 \times \frac{[1.96\sqrt{0.08(0.92)} + 1.645\sqrt{0.2(0.8)}]^2}{(0.08 - 0.02)^2}$$

$$\text{approximately} = 196.6 = 197$$

$$10\% \text{ add} = 196.6 \times 0.1 = 19.7 = 20$$

$$= 197 + 20 = 217 \text{ for each group}$$

$$\text{Total sample size} = 217 \times 2 = 434$$

From the calculation above, the sample size is equal to 434 mothers/caregivers of children having children in the age group of 0-23 months was appropriate for this study using WHO 30 cluster survey methodology (Organization, 2005). However, due to the possibility of some mothers/caregivers opting out of participation in the survey, the sample size was increased by 10% making it 434. Therefore, the total sample size for the initial stage was 217 mothers/caregivers of the eligible children in each group (intervention group and control group).

3.5.2 Sampling technique

Stage 1.

The study subjects were selected using multistage sampling technique. There are 21 LGAs in Kebbi State. To ensure homogeneity, Arewa and Dandi LGAs were chosen because they share some common characteristics which include similarity in population, characteristics of health facilities, religion, culture and statistics on the routine immunization coverage and both are rural LGAs. Arewa LGA was purposively selected as intervention study area while Dandi LGA as the control study area.

Stage 2

Two political wards in each of the two selected LGAs have been chosen by random sampling. As mentioned above, Kangiwa and Gumunde- Rafin Tsaka wards in Arewa LGA constituted the intervention area while, Kamba-Kamba and Geza wards in Dandi LGA were sampled as the control study area.

Stage 3

A WHO 30 by 30 cluster survey method was adapted (Organization, 2005). A cluster comprises an area (settlements) where there are fixed samples of 7 eligible (0-23 months) children. In each LGA, there are 30 clusters which were selected in both Intervention and Control LGAs. In each of the two selected wards, 15 clusters were selected by random sampling method.

Stage 4

Selection of participants (mothers/care givers of children 0-23 months of age). In each cluster, 7 participants were selected by random sampling to give a total of 210 participants in each LGA i.e $210/30 = 7$. However, 7 participants per LGA were kept as reserves to take care of sampling gaps which might arise due to unavailability of the initially selected mothers/caregivers. In Post intervention the same women of baseline were interview at the end line.

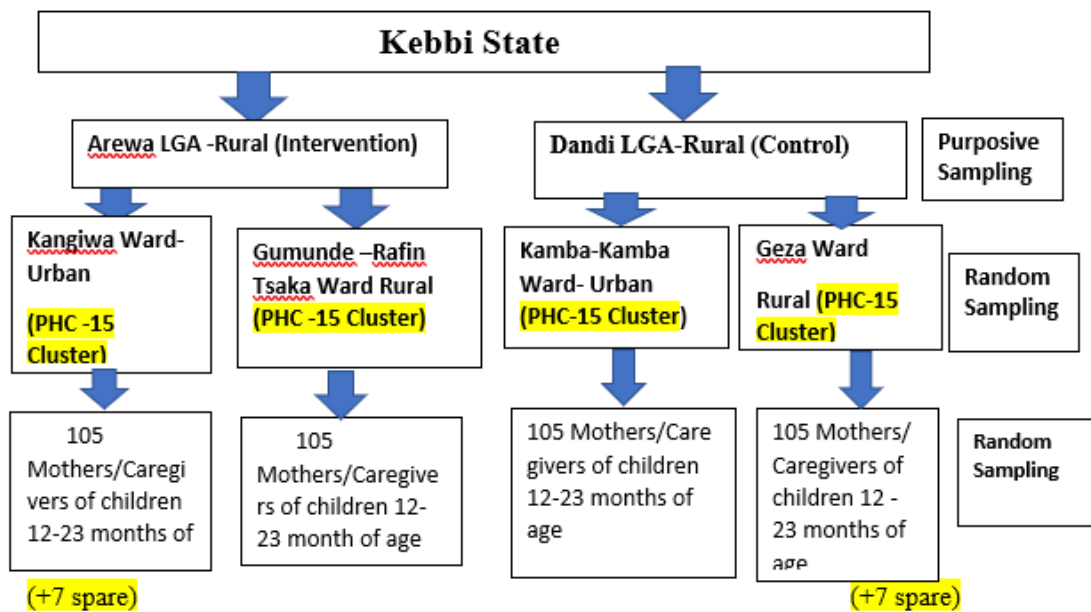


Figure 10 Sampling for the respondents for the study

3.6 Study procedure

Phase 1: Initial survey and Preparatory approach

The survey research in the first stage aimed to assess the level of interpersonal communication skills among PHC workers on immunization services, determine the factors contributing to low immunization coverage, and the strategies to improve immunization services using questionnaire and IPC skills training manual preparatory stage of the study. Building team work was established for team members comprises (Health Education Officers) who supported the implementation of the training and (PHC Workers) who conducted the collection of data in each month.

Phase 2: Training of 24 Public Health workers on strengthening interpersonal communication skills on routine immunization

The purpose of strengthening interpersonal communication skills among PHC workers is to increase their knowledge and skills to communicate effectively on key IPC messages to mothers and caregivers, as well as the community regarding immunization services. As a result of the knowledge gained, the PHC worker will keep mothers/caregivers informed on the benefit of vaccination, where, when and how many times they need to bring their children for vaccination. Strengthening interpersonal communication skills of PHC workers' intervention would basically create a platform that will improve quality of immunization services to meet demand as well as improve interaction between health workers and mothers/caregivers. IPC skills also address compliance on immunization services among mothers/caregivers, which was done in a manner that is expected to improve their knowledge, changes in their attitudes and practice. It also achieves high coverage rates - immunization coverage within a short-term period will be recorded. While in the long term, this will help to sustain EPI and other health program by making the health facility friendlier and more supportive environment for mothers/caregivers' visit.

Training Materials

The content of intervention was primarily on two parts: (i) Delivery of knowledge, and (ii) Skills building for PHC workers. The activities on knowledge and skill building were adapted and modified from the training manual on Interpersonal communication skills for EPI service providers:

- Training of Trainers on strengthening interpersonal communication (IPC) Skills of health workers for the Expanded Program on Immunization (Basics).

Three Phases for implementing the IPC skills:

During the preparatory stage of intervention, there were two levels of training. Two health educators were trained first and in turn, they provided the training to the PHC workers. The third phase involved the actual implementation of the IPC skills in the PHC centres.

Phase 1: Training of Health Education Officers

The researcher, with approval from the Communication unit in the Department of primary Health care, State Primary Health Care Development Agency, Kebbi State, selected two health education officers at the health education unit based on their prior experience in health communication practices. However, for this training, their focus was on the skills required for being a trainer for the IPC skills. They received the training on strengthening interpersonal communication skills on immunization services based on the training manual developed by (Basics) in collaboration with Federal Ministry of Inter- Provincial coordination Government of Pakistan called “Facilitator’s Guide session on: Strengthening interpersonal communication (IPC) skills of health workers for the Expanded Program on Immunization. The steps contained in this manual on how to conduct IPC activities and transfer knowledge and communication skills to PHC workers were meticulously followed. Furthermore, health educators were informed of the research objectives and instruments. The training was 4 hours per day for 2 days and took place in the Local Government Area PHC Conference hall.

The teaching methods were lectures, active participation/discussion, brain storming, role play and practical demonstration. There was a discussion and questions and answer session or feedback during the training session.

Phase 2: Training of PHC workers on IPC Skills

In consultation with the PHC Directorate, Arewa LGA and officers in-charge of the Health facilities in the two intervention wards (Kangiwa and Gumunde- Rafin-Tsaka), the researcher selected 3 PHC workers from each PHC centre making a total of 12 PHC workers from each of the two selected wards. The two intervention wards had a total of 24 PHC workers taking part in the IPC skills training. The advice of the officers in-charge of the PHC centres was sought while selecting the potential PHC workers. However, the following criteria were set in trainers' selection:

1. Routine Immunization/ANC service provider in PHC centre having worked for at least six months in any of the PHC facility in the selected ward
2. Willingness to learn and open to new ideas
3. Able to express themselves clearly
4. Good Language skills
5. Commitment to interact with mothers/caregivers effectively

The Health Education officers trained the selected PHC workers for a duration of 8hours for 2 days. The training took place at their various Health centre usually when the health workers closed from duty. The major components of the training package comprised knowledge and skills of interpersonal communication on Immunization program. The following teaching instrument were used to transfer knowledge and build the skills of the PHC workers:

1. Facilitators manual on Strengthening IPC skills of PHC workers (Basics)
2. Immunization posters
3. Pictorial books on childhood diseases
4. Child Health card

The training was delivered through a variety of teaching methods, which included pre-test, lectures, discussions, role plays, exercises, recapitulation and feedback and post-test. The PHC workers went through intensive training sessions to be acquainted with all information they would be learning during the sessions. The health education officers encouraged the PHC workers to ask questions and interact as openly as they could with them. They were also given opportunity to discuss their concerns and issues regarding immunization services. At the end of the day's session, the health educators summarize all the important points. Presentation notes and contents on sample of the booklets were distributed to the PHC workers for their self-learning. The following constituted the training plan and its contents:

Table 2: Agenda for training of Primary Health Care health workers on interpersonal communication skills

Duration	Sessions	Contents	Trainers
Day One 1pm-5 pm (4 hours)	1 st Session: Introduction	<ol style="list-style-type: none"> Objectives and outcomes of the study/training Brief on study intervention 	<ul style="list-style-type: none"> Researcher
	2 nd Session: IPC Skills	<ol style="list-style-type: none"> Pre-Test Definition of interpersonal communication skills Types of IPC skills IPC opportunities in EPI and Health Education Importance of IPC skills in Health Education 	<ul style="list-style-type: none"> Researcher Health Education Officer LGA Director PHC
	3 rd Session: Exercise 1 Plenary & Evaluation	<ol style="list-style-type: none"> Roles of Health Workers as a communicator in the EPI program Summary/ wrap-up 	<ul style="list-style-type: none"> Health Education Officer
		Lunch/Refreshment and Closing for day 1 session	All

Day Two 1pm-5 pm (4hours)	1 st Session: Role Play 1 Lecture/Discussions Role Play 2	1. Good and bad IPC during RI session at fixed centre (Scene 1 & 2) 2. Principles of effective IPC in RI session 3. IPC during Home visit (scene 1 & 2)	<ul style="list-style-type: none"> ● Health Education Officer ● Researcher
	2 nd Session: Recapitulation & Feedback Post -test	1.Recapitulation and Feedback 2. Post-test 3. Other issues/Next step	<ul style="list-style-type: none"> ● Researcher ● Health Education Officers ● LGA Director PHC
		Lunch/Refreshment and closing for day 2	All

Phase 3: Implementation of IPC skills

The PHC workers went back to their respective health centres, and started implementing the intervention after the baseline exercise. The intervention activities started from 2nd October 2016 till 31st March, 2017. This lasted for six months. The PHC workers roles and conduct of various IPC activities. Their major tasks were as follows:

1. One-on-One communication: The PHC workers conducted a casual one to one or small group interaction sessions with mothers/care givers or community members. It was carried out during immunization sessions at the fixed post or outreaches, follow up of defaulters or missed opportunities.

2. Group Communication: Health workers conducted a prepared session with a group of up to 20 to 30 mothers/caregivers of eligible children or community members. This was carried out in settings such as:
 - a) At immunization session at fixed post or outreach activities.
 - b) During health talk at post-natal session
 - c) At community meeting - Ward development committee or village development committee meetings and other important gatherings
 - d) When people visited PHC centres

Six months after the IPC intervention, post intervention data were collected in both the study and control LGAs using the same sample size, sampling technique, study instruments and research team as done at the baseline. The post intervention was collected from 17th to 31st March 2017.

Coordination and implementation Plan

The researcher had meeting with the in-charges of the health facilities of (Kangiwa and Gumunde/Rafin-Tsaka ward) to discuss on how best the IPC activities would be carried out at fixed and outreaches location. At the same time, the researcher met the head of the PHC Department of Arewa LGA and discussed about the health educator's role in the study, and the importance of the IPC skills in improving routine immunization services.

Control PHC Centres

For the PHC centres in the control wards, IPC skills intervention did not take place there. They continued with their normal activities or services.

3. 7 Measurement Tools

The research instrument was a structured questionnaire on immunization for children 0-23 months of age adapted and modified from a tested questionnaire of Household survey on immunization from EPI coverage Survey (Organization, 2008). The original questionnaire was prepared in English language and translated into local Language (Hausa) and back translated into English to the check of consistency with the questions. The translation was done by the two Health Educators from Health Education Department of State Ministry of Health who speak both English and Hausa. All the two translators were familiar with the questions.

. The content of the questionnaire was composed of four main sections as follows:

1. Socio-demographic information: - Consists of age, residence, religion, ethnic occupation, wealth index, education and marital status of mothers/caregivers, and information of the child,
2. Knowledge regarding child immunization: It contains 10 questions. With a total score of 10 points, 1 point for correct answer and 0 point for an incorrect answer, Mother/caregivers will respond "Yes", "No" or missing values will be scored with zero points. All scores were added up by applying a 10 points scores. A Bloom's cut off points were used for the assessment of knowledge (Bloom's cut off points) (Bloom, 1965). The

scores for knowledge varied from 0-10 points and were classified into three levels as follows:

High knowledge = 8 -10 scores (80% -100%)

Moderate Knowledge = 5-7 scores (60% - 79%)

Low Knowledge = 0 – 4 scores (0-59%)

3. Attitude regarding child immunization: The attitude of study participants was measured based on a Likert scale 1-5 scoring system (Strongly disagree to Strongly agree). A positive attitude is considered when mothers/caregivers agreed to a favourable outcome or disagree with behaviour which has a negative impact toward routine immunization services. Thus, both agreement to favourable outcomes and disagreement with negative behaviour about statement of 8 questions were considered as the correct response using a frequency distribution which showed normal distribution, unfavourable attitude was defined as a score of < 50% (responding to less than 4 questions correctly) whereas score of $\geq 50\%$ was considered as having favourable attitude.

Rating of Likert Score was measured as follows:

Table 3 Rating of Likert Score

Positive Statement		Negative Statement	
Choice	Score	Choice	Score
Strongly disagree	1	Strongly disagree	5
Disagree	2	Disagree	4
Neither agree nor disagree	3	Neither agree nor disagree	3
Agree	4	Agree	2
Strongly agree	5	Strongly agree	1

4. Supportive Environment towards child immunization: The part included 5 questions, Choice of health facility obtaining immunization services, distance to health facility (1-5 km), availability of vaccination card, convenient time for immunization, know where to get child vaccination and completeness of child vaccination. For practice question the scoring for yes was 1 point and no was given 0 point. The total scores of the respondents ranged from 0 to 5, with higher scores indicating a high level of immunization practices. According to the median split method (Sedney, 1981) scores less than 3 (medium) would be considered as having low level of practice regarding child immunization and mothers with scores from 3 to 5 would be considered as having adequate practices. This scoring method and categorization was used to identify the degree of parental immunization practices.

3.8 Content of validity and Reliability of the instrument

3.8.1 Validity

The content of validity of the questionnaire was pretested with of Item -Objective Congruence (IOC) by three experts on similar population taking 5% of the total sample and necessary modification were made to suite the content of this study.

3.8.2 Reliability

All questions were tested for reliability by means of pilot-testing with 30 mothers/caregivers in an area with similar characteristic (Yeldu ward) living in 30 households similar to the sample area in Arewa LGA were selected to test the questionnaire. The internal consistency reliability of knowledge questions was tested by Kuder Richardson formula 20 score (KR20) and the result score was 0.60

3.9 Data collection

The baseline data were collected on the between 2nd to 15th October 2016 and End line data collection was collected between 17th to 31st March 2017. Upon receiving the approval of the Research Committee of Kebbi State Ministry of Health, the researcher wrote a cover letter to the Ministry for Local Government Affairs, State Primary Health Care Development Agency and study Local Governments Areas including the community leaders of the study areas explaining the purpose of the study and assuring how confidentiality would be maintained.

3.9.1 Recruitment and Data Collection Procedures

The survey team comprised two groups of five persons each deployed to the two study LGAs. Each team had one supervisor and four research assistants at least with graduate qualification and had relevant experience in conducting household surveys. The training of survey personnel was conducted for two days to familiarize them with the survey tools. They were also trained on the use of the questionnaire and the process of data entry which was paper-based. A short

training guide was prepared for the interviewers and Supervisors with instructions on how to ask and record responses for each of the survey questionnaire items. The questionnaire contained questions on background and demographic characteristics of mothers/caregivers, their knowledge, attitude and practice on childhood routine immunization services. Before conducting the survey, an informed consent form was attached to each questionnaire to the participants of the study. The supervisors led the team members and assured quality of data collection and entry into the questionnaires.

3.9.2 Data Retrieval

Data were collected based on the filled questionnaires by the research assistants on daily basis and be submitted to the supervisor. The interviewer collected the information from respondents, edited the questionnaire in the field and submitted her quota for the day to the supervisor. At the end of each day in the field, and after editing, the supervisors would check the double entries and errors before submitting the completed questionnaires.

3. 10 Data Analysis

Data collected were analysed using IBM SPSS software version 22.0 was used for the data analysis. Descriptive statistics (such as frequencies, percentage for categorical data and mean and standard deviation (S.D) for continuous data) were used for analysis. Chi-square were conducted to compare the characteristics between intervention and control group at baseline. Student t-test (Paired t test and independent t test) were used to test the effect of intervention on knowledge

and utilization between the control group and intervention groups at baseline and end line. A p-value <0.05 (2 tailed) was statistically significant.

3.11 Ethical considerations

This study was conducted in accordance with good clinical research practice. Government regulations and relevant research policies of the state and procedures were adhered to. Ethical clearance and approval were obtained from the Kebbi state Ministry of Health Ethical Research Committee Board prior to the commencement of the study.

All eligible mothers/caregivers that participate in the survey were provided with a consent form describing the study and providing sufficient information for them to make an informed decision about their participation. The consent forms were duly signed or thumb- printed by the respondents. Participants were let to decide on whether to participate in the study or not and this ensured the right of self-determination and autonomy.

Chapter 4

Results

This chapter presents an analysis of the findings and results of the research done on mothers/caregivers of children 0 to 23 months of age from Arewa and Dandi Local Government Areas in Kebbi State, Nigeria. Intervention and control (pre and post) data were used to assess the effectiveness of interpersonal communication skills intervention on change in knowledge, attitude and practices of mothers/caregivers of 12 to 23 months of age towards routine immunization. A structured questionnaire was used to collect the data for both baseline and follow-up survey. Arewa was the intervention LGA, while Dandi LGA was used as a control group, all of which provided routine immunization services. All the groups were successfully followed. Out of the 420 mothers/caregivers sampled for the survey at baseline and end line of the study, all responded to the questionnaires giving a response rate of 100%. The results are presented in to two parts:

Part 1 presents the general and socio-economic characteristics of mothers/caregivers of mother's monthly income, level of education, number of children, number of children under-2 years and sex of children in both intervention and control populations have been evaluated. There was no significant difference reported at baseline within the socio-demographic characteristics. Association of Income, Education, knowledge, attitude and practices level of full immunization in intervention and control groups were explored. There was no any significant difference reported at the baseline within income, education, knowledge, attitude level and practices on practice level of full immunization status.

Part 2 presents the results for the effectiveness of interpersonal communication skills. The effectiveness was assessed by the difference in knowledge, attitude and practices and immunization status of children of mothers/caregivers towards routine immunization between the intervention and control groups. It also presented the change in mothers/caregivers' knowledge, attitude and practice regarding routine immunization within both groups.

4.1 Descriptive findings

Descriptive findings were measured through the pre-tested; validated piloted tool and the following variables were measured:

1. General and socio-economic characteristics
2. Knowledge on routine immunization
3. Attitude on routine immunization
4. Practices on routine immunization
5. Immunization status

4.1.1 General and socio – economic characteristics at Baseline

This part revealed the frequency distribution of selected variables describing the background of mothers/caregivers before intervention. The frequency of distribution for the selected variables of the socio-demographic characteristics including age of mothers/caregiver, marital status, income, level of education, occupation, number of children and sex of children under-2 years. The socio-demographic information like age of mother/caregiver ($p= 0.906$) marital status ($p= 0.805$), occupation ($p= 0.797$), daily income ($p= 0.672$), level of education ($p= 0.964$), number of mother's living children ($p= 0.652$) and ethnicity ($p= 0.873$) were not statistically significant

different in both groups. Majority of the respondents in both intervention and control groups were married (96.2% and 95.2% respectively) and more than half of the respondents (62.9% and 61.4%) in both groups were within the age bracket of 21-30 years. The predominant religion of the respondents is Islam with 100% and 99.5% Muslims in intervention and control groups respectively. Majority of the mothers/caregivers in two groups were petty traders (51.0% in the intervention and 50.5% in the control group) with small percentage with any form of employment in both intervention and control group (6.7% and 5.2% respectively), (42.4% and 44.3%) in both intervention and control groups were full housewives. Regarding the income level of mothers/caregivers, 80.5% in the intervention and 83.8% had income level between N100 to N200 (1USD = N357) per month, 11.0% and 9.0% of the respondents had income level between N200 to N300 (1USD = N357) per month and 8.6% and 7.1% of the respondents had more than N300 (1 USD = N357) per month.

The level of education between the groups in terms of ability to read and write English were almost the same. Only 5.7% and 5.2% of the respondents in intervention and control group attend higher than secondary school, 10.5% of the respondent in the intervention and 9.5% in control group completed their secondary school that is 6 years of education after primary school, 26.2% and 25.2% of the respondent in the intervention and control group had completed primary school. While, more than half of the respondent 57.6% and 60.0% in both groups did not attend formal education.

The number of mothers with living children, 34.8% of the respondents in the intervention and 31.0% in control group had between one to two children and 37.1% of respondents in intervention and 41.0% in control group had between three to four children and 28.1% in both groups had between five to eight children. Details shown in Table 4

Table 4: Socio-demographic Characteristics of the Participants between intervention and control group at Baseline (n=420)

Variable	Intervention (n=210)		Control (n=210)		p-value [‡]
	Number	Percent	Number	Percent	
Age of Mother/Care giver					0.906
< 20 years	11	5.2	9	4.3	
21 - 30 years	132	62.9	129	61.4	
31- 40 years	60	28.6	63	30.0	
41 - 50 years	7	3.3	9	4.3	
Number of Children					0.652
1 - 2 Children	73	34.8	65	31.0	
3 - 4 Children	78	37.1	86	41.0	
5 - 8 Children	59	28.1	59	28.1	
(Min 2 and Max 4) (Mean ± SD 3.05 ± 0.780)					
Religion					0.500 ^β
Islam	210	100	209	99.5	
Christianity	0	0	1	0.5	
Ethnicity					0.873
Hausa	186	88.6	183	87.1	
Fulani	9	4.3	11	5.2	
Zabarma and Others	15	7.1	16	7.6	
Educational Level					0.964
No Formal Education	121	57.6	126	60.0	
Complete Primary	55	26.2	53	25.2	
Completed Secondary	22	10.5	20	9.5	
Higher Than Secondary	12	5.7	11	5.2	
Marital Status					0.805 ^β
Married	202	96.2	200	95.2	
Divorced	6	2.9	6	2.9	
Widow	2	1.0	4	1.9	
Occupation					0.797
Housewife	89	42.4	93	44.3	
Petty Trading	107	51.0	106	50.5	
Employed	14	6.7	11	5.2	
Daily Income					0.672
N100 - N200 (1USD = N357)	169	80.5	176	83.8	
N200 - N300 (1USD= N357)	23	11.0	19	9.0	
Above N300 (1 USD = N357)	18	8.6	15	7.1	

Significant Level at p-value <0.05 [‡]Chi-Square test ^βFisher's Exact test

4.1.2 Immunization Status at Baseline

Table 5, shows the analysis of child immunization record between intervention and control group before intervention. Based on vaccination card (50) in the intervention and (47) in the control group, plus mothers' recall (20) in the intervention and (24) in the control group. Majority (92.9%) of children in the intervention group and 92,3% of children from the control group received zero or some vaccines, but did not complete all the eight recommended vaccines or have never been vaccinated. Only 7.1% of children in the intervention and 7.7% in the control group completed all the recommended vaccines at baseline.

Table 6 shows the overall immunization status of children under two years (0-23 months). In the intervention group the complete immunization status was 7.1% as compared to control group which was 7.7%. Partial immunization status (started but not completed or dropped) for children under two years in both intervention and control group was the same (26.2%). The un-immunized or zero dose (never received vaccination) children in intervention and control group at baseline was within the same range 66.7% and 66.2% respectively. There was no statistically significant difference found in immunization status of children under two years at baseline.

Table 5: Child Immunization record base on card and recall between intervention group and control group before intervention

Type of Vaccines by Age	Intervention Group (n=210)		Control Group (n=210)	
	Number Immunized	%	Number	%
BCG at Birth				
Fully Immunized	68	32.4	65	31.0
Un-Immunized	142	67.6	145	69.0
Hep B at Birth				
Fully Immunized	68	32.4	67	31.9
Un-Immunized	142	67.6	143	68.1
OPV 0 at Birth				
Fully Immunized	70	33.3	67	31.9
Un-Immunized	140	66.7	143	68.1
OPV 1 at 6 weeks				
Fully Immunized	67	31.9	69	32.9
Un-Immunized	143	68.1	141	67.1
OPV 2 at 10 weeks				
Fully Immunized	44	21.0	41	19.5
Un-Immunized	166	79.0	169	80.5
OPV 3 at 14 weeks				
Fully Immunized	15	7.1	16	7.6
Un-Immunized	195	92.9	194	92.4
PENTA 1 at 6 weeks				
Fully Immunized	63	30.0	65	31.0
Un-Immunized	147	70.0	145	69.0
PENTA 2 at 10 weeks				
Fully Immunized	42	20.0	39	18.6
Un-Immunized	168	80.0	171	81.4
PENTA 3 at 14 weeks				
Fully Immunized	15	7.1	16	7.6
Un-Immunized	195	92.9	194	92.4
IPV at 14 weeks				
Fully Immunized	15	7.1	16	7.6
Un-Immunized	195	92.9	194	92.4
PCV 1 at 6 weeks				
Fully Immunized	63	30.0	65	31.0
Un-Immunized	147	70.0	145	69.0
PCV 2 at 10 weeks				
Fully Immunized	41	19.5	38	18.1
Un-Immunized	169	80.5	172	81.9
PCV 3 weeks				

Fully Immunized	15	7.1	16	7.6
Un-Immunized	195	92.9	194	92.4
MEASLES at 9 months				
Fully Immunized	15	7.1	14	6.7
Un-Immunized	195	92.9	196	93.3
YELLOW FEVER at 9 months				
Fully Immunized	14	6.7	12	5.7
Un-Immunized	196	93.3	198	94.3

Table 6 Immunization Status between intervention and control group at Baseline

Variable	Intervention		Control		p-value
	(n=210)	%	(n=210)	%	
Fully Immunized	15	7.1	16	7.6	0.982
Partially Immunized	55	26.2	55	26.2	
Un- Immunized	140	66.7	139	66.2	

**Significant Level at p-value = .05 *Person Chi square test*

4.2 Baseline Findings

4.2.1 Knowledge about Routine Immunization before intervention

Table 7 shows the frequency, percentages and significant level of mothers/caregivers on their level of knowledge regarding routine immunization of children 0-23 months. At baseline, 33.3% in the intervention and 33.8% in the control group have the information about routine immunization. Their knowledge of vaccine preventable diseases (VPDs) was 16.2% and 18.5% among intervention and control groups respectively. There were also no significant differences between intervention and control groups in terms of knowledge regarding routine immunization benefits, age at which child begin and complete their routine immunization and the vaccination schedule.

Table 7: Knowledge of mothers/caregivers on routine immunization between intervention and control group at Baseline

Variables	Intervention Group (n=210)		Control Group (n=210)		p-value
	Number	(%)	Number	(%)	
1. Heard information about routine immunization	70	33.3	71	33.8	0.918
2.Knew vaccine preventable diseases	34	16.2	39	18.5	0.522
3.Knew Types of vaccine preventable diseases	30	14.3	32	15.2	0.755
4.Knew causes of childhood vaccine preventable diseases	34	16.2	39	18.6	0.520
5.Knew types of childhood vaccination	30	14.3	32	15.2	0.783
6.Knew benefit of immunization	28	13.3	30	14.3	0.582
7.Knew number of visits a child taken to HF to complete immunization	33	15.7	29	13.8	0.777
8.Knew beginning and completion period of immunization	23	11.0	18	8.6	0.411
9.Knew common side effect of childhood vaccination	20	9.5	17	8.1	0.606

Significant Level at p-value = .05 Pearson χ^2 test

4.2.2 Knowledge level between intervention and control group at baseline

Structured questionnaire for mothers/caregivers with 10 questions were used to evaluate their knowledge at baseline. The score was set as 1 for correct answer (Yes) including the multiple answer and score for incorrect answer (No).

The knowledge for the respondents were ranged into 3 levels as follows: Low, moderate and high knowledge. The obtained score was then changed as per score level and categorized into three levels low, moderate and high knowledge (Blooms cut off point), (Blooms, 1965).

Low knowledge = \leq 0- 50%

Moderate Knowledge = 60- 70%

High Knowledge = 80%

Table 8 shows level of knowledge of mothers/caregivers between intervention and control group at baseline. Most of the mothers/caregivers 180 (85.7%) in the intervention group and 183

(87.1%) in the control group had low knowledge level knowledge towards routine immunization of children under two years. 11.4% of the intervention and 19.0% of the control group had moderate knowledge level, while, 2.9% in the intervention and 3.8% in the control group had high knowledge level. At baseline, no statistically significant difference has been found among both groups,

Error! Use the Home tab to apply 0 to the text that you want to appear here. Table 8:
Knowledge Level between intervention and control group at Baseline

Knowledge Level*	Intervention		Control		p-value
	(n=210)	%	(n=210)	%	
Low Knowledge Level	180	85.7	183	87.1	0.640
Moderate Knowledge Level	24	11.4	19	9.0	
High Knowledge Level	6	2.9	8	3.8	

Significant Level at p-value= .05 Pearson Chi square test

4.2.3 Attitude level towards routine immunization at baseline

Attitude of mothers/caregivers towards routine immunization was assessed using 8 questions based on a Likert scale (Likert, 1932) 1-5 scoring system (Strongly agree -Strongly disagree).

Responses to questions related to attitude were graded to a 3 -point Likert scale, an agreement scale ranging from 1 for disagree to 3 for agree. The overall level of attitude was categorized in to

3 level using original Bloom's cut- off points as shown below table

Table 9: Categories of Level of Attitude

Attitude Level	Cut off- Point
Positive Attitude	20-24 (80 -100%)
Neutral	15-19 (60-79%)
Negative Attitude	0- 14 (0-59%)

A positive attitude is considered when mothers/caregivers agree to a favourable outcome or disagree with a behaviour which has negative impact on childhood routine immunization.

Regarding the attitude of the respondents towards childhood immunization at base line shown in Table 10 majority (61%) of the respondents in the intervention group disagreed that childhood immunization was necessary/important, 60.5% disagreed that immunization is prohibited by religion. Most 65.2% in the intervention and 67.1% in the control group did not trust the safety of the vaccine used for immunizing their children and also majority 76% in the intervention and 79% in the control group are of the opinion that sick children should not be immunized. In terms of vaccine side effects, the study showed that 57% of respondents agreed that they are afraid to take their children for vaccination due to vaccine side effects after vaccination, while 23% stated too many vaccinations shot in one visit overwhelmed their child system.

Table 10: Responses of mothers/caregiver's attitude between intervention and control group towards routine immunization at baseline

Statements	SA (%)	A (%)	N (%)	D (%)	SD (%)
Intervention Group(n=210)					
1.Child Immunization is necessary/important	12 (5.7)	50(23.8)	20(9.5)	81(38.6)	47(22.4)
2 Confident in safety of vaccine used for child immunization	13 (6.2)	33 (15.7)	18 (8.6)	137 (65.2)	9 (4.3)
3.Vaccines are necessary in preventing childhood diseases	12 (5.7)	80(38.1)	21 (10.0)	88 (41.9)	9 (4.3)
4.Child immunization is prohibited in religion	8 (3.8)	52 (24.8)	23 (11.0)	123(58.6)	4(1.9)
5.Can take child for immunization even if he/she is sick	2(1.0)	34(16.2)	6 (2.9)	159 (75.7)	9 (4.3)
6.Too many vaccines in one visit can over whelm child immune system	8 (3.8)	53 (25.2)	81 (38.6)	59 (28.1)	9(4.3)
7.If child is vaccinated may have side effect	5 (2.4)	168 (80.0)	3 (1.4)	32(15.2)	2(1.0)
8. Trust information receive about immunization	14 (6.7)	84 (40.0)	21 (10.0)	86 (41.0)	5 (2.4)

Control Group (n=210)

Statements	SA (%)	A (%)	N (%)	D (%)	SD (%)
1.Child Immunization is necessary/important	9 (4.3)	47 (22.4)	17(8.1)	91 (43.3)	46(21.9)
2. Confident in safety for vaccine used for child immunization	12 (5.7)	31 (14.8)	17 (8.1)	141 (67.1)	9 (4.3)
3.Vaccines are necessary in preventing childhood diseases	10(4.8)	81(38.6)	21 (10.0)	90 (42.9)	8 (3.8)
4.Child immunization is prohibited in religion	6 (2.9)	48 (22.9)	24 (11.4)	130 (61.9)	2 (1.0)
5.Can take child for immunization even if he/she is sick	4 (1.9)	32 (15.2)	5(2.4)	166 (79.0)	3 (1.4)
6.Too many vaccines in one visit can weaken child immune system	8 (3.8)	48(22.9)	76 (36.2)	64 (30.5)	14(6.7)
7.If child is vaccinated may have side effect	9 (4.3)	162 (77.1)	5(2.4)	33 (15.7)	1 (0.5)
8. Trust information receive about immunization	10 (4.8)	81 (38.6)	21 (10.0)	90 (42.9)	8 (3.8)

Significant Level at p-value= .05 Pearson Chi square test

Table 11 presents the level of attitude towards routine immunization at baseline. The score ranged from 8-40. Majority of mothers/caregivers 68.6% in intervention group and 67.1% in control group had negative attitudes regarding routine immunization of children under two years, while 23.3% in intervention group and 22.9% in control group had neutral attitude. Only 8.1% in intervention group and 10.0% in control group had positive attitude.

Table 11 Attitude Level Regarding Routine Immunization at Baseline

Attitude level	Intervention Group (n=210)		Control Group (n=210)		p-value
	Number	Percent	Number	Percent	
Immunization Status					

0.793

Negative Attitude	144	68.6	141	67.1
Neutral Attitude	49	23.3	48	22.9
Positive Attitude	17	8.1	21	10.0

Significant Level at p-value= .05 Pearson Chi square test

4.2.4 Supporting environment toward vaccination uptake about routine immunization at baseline

Table 12 shows the frequency, percentage and significance level for the mothers/caregivers on uptake and supporting environment of routine immunization of children 0-23 months at baseline. The study indicates that, more than one third of the respondents in both intervention and control groups had their choice of health facility where to get immunization services. About 40% of all respondents in both groups were living within a distance of 1-5 kilometres from the health facilities. Only 9% and 7.1% of mothers/caregiver in the intervention and control groups had the ability/means of transportation to take their children for immunization services respectively. Only 11.0% in the intervention and 9.0% in the control group had convenient time to take their children for immunization. This study did not find any significant difference between the intervention and control group members in terms of routine immunization uptake and enabling environment.

Table 12 Supporting environment towards vaccination uptake about routine immunization among the subjects at baseline

Variables	Intervention (n=210)		Control (n=210)		p-value
	Number	%	Number	%	
1.Choice of Health Facility obtaining Immunization services	70	33.3	68	32.4	0.835
2.Distance to Health Facility (1-5 km).	87	41.4	83	39.5	0.691
3.Availability of vaccination card	51	24.3	47	22.4	0.989
4.Ability to travel for immunization	19	9.0	15	7.1	0.474
5.Convenient time for immunization	23	10.9	19	9.0	0.515

Significant Level at p-value= .05 Pearson Chi square test

4.4 PART 2: Post Intervention Findings and effectiveness of IPC Skills

4.4.1 Knowledge of mothers/caregivers regarding Routine immunization post intervention

Table 13 shows that majority (59.5%) of the respondents in the intervention group after intervention heard the information about routine immunization compared to baseline with 33.3%, while for the control group is 37.6% after intervention with an increase of only 3.8%. More than half (61.9%) of the respondents in the intervention group had the knowledge of vaccine preventable diseases after intervention compared with 16.2% at baseline. While for the control group only 23.3% of mothers/caregivers after intervention had the knowledge on vaccine preventable diseases compared with the baseline 18.6% with an increase of 4.8%. Majority (54.3%) of the respondents in the intervention group that can named the types of vaccine preventable diseases as well as childhood vaccination after the intervention from 14.3% at baseline, but for the control group the percentage remained the same after intervention.

The percentage of mothers in the intervention group who had the knowledge on the benefit of immunization was 53.3% after intervention from 13.3% at baseline but, for the control group there was only an increase of 2% after intervention from 14.3% at baseline to 16.2% after intervention. The proportion of mothers in the intervention group who knew the number of visits a child should be taken to a health facility to complete his routine immunization was 53.8% after intervention from 15.7% at baseline and for the control group the increase was only 1.4% from 13.8% at baseline to 15.2% after intervention. The proportion of mothers in the intervention group who knew the beginning and completion period of the child immunization was 55.2% after intervention compared with 11.0% at baseline and for the control group it was 16.2% after intervention from 8.6% at baseline. 34.3% of the respondents in the intervention group after intervention can mention the common side effect of childhood vaccination compared with 9.5% at baseline. Only (11%) of the respondents in the control group after intervention had the knowledge on common side effect of childhood vaccination compared with 8.1% at baseline. There was a statistically significant difference between intervention and control groups after intervention.

Table 13 Knowledge of mothers/caregivers among intervention and control group towards Routine Immunization before and after intervention

Variables	Intervention Group (n=210)		Control Group (n=210)	
	Before	After	Before	After
1.Heard information about routine immunization	70 (33.3)	125 (59.5)	71 (33.8)	79 (37.6)
2.Knew vaccine preventable diseases	34 (16.2)	130 (61.9)	39 (18.6)	49 (23.3)
3.Knew Types of vaccine preventable diseases	30 (14.3)	114 (54.3)	32 (15.2)	32(15.2)
4.Knew causes of childhood vaccine preventable diseases	34 (16.2)	121 (57.6)	39 (18.6)	39 (18.6)
5.Knew types of childhood vaccination	30 (14.3)	114 (54.3)	32 (15.2)	32 (15.2)
6.Knew the benefit of immunization	28 (13.3)	112 (53.3)	30 (14.3)	34 (16.2)
7.Knew number of visit a child taken to HF to complete immunization	33 (15.7)	113 (53.8)	29 (13.8)	32 (15.2)
8.Knew the beginning and completion period of child immunization	23 (11.0)	116 (55.2)	18 (8.6)	34 (16.2)
9.Mention common side effect of childhood vaccination	20 (9.5)	72 (34.3)	17 (8.1)	23 (11.0)

4.4.2 Knowledge level regarding routine immunization between intervention and control group after intervention

จุฬาลงกรณ์มหาวิทยาลัย
CHULALONGKORN UNIVERSITY

Table 14 below is an independent t-test result showing the mean change of knowledge levels of mothers/caregivers before and after intervention for the intervention and control groups. There was a significant difference in the mean scores for knowledge for the intervention group after intervention (M= 3.40, SD=3.04) compared with knowledge scores of control group after intervention (M= 0.02, SD = 1.20), $t(418) = 15.00$, $p < 0.00$. Therefore, knowledge of mother's in the intervention group on routine immunization has increased after intervention.

Knowledge levels regarding routine immunization were divided into 3 - low, moderate and high. Table 15 indicate that most of the mothers/caregivers, in both groups before intervention had low level of knowledge. However, after intervention 53.3% mothers/caregivers in the intervention group had high knowledge level and 40.5% had low level of knowledge from (2.8% and 85.7% respectively) at baseline compared with the control group with 11% there was no much change in knowledge level being reported. There was a statistically significant difference in the knowledge levels between intervention and control groups after intervention with $p = <0.001$.

Table 14 Comparison of Knowledge mean change among intervention and Control group before and after intervention

Variable	Intervention group (n=210)	Control group (n=210)	95% CI		p-value
	Mean (SD)	Mean (SD)	Lower	Upper	
Knowledge Mean Difference	3.40(3.04)	0.02(1.20)	2.942	3.829	<0.001*
At Baseline	2.01(2.99)	1.94(2.86)	-486	0.638	0.790
After Intervention	5.42(3.35)	1.96(2.37)	2.905	4.019	<0.001*

*Significant Level at p -value <0.05 ^aIndependent t-test

Table 15 Knowledge level changes between intervention and control group before and after intervention

Knowledge Level	Intervention		Control		p-value
	Before (n=210)	After (n=210)	Before (n=210)	After (n=210)	
High Level	6(2.9%)	112(53.3%)	8(3.8%)	24(11.4%)	<0.001*
Moderate Level	24(11.4%)	13(6.2%)	19(9.0%)	14(6.7%)	
Low Level	180(85.7%)	85(40.5%)	183(87.1%)	172(81.9%)	

*Significant Level at p -value <0.05 Pearson Chi square test

4.4.3 Attitude of mothers/caregivers regarding routine immunization after intervention

Regarding the attitude of the respondents towards routine immunization. Table 16 below, is the independent t-test result showing the mean change for the attitude of mothers/caregivers before and after intervention for intervention and control groups. There was a significance difference in the mean scores for attitude in the intervention group after intervention (M= 2.55, SD= 7.69) compared with attitude scores of control group after intervention (M= -7.00, SD = 4.83), $t(351.88) = 15.25$, $p < 0.001$. Therefore, attitude of mother's in the intervention group on routine immunization has changed after intervention with $p < 0.001$.

Attitude regarding routine immunization was divided into 3 levels - negative attitude, moderate attitude and positive attitude. Table 17 indicates that, majority of mothers/caregivers, in both groups before intervention had negative attitude. However, after intervention 29% of mothers/caregivers in the intervention group had negative attitude from 68.6% at baseline and 58.1% had positive attitude from 8.0% at baseline compared with control group where there was no much change in their attitude. There was a statistically significant difference of change of attitude between intervention and control group after intervention with $p < 0.001$.

Table 16 Attitude mean change among intervention and control groups before and after intervention

Variable	Intervention group	Control group	95% CI		p-value
	(n=210)	(n=210)	Lower	Upper	
	Mean (SD)	Mean (SD)			
Attitude Mean Difference	2.55(7.69)	-7.00(4.83)	8.332	10.800	<0.001*
Before Intervention	22.83(1.83)	22.76(1.97)	-0.294	0.437	0.701
After Intervention	25.39(7.41)	15.75(4.25)	8.478	10.798	<0.001*

*Significant Level at p-value <0.05 ^aIndependent t-test

Table 17 Attitude Level of mothers/caregivers regarding routine immunization before and after intervention between intervention and control group

Variables	Intervention		Control		p-value [‡]
	Before (n=210)	After (n=210)	Before (n=210)	After (n=210)	
Negative Attitude	144(68.6%)	61(29.0%)	141(67.1%)	136(64.8%)	<0.001*
Neutral Attitude	49(23.3%)	27(12.9%)	48(22.9%)	51(24.3%)	
Positive Attitude	17(8.1%)	122(58.1%)	21(10.0%)	23(11.0%)	

*Significant Level at p-value <0.05 †Pearson Chi square test

4.4.4 Supporting environment towards vaccination uptake on routine immunization between intervention and control group before and after intervention

Table 18 presents a comparison of supporting environment towards vaccination uptake on routine immunization among mothers/caregivers of 0-23 months children before and after intervention. The result shows that, mothers' choice of health facility for attending immunization services in intervention group after intervention was 70.5% from 33.3% at baseline compared to control group with 33.8% after intervention from 32.8% at baseline. Distance to Health facility (1-5 km) to access immunization services for the intervention group before and after intervention was 41.4% which is the same and control group was 39.5%. The availability of vaccination card seen and confirmed for the intervention group after intervention was 62.9% from 24.3% at baseline compared to control group with 27.1% after intervention from 22.4% at baseline. Mother's ability/decision to travel to access immunization services had increased from 9% at baseline to 20.0% after intervention. This could be explained as the result of mothers increase receptiveness and knowledge on the importance of protecting their children against vaccine preventable diseases. While for the control group there was no change after intervention.

Convenient time or hours to access immunization services in the intervention group after intervention was 58.1% from 7.6% at baseline compared to control group with 11.0% after intervention from 9% at baseline. There is statistically significant difference between intervention and control group after intervention.

Table 18 Supporting environment towards vaccination uptake about routine immunization between intervention and control group before and after intervention

Variables	Intervention Group (n=210)		Control Group (n=210)	
	Before	After	Before	After
Choice of Health Facility attending Immunization services	70(33.3)	148(70.5)	68(32.4)	71(33.8)
Distance to Health Facility (1-5 km)	87(41.4)	87(41.4)	83(39.5)	83(39.5)
Availability of vaccination card	51(24.3)	132(62.9)	47(22.4)	57(27.1)
Ability to travel for immunization	19(9.0)	42(20.0)	15(7.1)	15(7.1)
Convenient time for immunization	23(7.6)	122(58.1)	19(9.0)	23(10.9)

4.4.5 Overall immunization status before and after intervention

Table 19 shows the overall full immunization status before and after intervention. There was mark increase of children fully immunized 53.8% in the intervention group measured by card (63%) plus mother's recall (7%) after intervention from 7.1% fully immunized measured by card (24%) plus mother's recall (10%) at baseline compared to control group where vaccination measured by card was (22%) plus mother's recall (12%) at baseline while, at end line immunization measured by card was (27%) plus mother's recall (15%) . The increase was only 2% for the children fully immunized in the control group from 7.6% at pre-intervention to 9.5%

after intervention. There was also mark reduction of un-immunized children in the intervention group from 66.6% at pre-intervention to 29.5% after intervention unlike the control group where the reduction was 8.5% from 66.1% at pre-intervention to 57.6% after intervention. There is statistically significant difference between intervention and control group after intervention with p value <0.001

Table 19: Overall Immunization status between intervention and control group before and after intervention

Variables	Intervention		Control		p-value#
	Before (n=210)	After (n=210)	Before (n=210)	After (n=210)	
Fully Immunized	15(7.1%)	113(53.8%)	16(7.6%)	20(9.5%)	<0.001*
Partially Immunized	55(26.2%)	35(16.7%)	55(26.2%)	69(32.9%)	
Un-Immunized	140(66.7%)	62(29.5%)	139(66.2%)	121(57.6%)	

*Significant Level at p-value <0.05 #Pearson Chi square test

Chapter 5

Discussion

This chapter explained the study findings from the research questions and their interpretation in the context of the research hypothesis. This part will discuss the similar studies done in the research area with a view of looking at areas of concurrence or divergence. Therefore, the author will give recommendations for policy solutions and further research on the area of routine immunization utilization.

Firstly, we discuss the background of this study and reasons why this study was conducted. Despite the fact that immunization is proven to be the most cost successful and cost-effective public health intervention in reducing childhood morbidity and mortality as it averts 2 to 3 million deaths every year, the global vaccination coverage has remained stalled at 86% since 2010, with no significant changes during the past years (G. V. A. P. WHO, 2013). Of the estimated 19,5 million infants that were not reached with routine immunization services worldwide in 2016, 60 % of them live in 10 countries including Nigeria.

The regular impediment found rendering developing countries to achieve >90% coverage are weak health systems, isolated rural areas and rural settlements, lack of information and understanding about the importance of vaccines and immunization especially among the rural communities, fear of immunization side effects that are rumoured or suspected of being related to vaccine (Ozawa & Stack, 2013), (Rainey et al., 2011) and (U. Who, 2009). Dealing with these barriers, researchers and policy makers have applied different methods of Public Health interventions in developing countries. Therefore, this study was carried out to assess the

effectiveness of interpersonal communication skills intervention regarding routine immunization utilization in primary health care level.

5.1 Pre-intervention characteristics

Analysis of the demographic characteristics of the mothers/caregivers in this study showed that, 57.6% in the intervention and 60% in the control group did not have formal education. While 10% in the intervention and 9% in control group completed their secondary education. Only 5% of the respondents in each group attained higher than secondary education. This might be explained by the fact that majority of the participants were living in the rural areas where they did not have opportunities to attend formal education. This possibly contributed to the low literacy level of women in the North West Nigeria.

This finding was consistent with a study in Bungudu, Nigeria (Gidado et al., 2014), where majority (78.5%) of women had low level of education which attributed to poor knowledge in routine immunization. This study revealed that, maternal education is linked to complete immunization status. Similar study (Adenike, Adejumo, Olufunmi, & Ridwan, 2017) cited that mothers with high level of education are more likely to accept and complete immunization schedules for their children than less educated mothers. This low educational status has also reflected in poor knowledge and information on vaccines and immunization among mothers/caregivers as stated in our result at baseline study. Similar finding also stated that, educational level of parent or caregiver has a vital role to play in determining if a child is vaccinated or not (Subhani, Yaseen, Khan, Jeelani, & Fatima, 2015).

Mother's occupation is another factor that influence vaccination uptake, majority (80.5%) in the intervention and 83.8% in control group were earn a daily income between 100-200 Nigerian Naira on average (0.28 USD to 0.56 USD). Those in the high-income category are more likely to

receive all the recommended vaccinations compared to those in the middle or low-income categories. This study observed and supported by findings by (Gurmu & Etana, 2016) and (Payne, Townend, Jasseh, Lowe Jallow, & Kampmann, 2013), which found that households with higher incomes have better immunization coverage than those in the low-income household. Though in Nigeria, vaccination is provided free of charge through the national immunization program, the clear impact of income on vaccination status indicates that other monetary and time cost affect poorer individuals to receive vaccination. This agrees with the findings of a study in Ethiopia, where children from the poor households living farther from health facility left their children partially vaccinated or not-vaccinated as they could not afford to pay for transport expenses for going to the health facility (Canavati, Plugge, Suwanjatuporn, Sombatrungjaroen, & Nosten, 2011).

5.2 Effectiveness of the interpersonal communication skills

The purpose of immunization programme is to achieve high vaccination rate to control vaccine-preventable diseases among targeted groups who are susceptible to vaccine preventable diseases and reduce morbidity and mortality rate among them. There is evidence that health services providers practices are key determinants of vaccination coverage among children as reported by (Stockwell, Irigoyen, Martinez, & Findley, 2011). Similar study reported by (Dickerson, 2010) who stated that, in order to provide an effective immunization services, primary health workers working in the grassroot level should have up-to-date information on regular basis to keep them well versed with the basics of immunization program. Though continuing education will improve their knowledge base and skills level as well change their behaviour and attitude and improve health outcomes. Therefore, interpersonal communication intervention was effective in raising the awareness of mothers/caregivers regarding vaccine and increasing demand.

Similar study in Nigeria (Grade Imoh 2014) cited that communication programmes targeting rural mothers are more effective when health workers were trained and motivated to interact positively with clients to immunize their children and complete all the visits. A Study by (Jacobson et al., 1999) was successful in increasing immunization coverage rates using low literacy materials to the study participants. Similar studies by (Kimura, Nguyen, Higa, Hurwitz, & Vugia, 2007) were able to increase influenza vaccine coverage rate among workers in health care facilities with the support of educational campaign and provision of free vaccines.

(Usman, Akhtar, Habib, & Jehan, 2009) also reported an increase of 31% of DPT3 completion among children of mothers who received primary health care centre-based education on their immunization visits. This success of communication/education intervention in increasing health seeking behaviour may be attributed to the focused nature of interventions. This is the fact that, the goal of this study is to assess the effect of interpersonal communication intervention on knowledge, attitude and practice of mothers and care givers towards immunization services in our study area. The intervention group received an educational session alongside face-face interaction, focusing on importance of immunization for a child's health. While, the control group did not receive such intervention during the period of the study. Therefore, the group that received the focused message may have been more likely to understand and retain the content, by modifying their seeking behaviour, compared to the control group who did not have any information. These findings were similar with study reported by (Hu, Chen, Wang, Song, & Li, 2017), where educational intervention would be a successful in increasing the parental awareness and demands regarding immunization.

5.3 Knowledge regarding routine immunization

Assessment of knowledge of mothers/caregivers about immunization showed a significant gap in the knowledge level of participants at baseline. In assessing the sociodemographic characteristics of the subjects, 57.6% of the participants in the intervention and 60% in the control group had low literacy level and did not acquire formal education before the intervention. There was a significant need for the intervention to address and improve knowledge about immunization strategies and its benefits, as most of the mothers are the caretakers and part of the key decision makers regarding vaccination in their families. This finding is similar with the study done by (Siddiqi, Siddiqi, Nisar, & Khan, 2010), where significant vaccination status was found among children with both literate parents as compared to children with both parents who are illiterates. Other studies reported that educational intervention in promoting vaccine use has proven effective in improving immunization coverage. Having access to information on routine immunization influences the uptake which reinforces knowledge that eventually leads to utilization and uptake of health services including immunization. This study did not find this, only 33.3% of mothers/caregivers in the intervention and 33.8% in control group heard information regarding routine immunization. This contrasted with the previous studies in Osun Southern Nigeria (Adedire et al., 2016) and (Bbaale, 2013) in Uganda which demonstrated that access to information on routine immunization improves uptake and utilization of immunization services.

The study assessed the knowledge of mothers/caregivers about vaccine preventable diseases. Majority (82.7%) of mothers in both groups did not know that routine immunization prevents children from some serious infectious diseases and its complications at baseline. This is in contrast with the studies conducted in Lagos and Enugu South and Eastern parts of Nigeria (Adefolalu, Kanma-Okafor, & Balogun, 2019) and (B. Tagbo et al., 2013b) where high proportion (93%) of the respondents were able to mention at least two or more of vaccine preventable diseases. Also in

contrast with another study conducted in United Arab Emirates where more than 85% of the participants knew the importance of childhood immunization in prevention of deadly diseases (Bernsen et al., 2011).

Most vaccines in the immunization schedule require 2 or more doses for developing of an adequate and persisting antibody response (Kroger, 2013). Lack of proper information regarding the routine immunization affected vaccination schedule in this study. Majority of mothers/caregivers in both groups did not differentiate between mass vaccination campaign (i.e. Polio and Measles) and routine immunization. Majority (84%) of mothers/caregivers in intervention and 86% in control group at baseline did not know the number of visits required to complete child immunization schedule. Similar study were reported in Cameroon (Nolna et al., 2018), where parents/guardians admitted their ignorance in not mentioning the complete vaccination schedule and some were convinced that their child was well vaccinated if he/she was vaccinated at least once. This study indicated only 15.7% of mothers/caregivers in the intervention and 13.8% in control group at baseline study correctly knew the importance of administration of multi-dose of the same vaccine given at intervals for child immunity. Mothers/caregivers may have mistaken these mass campaigns as routine immunization and hence no longer likely felt the need to take their children for additional vaccination. The consequence of this finding is that, mothers might think that only the first dose of the vaccine is sufficient to develop immunity and protect their children.

Maternal and Parental education has positive relationship with access to child immunization services. This is similar with study conducted by (Mathew, 2012) who stated that high level of maternal education is associated with high infant vaccination. The result of this study indicates that lack of awareness against vaccine preventable diseases was high (81.4%) among the study

participants and very few (18.6%) obtained information from health workers and community mobilizers. The findings is similar with the findings in a study conducted in the United Arab Emirate (Bensen et al., 2011) where only 16% of the respondents in the study obtained information from the health workers. Majority of the respondents (85%) from both groups could not name one or two types of diseases that could be prevented by immunization, only 15% could name more than two types of diseases. Similar to finding in Bungudu Northern, Nigeria (Gidado et al., 2014) where measles and poliomyelitis could be recalled by mothers as the most common vaccine preventable diseases. Similar to finding from study conducted in India where only 11.6% of mothers could identify symptoms of two or more diseases and 61.2% could not identify even one (Angadi, Jose, Udgiri, Masali, & Sorganvi, 2013). In another finding from Ethiopia 20.5% could not name any type of vaccine diseases (Birhanu, Anteneh, Kibie, & Jejaw, 2016). Other studies (Hamid, Andrabi, Fazli, & Jabeen, 2012) and (Kapoor & Vyas, 2010) emphasized that mothers' inability to identify diseases other than polio need to get intensive health education about complete immunization uptake.

Mothers knowledge regarding the benefit of immunization and follow the vaccination schedule of child immunization is an important tool that positively encourages mother's decision to fully immunized their children. However, the finding in this study showed that only 13.3% of the respondents in the intervention and 14.2% in control groups knew the benefits of child immunization at baseline. This is similar to findings for studies conducted in Ethiopia and Nigeria (Abel Negussi et al. 2015) (Adenike et al., 2017) and (Adebayo, Oladokun, & Akinbami, 2012) who stated that, mothers who don't know the benefits of immunization may be reluctant in following the vaccination schedule.

However, after intervention there was significant improvement in the knowledge of intervention group members on the benefit of immunization with an increase of 40% while, for the control group the change was only 2%. Mother's ignorance of these benefits may have also contributed to many children not being fully immunized. The relationship between mothers' knowledge of the benefits of immunization and full vaccination has been cited in other studies in Nigeria (Adenike et al., 2017) and Bangladesh (Etana & Deressa, 2012).

Mothers' of children who had good knowledge on the importance of vaccination are more likely to complete childhood immunization. This findings is similar with the study done in North west Ethiopia (Debie & Taye, 2014). Who stated that, mothers with good knowledge are more likely to fully vaccinate their children than those who do not have. Immunization status of children and mothers' knowledge on the correct age at which the child begins and complete immunization were found to be statistically significant for the intervention group after intervention. While there was no corresponding change of mother's knowledge in the control group after intervention. Mothers' who knew the correct age at which a child will be fully immunized are more likely to complete their children immunization compared to those who do not know. This finding was found to be similar with previous studies (Etana & Deressa, 2012) and (Kassahun, Biks, & Teferra, 2015). Previous studies also reported that, mothers who could know the age at which a child be fully immunized might have got the information on completing child immunization during ANC follow-up, through media or other source of information (Kassahun et al., 2015). The low knowledge of mothers at baseline might be explained by their low level of education found in our study.

The IPC intervention has statistically proved that, regular health education, one-on-one interaction and reminder for the next schedule provided to mothers/caregivers during

immunization session including social mobilization by primary health care workers had increases the knowledge of mothers/caregivers in improving the practices regarding the utilization of immunization services in the intervention group. This finding is similar from the studies conducted in southern Nigeria (Awodele, Oreagba, Akinyede, Awodele, & Dolapo, 2010) and (Al-Zahrani, 2013) which reported that health workers were the main source of information regarding the importance of childhood immunization and promoting vaccination coverage. It is also similar with previous studies conducted in Sokoto Northern Nigeria (Awosan et al.) and Ethiopia (Legesse & Dechasa, 2015) which revealed that counselling of mothers by health workers during postnatal clinic promoted child immunization and increased vaccination coverage.

We observed that, there was significant improvement of vaccination knowledge between pre and post survey in the intervention group, while on routine immunization vaccine and its policy had improved between the pre and post study in the intervention group.

5.4 Vaccination Coverage

This study found a significant gap in immunization coverage in intervention and control group before intervention. Based on information from the vaccination cards and mothers recall (history) at baseline, only (7.1% and 7.6%) of children in both intervention and control groups were vaccinated for BCG, OPV0, Hep B, OPV3, Penta 3, PCV3, IPV, Measles and Yellow fever. This findings is similar with study conducted in Zamfara Nigeria (Gidado et al., 2014) where 7.6% of children were fully immunized and 73.6% were un-immunized. This low coverage might be explained by the lack of proper information regarding routine immunization and vaccination schedule. Majority of mothers in this study did not differentiate between mass campaign (i.e. Polio and Measles) and routine immunization. Similar study conducted in Cameroon (Nolna et al.,

2018) reported that having several mass Campaigns in a year had effect towards routine immunization.

Other factors that might have contributed to low vaccination coverage includes mother's educational level, household income, walking distance to healthcare centre, husband approval/decision making, non- compliance/resistance and lack of knowledge on immunization.

This findings is similar to study conducted in northern Nigeria (Taiwo et al., 2017) and (Gidado et al., 2014). 53.8% coverage of full immunization reported in this study was found to be below the national goal of 80% coverage set in every district or equivalent administrative unit as reported by the Nigeria NDHS 2013. However, this prevalence is lower when compared to what is seen in other rural LGAs from the northern and southern parts of Nigeria (Adedire et al., 2016), (Adeleye & Mokogwu, 2016) and (Adenike et al., 2017), which was 57.9%, and 75.3% and 56.6% respectively. The variation in immunization coverage between different LGAs can be explained by factors such as mother's educational level, household income, walking distance to healthcare centre and knowledge on immunization and feeling that immunization is free of charge. Similar findings have been found from previous studies in sub-Saharan African countries (Wysong et al., 2012). After intervention, more than half (53.8%) of the children in the intervention group received all the 8 recommended doses (BCG, OPV, Hep B, Penta, PCV, IPV, Measles and Yellow fever) which is significantly higher compared with the coverage before intervention. While for the control group only 9.5% of children were fully vaccinated. The study observed that majority of mothers/caregivers that had completed the vaccination schedule of their children were those that received the vaccination education during the immunization session.

5.5 Attitude towards routine immunization

The result of this study revealed that, only 10% of mothers in both groups had positive attitude regarding their children immunization at baseline. While after intervention the positive attitude of mothers towards routine immunization in the intervention group improved to 58%. This is similar to the finding to the study conducted by (Bernsen et al., 2011) (Asim, Malik, Yousaf, Gillani, & Habib, 2012) who found that the prevalence of a positive attitude towards immunization was excellent in the study group of mothers and the satisfaction of the service was high. 40% of mothers in both groups are in the opinion not to immunized their children due to vaccine side effects. Similar findings to the study conducted in Saudi Arabia (Yousif, Albarraq, Abdallah, & Elbur, 2014) reported systematic reaction including fever, irritability, drowsiness and rash may also occur.

Previous studies also reported common local reactions to vaccine which include pain, fever, swelling and redness at the injection site (Spencer, TRONDSEN PAWLOWSKI, & Thomas, 2017) (B. Tagbo, Uleanya, & Omotowo, 2013a). 65% of the respondents in the intervention and 67% in the control groups at baseline disagreed that vaccines are safe. This is in contrast with other study (Yousif, Albarraq et al. 2014) cfr where 73% of the mothers are in the opinion of the vaccine safety.

This study indicates that (28.3%) of mothers in the intervention and 30% in control group in this study did not agree that administration of more than one vaccine at the same time have negative impacts on child immunity. In another study, it was found that, caregivers who experienced after effects of immunization have shown negative attitude towards immunizing their children (Favin, Steinglass, Fields, Banerjee, & Sawhney, 2012). Similarly, some studies have not reported scientific evidence that linked parents' fear that combined vaccines can causes immune overload (Hilton,

Petticrew, & Hunt, 2006). This is in contrast with other finding which reported that more than one third of mothers had believed that multiple immunizations will reduce the immunity of their children (Gellin, Maibach, & Marcuse, 2000). Another study (V. B. Brown, Oluwatosin, & Ogundeji, 2017) recommend for intervention studies using trained health staff to improve positive attitude of mothers.

5.6 Supporting environment towards vaccination uptake

The present study revealed that, 7.1% and 7.6% of eligible children from intervention and control group received all National immunization schedule at the appropriate age at baseline. Significant delay or incomplete vaccination for all vaccines administered at the appropriate age was reported in this study. Similar to our findings also documented the presence of significant delay in vaccination would expose the children to risk of acquiring infection due to vaccine preventable disease. (Yadav et al., 2011).

This study found that distance to the health facility, availability of vaccination card and affordability to travel to for immunization were all very low for the respondents in both groups before intervention. These might have contributed to the incomplete immunization of the children. Distance to health facility has been observed to be a barrier to child immunization in the rural areas. Several studies reported this (Adebayo et al., 2012) and (Kimani-Murage, Mutua, & Ettarh, 2017).

Immunization card remains an essential tool for measuring immunization status. One of the strength of this study is the increase in confirmation of immunization status of children in the intervention group by immunization card after intervention from 24% by card plus mother's recall 10% at baseline while (63%) of children assessed in the intervention group after

intervention had their vaccination card available and mother's recall was 7% compared with the control group where only 27% possessed their immunization by card and mother's recall 15% after intervention from 22% by card plus mother's recall 12% at baseline. This is consistent with a study reported in Togo a high rate of vaccination card possession (Landoh et al., 2016). Non-possession of vaccination card was associated with incomplete immunization as reported in Senegal (Mbengue et al., 2017) and in Ghana (Baguune, Ndagbo, & Adokiya, 2017). The use of vaccination card is a key measure which could help in having accurate estimation of vaccine coverage. Children without vaccination cards have high probability of drop out. This is reported in a study conducted by (Russo et al., 2015) in the Dschang region of Cameroon.

Mothers/caregivers' distance to health facility have been observed in this study to be a barrier to immunization uptake in remote areas that are more than 5 Kilo meters away from their household. This statement is similar with other findings (Adebayo et al., 2012) and (Kimani-Murage et al., 2017) which cited that, distance to health facility is linked to immunization status of children especially if the health facility is not close. Choice of place to obtain immunization by mothers/caregivers showed a significant difference in the intervention group after intervention compared to control group. This could be explained by mother's knowledge, Attitude and practice having a significant effect on the immunization status of children. Similar finding reported that place of choice where immunization is obtained was associated with immunization status (Obasohan, Anosike, & Etsunyakpa).

5.7. Conclusion

The purpose of the study was to find the effectiveness of interpersonal communication skills towards strengthening routine immunization. The findings of this study revealed that mothers/caregivers in the intervention group had significantly increased uptake regarding immunization compared to the control group. There was also significant positive change within the intervention group regarding knowledge, attitude and uptake of immunization by the mothers.

Regarding knowledge, most of the mothers/caregivers did say that, routine immunization for their children was important but, the information regarding existing facility available in their community which is accessible and free of cost was low. After the intervention, there was a significant difference with the intervention group while for the control group there was no change. This concludes that, mothers/caregivers in the intervention group had better knowledge regarding routine immunization after intervention.

Knowledge of the mothers/caregivers in the intervention group on routine immunization also increased and was statistically significant after intervention. Knowledge was increased because of interpersonal communication skills intervention by the primary health care workers. In contrast, there were no changes documented in the control group.

Good practices about routine immunization among mothers/caregiver have been an important determinant for the family. In this study, after intervention, mothers in the intervention group had improved practices towards routine immunization. Services with the support from the Primary health care workers during the interpersonal communication intervention helped in having

effective uptake of routine immunization services. The intervention was effective in improving the uptake of routine immunization at PHC levels of Arewa Local Government Area, Kebbi State, Nigeria by using existing services within both PHC centres/clinics effectively and efficiently.

This study concludes that, interpersonal communication skill is an effective intervention which shows significant change in the intervention group and improving the knowledge, attitude and uptake of mothers/caregiver's towards routine immunization services.

5.8. Recommendations

We recommend the following based on our findings to serve as guide for further research into the area of improving knowledge, attitude and practices towards routine immunization services in order to reduce the prevalence of vaccine preventable diseases and infant and child mortality.

The interpersonal communication intervention used in this study focused on improving mother's knowledge, attitude and practice about childhood immunization in Arewa LGA and has brought a significant positive change in knowledge, attitude and practice compared to the baseline results.

Further studies using a larger sample of mothers from other LGAs in the State are required in order to applied interpersonal communication skills in improving knowledge, attitude and practice about childhood immunization and immunization status in order to increase coverage to 80%.

The findings from this study showed full vaccination coverage (53.8%) is lower than the National EPI coverage plan (80%) at district level. Hence the Ministry of Health shall work with the Ministry of Information to develop appropriate information and education strategies to further improve awareness about the important of child immunization.

There is need for the health workers to increase engagement with the Community and religious leaders to develop a comprehensive strategy to bring out effective changes in the attitudes and practices regarding immunization of children seeing the effect of community and religious leaders from several studies in child health services.

The immunization schedule should made frequent and more flexible outreach centres should also be created to accommodate place of vaccination too far were also important reason for incomplete immunization.

The challenge however is that children of mothers without education, that are poor in the rural area are not fully immunized, thus affecting the immunization picture of Arewa and Dandi LGAs. Women empowerment intervention is thus recommended for the poor women, as well as improved female literacy level as knowledgeable mothers utilize child health services better including immunization.

We also recommend behavioural research into the aspect of immunization services among mothers in the rural community that delve into the real unseen barriers that make it utilization low.

5.9. Strengths

Although assessment study has been conducted in various groups of mothers in the study area of Arewa and Dandi LGA but, there is no single study that focused on interpersonal communication with the mothers/caregivers on routine immunization. The 100 percent retention rate of pre and post recruited mothers is as a result of early sensitization of the community leaders and heads of the household with LGA authority over the child immunization by the research team prior to the study and also during the intervention period in order to address community rumours and concern about the study.

5.10. Limitations

The following were some of the limitation of the study:

The study has been conducted in two catchment areas of Arewa and Dandi Local Government and the issues identified during the study were almost similar in all the same kind of communities and health facilities across the State. Hence, these findings after intervention may applied at other primary health care facilities in the State.

Our study revealed that 63% of children assessed in the intervention group after intervention had their vaccination card and 7% were measured by mothers' recall. While the control group only 27% assessed by vaccination card after intervention. This difference could be as a result of inability of mothers to recall actual doses of vaccines and social desirability biases which may lead to over estimation of vaccines received by the children.

Some mothers may have been less than forthcoming about their infant's vaccination status if they believed it to be a no favourable response or may have recalled information in accurately.

Based on our survey we cannot know whether partial immunization reported by the mother was accurate as some mothers may not be fully aware of immunization schedule.



APPENDICES

Appendix A : Household Survey Questionnaire

Household Survey Questionnaire For Childhood Immunization

A. INFORMATION PANEL	
<i>This questionnaire is to be applied to mothers or caretakers of children 12 -23 months of age.</i>	
1.Cluster Number _____	2. Household Number _____
3. State -----	4. LGA -----
5. Name of Ward _____	6. Name of village/community: _____
7. Sex of the child -----	If Caregiver: Sex -----
7. Interviewer name:	8. Day / Month / Year of interview: _____ / _____ / _____
Name _____	

Interviewer: Have you read the consent form to the respondent	Yes No
Interviewer: Does the respondent agree?	Yes No
IF NO END INTERVIEW HERE	

9. Result of Mother's interview	Completed01
<i>(This is to be recorded at the end of the interview)</i>	Did not turn up for interview02
	Refused03
	Partly completed.....04
	Incapacitated05
	Other (specify) _____ 06

1. MOTHER'S/CARE GIVER'S BACKGROUND (SOCIO DEMOGRAPHIC CHARACTERISTICS)			
1.1	NOW I WANT TO ASK SOME QUESTIONS ABOUT YOU. WHAT IS YOUR CURRENT AGE?	<201 21-30.....2 31- 40.....3 41- 50.....4 51 and Above.....5	
1.2	WHAT IS YOUR RELIGION?	Islam.....1 Christianity.....2 Others (Specify)3	
1.3	ETHNICITY	Hausa.....1 Fulani.....2 Zabarma.....3 Others (Specify).....4	
1.4	EDUCATIONAL STATUS	Not attended.....1 Quranic.....2 Primary.....3 Secondary.....4 Higher than Secondary or Tertiary.....5	
1.5	MARITAL STATUS OF THE IMMEDIATE CARE TAKER?	Currently married1 Divorced.....2 Widowed3 Separated.....4	
1.6	WHAT IS YOUR PRESENT OCCUPATION?	House wife1 Petty Trading.....2 Government Employee.....3 Farming.....4 Others (Specify).....5	
1.7	DAILY INCOME IN NAIRA	N100 to N200.....1 N300 and above.....2	

2. INFORMATION ABOUT CHILDREN			
NOW I WANT TO ASK SOME QUESTIONS ABOUT YOUR CHILDREN.			
2.1	HOW MANY CHILDREN'S DO YOU HAVE?	>6.....1 5 - 6.....2 3 - 4.....3 1 -2.....4	
2.2	NUMBER OF MALE AND FEMALE (DO NOT COUNT CHILDREN)	Male.....1 Female.....2	

2.3	NUMBER OF CHILDREN UNDER TWO YEARS	Number.....	

1. KNOWLEDGE OF MOTHER'S REGARDING CHILDHOOD IMMUNIZATION		
1. DO YOU HEARD INFORMATION ABOUT ROUTINE IMMUNIZATION?		
Yes <input type="checkbox"/>		
No <input type="checkbox"/>		
2. DO YOU KNOW VACCINE PREVENTABLE DISEASES?		
Yes <input type="checkbox"/>		
No <input type="checkbox"/>		
3. WHICH OF THE FOLLOWING ARE VACCINE PREVENTABLE DISEASES? (MULTIPLE ANSWERS)	Tuberculosis [] Poliomyelitis [] Hepatitis B [] Diphtheria [] Pertussis (Whooping Cough) [] Tetanus [] Pneumonia [] Measles [] Malaria..... [] Diarrhoea..... [] Yellow Fever []	TICK ALL THAT IS MENTIONED
4. PLEASE CAN YOU MENTION THE CAUSES OF CHILDHOOD VACCINE PREVENTABLE DISEASES (MULTIPLE ANSWERS)	BY GERMS..... [] POOR HYGIENE..... [] CONTACT WITH PATIENT..... []	TICK ALL THAT IS MENTION
5. DO YOU THINK THAT DISEASES CAN BE PREVENTED THROUGH VACCINATION	Yes <input type="checkbox"/> No <input type="checkbox"/>	

N?		
6. WHICH TYPE OF CHILDHOOD VACCINATION DO YOU KNOW? (MULTIPLE ANSWERS)	BCG..... [] Polio..... [] Pentavalent /DPT [] PCV..... [] Measles..... [] Yellow Fever..... []	TICK ALL THAT IS MENTION
7. DO YOU KNOW THE SCHEDULE OF CHILD IMMUNIZATION?	Yes <input type="checkbox"/> No <input type="checkbox"/>	
8. HOW MANY TIMES SHOULD A CHILD BE TAKEN TO A HEALTH FACILITY TO COMPLETE HIS/HER ROUTINE IMMUNIZATION?	One..... [] Two..... [] Three..... [] Four..... [] Five..... []	TICK ALL THAT IS MENTION
9. AT WHAT AGE SHOULD A CHILD RECEIVE THE FOLLOWING VACCINES?	BCG at Birth Yes No Polio at Birth Yes No Hep B at Birth Yes No Penta/DPT at (6wks, 10wks, 14wks) Yes No IPV at 14wks Yes No PCV at (6wks, 10wks, 14wks) Yes No Measles at 9 months Yes No Yellow Fever at 9 months Yes No	CIRCLE ALL THAT IS MENTION
10. DOES VACCINATION HAS BENEFIT FOR THE CHILD?	Yes <input type="checkbox"/> No <input type="checkbox"/>	

11. IF YES, WHAT ARE THE BENEFITS OF IMMUNIZATION?	Immunity for the child Yes No Prevent diseases Yes No Control epidemic Yes No	CIRCLE ALL THAT IS MENTION
12. DO YOU KNOW THE COMMON SIDE EFFECTS OF VACCINATION?	Yes <input type="checkbox"/> No <input type="checkbox"/>	
13. MENTION THE COMMON SIDE-EFFECTS OF CHILDHOOD VACCINES THAT YOU KNOW	<i>Fever</i> [] <i>Shivering</i> [] <i>Pain or swelling at injection site</i> [] <i>Vomiting</i> []	TICK ALL THAT IS MENTIONED

III. ATTITUDE TOWARDS ROUTINE IMMUNIZATION

FOR EACH OF THE FOLLOWING STATEMENT, PLEASE TELL ME IF YOU STRONGLY AGREE, AGREE, DISAGREE, OR STRONGLY DISAGREE (CIRCLE THAT APPLY)		
1. GIVING IMMUNIZATION TO CHILDREN IS NECESSARY/IMPORTANT	Strongly Disagree.....1 Disagree.....2 Neutral.....3 Agree.....4 Strongly Agree.....5	
2. ARE YOU CONFIDENT IN THE SAFETY OF ROUTINELY CHILDHOOD IMMUNIZATION	Strongly Disagree.....1 Disagree.....2 Neutral.....3 Agree.....4 Strongly Agree.....5	
3. VACCINES ARE NECESSARY TO PREVENT	Strongly Disagree.....1 Disagree.....2 Neutral.....3 Agree.....4 Strongly Agree.....5	

CERTAIN DISEASES		
4. ARE YOU WILLING TO TAKE YOUR CHILD FOR IMMUNIZATION EVEN IF HE/SHE IS SICK?	Strongly Disagree.....1 Disagree.....2 Neutral.....3 Agree.....4 Strongly Agree.....5	
5. IS CHILD IMMUNIZATION PROHIBITED IN RELIGION	Strongly Disagree.....1 Disagree.....2 Neutral.....3 Agree.....4 Strongly Agree.....5	
6. GETTING MULTIPLE SHOTS OF VACCINE IN ONE VISIT CAN OVERLOAD A CHILD IMMUNE SYSTEM?	Strongly Disagree.....1 Disagree.....2 Neutral.....3 Agree.....4 Strongly Agree.....5	
7. IF I IMMUNIZED MY CHILD HE/SHE MAY HAVE A SERIOUS SIDE EFFECT.	Strongly Disagree.....1 Disagree.....2 Neutral.....3 Agree.....4 Strongly Agree.....5	
8. DO YOU TRUST THE INFORMATION YOU RECEIVE ABOUT IMMUNIZATION ?.	Strongly Disagree.....1 Disagree.....2 Neutral.....3 Agree.....4 Strongly Agree.....5	

IV. SUPPORTING ENVIRONMENT TOWARDS VACCINATION UPTAKE

1. DO YOU HAVE A HEALTH FACILITY WHERE	Yes <input type="checkbox"/> No <input type="checkbox"/>	
--	---	--

ROUTINE IMMUNIZATION SERVICES PROVIDED?		
1.2. WHAT TYPE OF HEALTH FACILITY YOU ATTEND FOR IMMUNIZATION SERVICES?	1. Health Clinic [] 2. Outreach session [] 3. Hospital [] 4. Private clinic..... [] 5. I don't take my child for immunization.... []	TICK ALL THAT IS MENTION IF ITEM 5 IS INDICATED GO TO QUESTION 3
2. DISTANCE TO HEALTH FACILITY FOR IMMUNIZATION SERVICES	<1 Km..... [] 1-5 Km..... [] 6-10 Km..... []	TICK THAT APPLY
3. ABILITY TO TRAVEL FOR IMMUNIZATION	Yes <input type="checkbox"/> No <input type="checkbox"/>	
4. IS THE TIME FOR IMMUNIZATION SERVICE CONVENIENT FOR YOU?	Yes <input type="checkbox"/> No <input type="checkbox"/>	
5. DO YOU HAVE A CARD WHERE YOUR CHILD ROUTINE IMMUNIZATION IS RECORDED	Yes <input type="checkbox"/> No <input type="checkbox"/>	
IF CARD IS AVAILABLE (RECORD ALL THE VACCINES AND DATES WHICH VACCINES WERE GIVEN IN THE BOX)		
IF THE MOTHER DOES NOT HAVE THE CARD, ASK FOR THE REASON		
AGE	VACCINES	
At Birth	BCG <input type="text"/>	OPV0 <input type="text"/> Hep B <input type="text"/>

6 Weeks	OPV1 <input type="text"/>	PENTA1 <input type="text"/>	PCV3 <input type="text"/>	
10 Weeks	OPV2 <input type="text"/>	PENTA2 <input type="text"/>	PCV2 <input type="text"/>	
14 Weeks	IPV Once <input type="text"/>			
14 Weeks	OPV3 <input type="text"/>	PENTA 3 <input type="text"/>	PCV3 <input type="text"/>	
9 Months	MEASLES <input type="text"/>	YELLOW FEVER <input type="text"/>		

IMMUNIZATION STATUS

Fully Immunize

Partially Immunized

Un-Immunized

If the child received all recommended vaccines go to question 10.

If partially immunized, go to question 9

6. WHY DID YOUR CHILD NOT COMPLETE THE VACCINATION? (MULTIPLE ANSWERS)	Health worker's attitude..... []	TICK ALL THAT APPLY
	Place of immunization too far..... []	
	No enough money for transportation..... []	
	Long Waiting time..... []	
	No Husband permission/ decision..... []	
	No faith in immunization..... []	
	Unaware of the need to return for 2 nd or 3 rd dose []	
Unavailability of vaccines..... []	Child had previous vaccine reaction []	

7. IN YOUR OPINION WHAT COULD YOU DO TO IMPROVE IMMUNIZATION SERVICES IN YOUR COMMUNITY

.....
.....

9. Record the time of commencement of the interview.

Hour and minutes..... : ..



Thank you for responding.



Appendix B – Structured Questionnaire for Mothers/Givers

Informed Consent

Question Identification Number.....

Date of the visit..... Interviewer name-----

LGA..... Ward..... Settlement.....

Good morning/Good afternoon. I am-----who is a member of team conducting a study on improving the quality of routine immunization and child health services by primary health care workers who are providing routine immunization in your community and to find ways to address the challenges. Of the mothers who have children between ages of 12- 23 months, you are selected randomly as one of the mothers/caregivers to participate in this study. The study will be conducting through interviews.

Confidentiality and consent: I want to ask you some question of which may be personal. Your answers are completely confidential. Your name will not be written on this form and will never be used in connection with any of information you tell me. You may need to know that this exercise is taken place in 2 LGAs and 4 political wards of the state. Your honest answers to these questions will help us improve health services provided especially for children under 2 years of age. We would greatly appreciate your help in responding to this survey.

Finger print.....

(Finger/Thumb print of respondent certifying that informed consent has been given)

THANK THE RESPONDENT FOR THE COOPERATION GIVEN.

TIME FINISHED: _____ TIME TAKEN TO FINISH THIS QUESTIONNAIRE IN MINUTES:

REFERENCES

- Abdulraheem, I., Onajole, A., Jimoh, A., & Oladipo, A. (2011). Reasons for incomplete vaccination and factors for missed opportunities among rural Nigerian children. *Journal of Public Health and Epidemiology*, 3(4), 194-203.
- Abubakar, I., Tillmann, T., & Banerjee, A. (2015). Global, regional, and national age-sex specific all-cause and cause-specific mortality for 240 causes of death, 1990-2013: a systematic analysis for the Global Burden of Disease Study 2013. *Lancet*, 385(9963), 117-171.
- Adebayo, B. E., Oladokun, R. E., & Akinbami, F. O. (2012). Immunization coverage in a rural community in southwestern Nigeria. *J Vaccines Vaccin*, 3(4), 1-6.
- Adedire, E. B., Ajayi, I., Fawole, O. I., Ajumobi, O., Kasasa, S., Wasswa, P., & Nguku, P. (2016). Immunisation coverage and its determinants among children aged 12-23 months in Atakumosa-west district, Osun State Nigeria: a cross-sectional study. *BMC Public health*, 16(1), 905.
- Adefolalu, O. A., Kanma-Okafor, O. J., & Balogun, M. R. (2019). Maternal knowledge, attitude and compliance regarding immunization of under five children in Primary Health Care centres in Ikorodu Local Government Area, Lagos State. *Journal of Clinical Sciences*, 16(1), 7.
- Adeleye, O., & Mokogwu, N. (2016). Determinants of full vaccination status in a rural community with accessible vaccination services in South-South Nigeria. *Journal of Community Medicine and Primary Health Care*, 28(1), 1-7.
- Adenike, O.-B., Adejumoke, J., Olufunmi, O., & Ridwan, O. (2017). Maternal characteristics and immunization status of children in North Central of Nigeria. *The Pan African Medical Journal*, 26.
- Advisory, P. (2012). Paediatric Association of Nigeria (PAN) recommended routine immunization schedule for Nigerian children. *Niger J Paed*, 39(4), 152-158.
- Al-lela, O. Q. B., Bahari, M. B., Al-abbassi, M. G., & Basher, A. Y. (2011). Development of a questionnaire on knowledge, attitude and practice about immunization among Iraqi parents. *Journal of Public Health*, 19(6), 497-503.

- Al-lela, O. Q. B., Bahari, M. B., Al-abbassi, M. G., Salih, M. R., & Basher, A. Y. (2012). Estimation of immunization providers' activities cost, medication cost, and immunization dose errors cost in Iraq. *Vaccine*, 30(26), 3862-3866.
- Al-Zahrani, J. (2013). Knowledge, attitude and practice of parents towards childhood vaccination. *Majmaah Journal of Health Sciences*, 216(1216), 1-20.
- Anah, M., Etuk, I., & Udo, J. (2006). Opportunistic immunization with in-patient programme: eliminating a missed opportunity in Calabar, Nigeria.
- Analysts, F. B. (2005). The state of routine immunization services in Nigeria and reasons for current problems. *Bath: FBA Health Systems Analysts [homepage on the Internet]. c2005 [cited 2008 Oct 12] Available from: http://www.phfn.org/resources/Immunisation/2005%20State_of_Immunization_in_Nigeria.pdf.*
- Angadi, M., Jose, A. P., Udgiri, R., Masali, K., & Sorganvi, V. (2013). A study of knowledge, attitude and practices on immunization of children in urban slums of Bijapur city, Karnataka, India. *Journal of clinical and diagnostic research: JCDR*, 7(12), 2803.
- Ankrah, V., & Nwaigwe, F. (2005). Immunization system review and training needs assessment in Ekiti State. *February. Ado-Ekiti Ministry of Health. PATHS.*
- Asim, M., Malik, N., Yousaf, H., Gillani, I., & Habib, N. (2012). An assessment of parental knowledge, belief and attitude toward childhood immunization among minorities in rural areas of district Faisalabad, Pakistan. *Mediterranean Journal of Social Sciences*, 3(11), 153-159.
- Awodele, O., Oreagba, I., Akinyede, A., Awodele, D., & Dolapo, D. (2010). The knowledge and attitude towards childhood immunization amongst mothers attending antenatal clinic in Lagos University Teaching Hospital. *Tanzania journal of Health research*, 12(3), 172-177.
- Awosan, K., Ibrahim, M., Yunusa, E., Isah, B., Raji, M., & Abubakar, N. Knowledge, Attitude and Compliance with Full Immunization of Children Against Vaccine Preventable Diseases among Pregnant Mothers in Sokoto, Nigeria.
- Awosika, D. M. D. (2012). ACCESS TO IMMUNIZATION AND OTHER PUBLIC HEALTH INTERVENTIONS THROUGH THE PHARMACIST. *West African Journal of Pharmacy*, 23(1).

- Baguune, B., Ndago, J. A., & Adokiya, M. N. (2017). Immunization dropout rate and data quality among children 12–23 months of age in Ghana. *Archives of Public Health, 75*(1), 18.
- Bartlett, E. E., Grayson, M., Barker, R., Levine, D. M., Golden, A., & Libber, S. (1984). The effects of physician communications skills on patient satisfaction; recall, and adherence. *Journal of chronic diseases, 37*(9-10), 755-764.
- Basics, I. FACILITATOR'S GUIDE.
- Bbaale, E. (2013). Factors influencing childhood immunization in Uganda. *Journal of health, population, and nutrition, 31*(1), 118.
- Bernsen, R. M., Al-Zahmi, F. R., Al-Ali, N. A., Hamoudi, R. O., Ali, N. A., Schneider, J., . . . Grivna, M. (2011). Knowledge, attitude and practice towards immunizations among mothers in a traditional city in the United Arab Emirates. *J Med Sci, 4*(3), 114-121.
- Birhanu, S., Anteneh, A., Kibie, Y., & Jejaw, A. (2016). Knowledge, attitude and practice of mothers towards immunization of infants in health centres at Addis Ababa, Ethiopia. *Am J Health Res, 4*(1), 6-17.
- Bland, J., & Clements, C. J. (1998). *Protecting the world's children: the story of WHO's immunization programme*. Paper presented at the World health forum 1998; 19 (2): 162-173.
- Bofarraj, M. A. (2011). Knowledge, attitude and practices of mothers regarding immunization of infants and preschool children at Al-Beida City, Libya 2008. *Egyptian Journal of Pediatric Allergy and Immunology (The), 9*(1).
- Brieger, W., Salami, K., & Ogunlade, B. (2004). Catchment area planning and action: documentation of the community-based approach in Nigeria.
- Brown, K. F., Kroll, J. S., Hudson, M. J., Ramsay, M., Green, J., Long, S. J., . . . Sevdalis, N. (2010). Factors underlying parental decisions about combination childhood vaccinations including MMR: a systematic review. *Vaccine, 28*(26), 4235-4248.
- Brown, V. B., Oluwatosin, O. A., & Ogundeji, M. O. (2017). Impact of training intervention on immunization providers' knowledge and practice of routine immunization in Ibadan, south-western Nigeria: a primary health care experience. *Pan African Medical Journal, 26*(216).

- Canavati, S., Plugge, E., Suwanjatuporn, S., Sombatrungjaroen, S., & Nosten, F. (2011). Barriers to immunization among children of migrant workers from Myanmar living in Tak province, Thailand. *Bulletin of the World Health Organization*, 89, 528-531.
- Chan, M. (2014). Beyond expectations: 40 years of EPI. *Lancet*, 383(9930), 1697-1698.
- Cooper, L. Z., Larson, H. J., & Katz, S. L. (2008). Protecting public trust in immunization. *Pediatrics*, 122(1), 149-153.
- Debie, A., & Taye, B. (2014). Assessment of fully vaccination coverage and associated factors among children aged 12–23 months in Mecha District, North West Ethiopia: A cross-sectional study. *Sci J Public Health*, 2(4), 342-348.
- Dickerson, P. S. (2010). Continuing nursing education: enhancing professional development. *The Journal of Continuing Education in Nursing*, 41(3), 100-101.
- Dubé, E., Laberge, C., Guay, M., Bramadat, P., Roy, R., & Bettinger, J. A. (2013). Vaccine hesitancy: an overview. *Human vaccines & immunotherapeutics*, 9(8), 1763-1773.
- Etana, B. (2011). *Factors Affecting Immunization Status of Children Aged 12-23 Months in Ambo Woreda, West Shewa Zone of Oromia Regional State*. Addis Ababa University,
- Etana, B., & Deressa, W. (2012). Factors associated with complete immunization coverage in children aged 12–23 months in Ambo Woreda, Central Ethiopia. *BMC Public health*, 12(1), 566.
- Favin, M., Steinglass, R., Fields, R., Banerjee, K., & Sawhney, M. (2012). Why children are not vaccinated: a review of the grey literature. *International health*, 4(4), 229-238.
- Gellin, B. G., Maibach, E. W., & Marcuse, E. K. (2000). Do parents understand immunizations? A national telephone survey. *Pediatrics*, 106(5), 1097-1102.
- Gidado, S., Nguku, P., Biya, O., Waziri, N. E., Mohammed, A., Nsubuga, P., . . . Suleman, I. (2014). Determinants of routine immunization coverage in Bungudu, Zamfara state, northern Nigeria, may 2010. *The Pan African Medical Journal*, 18(Suppl 1).
- Gurmu, E., & Etana, D. (2016). Factors influencing Children's full immunization in Ethiopia. *African Population Studies*, 30(2).

- Hamid, S., Andrabi, S., Fazli, A., & Jabeen, R. (2012). Immunization of Children in a Rural Area of North Kashmir, India: A KAP Study. *Online Journal Of Health and Allied Sciences*, 11(1 (10)).
- Hariweni, T., Ali, M., Sofyani, S., & Lubis, I. Z. (2004). Knowledge, attitude, and practice of underfive children stimulation of working and nonworking mothers. *Paediatrica Indonesiana*, 44(2), 51-54.
- Hilton, S., Petticrew, M., & Hunt, K. (2006). Combined vaccines are like a sudden onslaught to the body's immune system': Parental concerns about vaccine 'overload' and 'immune-vulnerability. *Vaccine*, 24(20), 4321-4327.
- Hu, Y., Chen, Y., Wang, Y., Song, Q., & Li, Q. (2017). Prenatal vaccination education intervention improves both the mothers' knowledge and children's vaccination coverage: Evidence from randomized controlled trial from eastern China. *Human vaccines & immunotherapeutics*, 13(6), 1477-1484.
- Ibnouf, A., Van den Borne, H., & Maarse, J. (2007). Factors influencing immunisation coverage among children under five years of age in Khartoum State, Sudan. *South African Family Practice*, 49(8), 14-14f.
- Imoh, G. (1991). Communication for Social Mobilization: An Evaluation of EPI in Nigeria. *Unpublished Doctoral Thesis, University of Ibadan*.
- Jacobson, T. A., Thomas, D. M., Morton, F. J., Offutt, G., Shevlin, J., & Ray, S. (1999). Use of a low-literacy patient education tool to enhance pneumococcal vaccination rates: a randomized controlled trial. *Jama*, 282(7), 646-650.
- Kapoor, R., & Vyas, S. (2010). Awareness and knowledge of mothers of under five children regarding immunization in Ahmedabad. *Age*, 21(30), 73.
- Kassahun, M. B., Biks, G. A., & Teferra, A. S. (2015). Level of immunization coverage and associated factors among children aged 12–23 months in Lay Armachiho District, North Gondar Zone, Northwest Ethiopia: a community based cross sectional study. *BMC research notes*, 8(1), 239.
- Kempe, A., Daley, M. F., McCauley, M. M., Crane, L. A., Suh, C. A., Kennedy, A. M., . . . Babbel, C. I. (2011). Prevalence of parental concerns about childhood vaccines: the experience of primary care physicians. *American journal of preventive medicine*, 40(5), 548-555.

- Kennedy, A., LaVail, K., Nowak, G., Basket, M., & Landry, S. (2011). Confidence about vaccines in the United States: understanding parents' perceptions. *Health affairs, 30*(6), 1151-1159.
- Kidane, T., Yigzaw, A., Sahilemariam, Y., Bulto, T., Mengistu, H., Belay, T., . . . Olusegun, B. (2008). National EPI coverage survey report in Ethiopia, 2006. *Ethiopian Journal of Health Development, 22*(2), 148-157.
- Kimani-Murage, E., Mutua, M. K., & Ettarh, R. R. (2017). Childhood vaccination in informal urban settlements in Nairobi, Kenya: Who gets vaccinated?
- Kimura, A. C., Nguyen, C. N., Higa, J. I., Hurwitz, E. L., & Vugia, D. J. (2007). The effectiveness of vaccine day and educational interventions on influenza vaccine coverage among health care workers at long-term care facilities. *American Journal of Public Health, 97*(4), 684-690.
- Kroger, A. T. (2013). General recommendations on immunization.
- Kunle-Olowu, A., Kunle-Olowu, O. E., & Emeka, U. M. (2011). Immunization coverage of antenatal and immunization clinics attendees in the Niger Delta University Teaching Hospital. *Journal of Public Health and Epidemiology, 3*(3), 90-93.
- Landoh, D. E., Ouro-Kavalah, F., Yaya, I., Kahn, A.-L., Wasswa, P., Lacle, A., . . . Soura, A. B. (2016). Predictors of incomplete immunization coverage among one to five years old children in Togo. *BMC Public health, 16*(1), 968.
- Lee, J.-w. (2003). Child survival: a global health challenge. *The Lancet, 362*(9380), 262.
- Legesse, E., & Dechasa, W. (2015). An assessment of child immunization coverage and its determinants in Sinana District, Southeast Ethiopia. *BMC pediatrics, 15*(1), 31.
- Lewandowsky, S., Ecker, U. K., Seifert, C. M., Schwarz, N., & Cook, J. (2012). Misinformation and its correction: Continued influence and successful debiasing. *Psychological Science in the Public Interest, 13*(3), 106-131.
- Likert, R. (1932). A technique for the measurement of attitudes. *Archives of psychology.*
- Mathew, J. L. (2012). Inequity in childhood immunization in India: a systematic review. *Indian pediatrics, 49*(3), 203-223.
- Mbengue, M. A. S., Sarr, M., Faye, A., Badiane, O., Camara, F. B. N., Mboup, S., & Dieye, T. N. (2017). Determinants of complete immunization among senegalese children aged 12–23 months: evidence from the demographic and health survey. *BMC*

Public health, 17(1), 630.

- Nicholas, D. D., Heiby, J. R., & Hatzell, T. A. (1991). The Quality Assurance Project: introducing quality improvement to primary health care in less developed countries. *International Journal for Quality in Health Care*, 3(3), 147-165.
- Nolna, S. K., Bonono, C.-R., Moncher, M. N., Bindé, T., Nolna, D., & Zogo, P. O. (2018). Factors influencing the performance of routine immunization in urban areas: A comparative case study of two cities in Cameroon: Douala and Yaoundé. *Vaccine*, 36(49), 7549-7555.
- Obasohan, P. E., Anosike, B. U., & Etsunyakpa, M. B. Knowledge, Attitude and Practice of Immunization Processes and its Coverage in Rural Communities of Bida Emirate Area, Niger State, Nigeria. *ARC Journal of Nursing and Healthcare (AJNH) Volume, 1*, 29-37.
- Obioha, E., Ajala, A., & Matobo, T. (2010). Analysis of the Performance of Expanded Programme on Immunization (EPI) for Four Child Killer Diseases under the Military and Civilian Regimes in Nigeria, 1995-1999; 2000-2005. *Studies on Ethno-Medicine*, 4(1), 43-52.
- Obregón, R., Chitnis, K., Morry, C., Feek, W., Bates, J., Galway, M., & Ogden, E. (2009). Achieving polio eradication: a review of health communication evidence and lessons learned in India and Pakistan. *Bulletin of the World Health Organization*, 87, 624-630.
- Odusanya, O. O., Alufohai, E. F., Meurice, F. P., & Ahonkhai, V. I. (2008). Determinants of vaccination coverage in rural Nigeria. *BMC Public health*, 8(1), 381.
- Oku, A., Oyo-Ita, A., Glenton, C., Fretheim, A., Ames, H., Muloliwa, A., . . . Cartier, Y. (2016). Communication strategies to promote the uptake of childhood vaccination in Nigeria: a systematic map. *Global health action*, 9(1), 30337.
- Okwo-Bele, J.-M., & Cherian, T. (2011). The expanded programme on immunization: a lasting legacy of smallpox eradication. *Vaccine*, 29, D74-D79.
- Ophori, E. A., Tula, M. Y., Azih, A. V., Okojie, R., & Ikpo, P. E. (2014). Current trends of immunization in Nigeria: prospect and challenges. *Tropical medicine and health*, 42(2), 67-75.
- Organization, W. H. (2005). *Immunization coverage cluster survey: Reference manual*.

Retrieved from

- Organization, W. H. (2008). Module 7. The EPI coverage survey. *Training for mid-level managers (MLM). Volume WHO/IVB/08.07 edn. Geneva, Switzerland.*
- Organization, W. H. (2013). Health topics: immunization. *Internet] World Health Organization Available from: www.who.int/topics/immunization/en. Assessed, 15, 18.*
- Ozawa, S., & Stack, M. L. (2013). Public trust and vaccine acceptance-international perspectives. *Human vaccines & immunotherapeutics, 9(8), 1774-1778.*
- Payne, S., Townend, J., Jasseh, M., Lowe Jallow, Y., & Kampmann, B. (2013). Achieving comprehensive childhood immunization: an analysis of obstacles and opportunities in The Gambia. *Health policy and planning, 29(2), 193-203.*
- Rainey, J. J., Watkins, M., Ryman, T. K., Sandhu, P., Bo, A., & Banerjee, K. (2011). Reasons related to non-vaccination and under-vaccination of children in low and middle income countries: findings from a systematic review of the published literature, 1999–2009. *Vaccine, 29(46), 8215-8221.*
- Ransome-Kuti, O. (1986). Child health in Nigeria: past, present, and future. *Archives of disease in childhood, 61(2), 198.*
- Russo, G., Miglietta, A., Pezzotti, P., Biguioh, R. M., Mayaka, G. B., Sobze, M. S., . . . Rezza, G. (2015). Vaccine coverage and determinants of incomplete vaccination in children aged 12–23 months in Dschang, West Region, Cameroon: a cross-sectional survey during a polio outbreak. *BMC Public health, 15(1), 630.*
- Salako, A., & Oluwole, F. (2009). An appraisal of immunisation in Nigeria: towards improving coverage. *Nigerian Hospital Practice, 3(3-4).*
- Sedney, M. A. (1981). Comments on median split procedures for scoring androgyny measures. *Sex Roles, 7(2), 217-222.*
- Shen, A. K., Fields, R., & McQuestion, M. (2014). The future of routine immunization in the developing world: challenges and opportunities. *Global Health: Science and Practice, 2(4), 381-394.*
- Siddiqi, N., Siddiqi, A. A., Nisar, N., & Khan, A. (2010). Mothers' knowledge about EPI and its relation with age-appropriate vaccination of infants in peri-urban Karachi. *JPMA-Journal of the Pakistan Medical Association, 60(11), 940.*

- Simpson, M., Buckman, R., Stewart, M., Maguire, P., Lipkin, M., Novack, D., & Till, J. (1991). Doctor-patient communication: the Toronto consensus statement. *BMJ: British Medical Journal*, *303*(6814), 1385.
- Spencer, J. P., TRONDSEN PAWLOWSKI, R. H., & Thomas, S. (2017). Vaccine Adverse Events: Separating Myth from Reality. *American family physician*, *95*(12).
- Stewart, M. A. (1995). Effective physician-patient communication and health outcomes: a review. *CMAJ: Canadian Medical Association Journal*, *152*(9), 1423.
- Stockwell, M. S., Irigoyen, M., Martinez, R. A., & Findley, S. (2011). How parents' negative experiences at immunization visits affect child immunization status in a community in New York City. *Public Health Reports*, *126*(2_suppl), 24-32.
- Streefland, P., Chowdhury, A., & Ramos-Jimenez, P. (1999). Patterns of vaccination acceptance. *Social science & medicine*, *49*(12), 1705-1716.
- Sturm, L. A., Zimet, G. D., & Klausmeier, T. (2010). Talking with concerned parents about immunization. *Zero to Three (J)*, *30*(5), 11-18.
- Subhani, S., Yaseen, R., Khan, M. A., Jeelani, G., & Fatima, R. (2015). Impact of mother's education on child immunization: a comparative study of India and Pakistan. *Int J Finance Econ*, *3*, 51-54.
- Tagbo, B., Uleanya, N., & Omotowo, I. (2013a). Mothers' knowledge and perception of Adverse Events following immunization in Enugu, Southeast Nigeria. *J Vaccines Vaccin*, *4*(202), 2.
- Tagbo, B., Uleanya, N., & Omotowo, I. (2013b). Mothers' Perception of Adverse Events Following Routine Immunization. *Journal of Vaccines & Vaccination*, *4*, 202.
- Tagbo, B. N., Eke, C. B., Omotowo, B. I., Onwuasigwe, C. N., Onyeka, E. B., & Mildred, U. O. (2014). Vaccination coverage and its determinants in children aged 11-23 months in an urban district of Nigeria. *World Journal of Vaccines*, *4*(04), 175.
- Taiwo, L., Idris, S., Abubakar, A., Nguku, P., Nsubuga, P., Gidado, S., . . . Waziri, E. (2017). Factors affecting access to information on routine immunization among mothers of under 5 children in Kaduna State Nigeria, 2015. *Pan African Medical Journal*, *27*(1).
- Usman, H. R., Akhtar, S., Habib, F., & Jehan, I. (2009). Redesigned immunization card and center-based education to reduce childhood immunization dropouts in urban

- Pakistan: a randomized controlled trial. *Vaccine*, 27(3), 467-472.
- Waisbord, S. (2004). Assessment of communication programs in support of polio eradication: global trends and case studies. *Washington, DC: The CHANGE Project Academy for Educational Development/The Manoff Group*.
- Waisbord, S., & Larson, H. (2005). Why invest in communication for immunization? Evidence and lessons learned.
- Wang, Y., Wang, Y., Zhang, J., Kang, C., & Duan, P. (2007). Status of mother's KAP on child immunization in minority areas, Guizhou Province. *Beijing da xue xue bao. Yi xue ban= Journal of Peking University. Health sciences*, 39(2), 136-139.
- WHO, G. V. A. P. (2013). Plan 2011-2020. In: WHO.
- Who, U. (2009). World Bank. State of the world's vaccines and immunization, Geneva. *World Health Organization*, 130-145.
- Willis, N., Hill, S., Kaufman, J., Lewin, S., Kis-Rigo, J., Freire, S. B. D. C., . . . Robinson, P. (2013). "Communicate to vaccinate": the development of a taxonomy of communication interventions to improve routine childhood vaccination. *BMC international health and human rights*, 13(1), 23.
- Wiysonge, C. S., Uthman, O. A., Ndumbe, P. M., & Hussey, G. D. (2012). Individual and contextual factors associated with low childhood immunisation coverage in sub-Saharan Africa: a multilevel analysis. *PLoS One*, 7(5), e37905.
- Wonodi, C. B., Privor-Dumm, L., Aina, M., Pate, A., Reis, R., Gadhoke, P., & Levine, O. (2012). Using social network analysis to examine the decision-making process on new vaccine introduction in Nigeria. *Health policy and planning*, 27(suppl_2), ii27-ii38.
- Yadav, K., Srivastava, R., Kumar, R., Chinnakal, P., Rai, S. K., & Krishnan, A. (2011). Significant vaccination delay can occur even in a community with very high vaccination coverage: evidence from Ballabgarh, India. *Journal of tropical pediatrics*, 58(2), 133-138.
- You, D., Hug, L., Ejdemyr, S., Idele, P., Hogan, D., Mathers, C., . . . Alkema, L. (2015). United Nations Inter-agency Group for Child Mortality Estimation (UN IGME). Global, regional, and national levels and trends in under-5 mortality between 1990 and 2015, with scenario-based projections to 2030: a systematic analysis

by the UN Inter-agency Group for Child Mortality Estimation. *Lancet*, 386(10010), 2275-2286.

Yousif, M., Albarrag, A. A., Abdallah, M. A. A., & Elbur, A. I. (2014). Parentsand# 8242; Knowledge and Attitudes on Childhood Immunization, Taif, Saudi Arabia. *Journal of Vaccines & Vaccination*, 5(1), 1-5.



Abdulraheem, I., et al. (2011). "Reasons for incomplete vaccination and factors for missed opportunities among rural Nigerian children." Journal of Public Health and Epidemiology **3**(4): 194-203.

Abubakar, I., et al. (2015). "Global, regional, and national age-sex specific all-cause and cause-specific mortality for 240 causes of death, 1990-2013: a systematic analysis for the Global Burden of Disease Study 2013." Lancet **385**(9963): 117-171.

Adebayo, B. E., et al. (2012). "Immunization coverage in a rural community in southwestern Nigeria." J Vaccines Vaccin **3**(4): 1-6.

Adedire, E. B., et al. (2016). "Immunisation coverage and its determinants among children aged 12-23 months in Atakumosa-west district, Osun State Nigeria: a cross-sectional study." BMC Public health **16**(1): 905.

Adefolalu, O. A., et al. (2019). "Maternal knowledge, attitude and compliance regarding immunization of under five children in Primary Health Care centres in Ikorodu Local Government Area, Lagos State." Journal of Clinical Sciences **16**(1): 7.

Adeleye, O. and N. Mokogwu (2016). "Determinants of full vaccination status in a rural community with accessible vaccination services in South-South Nigeria." Journal of Community Medicine and Primary Health Care **28**(1): 1-7.

Adenike, O.-B., et al. (2017). "Maternal characteristics and immunization status of children in North Central of Nigeria." The Pan African Medical Journal **26**.

Advisory, P. (2012). "Paediatric Association of Nigeria (PAN) recommended routine immunization schedule for Nigerian children." Niger J Paed **39**(4): 152-158.

Al-lela, O. Q. B., et al. (2011). "Development of a questionnaire on knowledge, attitude and practice about immunization among Iraqi parents." Journal of Public Health **19**(6): 497-503.

Al-lela, O. Q. B., et al. (2012). "Estimation of immunization providers' activities cost, medication cost, and immunization dose errors cost in Iraq." Vaccine **30**(26): 3862-3866.

Al-Zahrani, J. (2013). "Knowledge, attitude and practice of parents towards childhood vaccination." Majmaah Journal of Health Sciences **216**(1216): 1-20.

Anah, M., et al. (2006). "Opportunistic immunization with in-patient programme: eliminating a missed opportunity in Calabar, Nigeria."

Analysts, F. B. (2005). "The state of routine immunization services in Nigeria and reasons for current problems." Bath: FBA Health Systems Analysts [homepage on the Internet]. c2005 [cited 2008 Oct 12] Available from: http://www.phfn.org/resources/Immunisation/2005%20State_of_Immunization_in_Nigeria.pdf.

Angadi, M., et al. (2013). "A study of knowledge, attitude and practices on immunization of children in urban slums of Bijapur city, Karnataka, India." Journal of clinical and diagnostic research: JCDR **7**(12): 2803.

Ankrah, V. and F. Nwagwe (2005). "Immunization system review and training needs assessment in Ekiti State." February. Ado-Ekiti Ministry of Health. PATHS.

Asim, M., et al. (2012). "An assessment of parental knowledge, belief and attitude toward childhood immunization among minorities in rural areas of district Faisalabad, Pakistan." Mediterranean Journal of Social Sciences **3**(11): 153-159.

Awodele, O., et al. (2010). "The knowledge and attitude towards childhood immunization amongst mothers attending antenatal clinic in Lagos University Teaching Hospital." Tanzania journal of Health research **12**(3): 172-177.

Awosan, K., et al. "Knowledge, Attitude and Compliance with Full Immunization of Children Against Vaccine Preventable Diseases among Pregnant Mothers in Sokoto, Nigeria."

Awosika, D. M. D. (2012). "ACCESS TO IMMUNIZATION AND OTHER PUBLIC HEALTH INTERVENTIONS THROUGH THE PHARMACIST." West African Journal of Pharmacy **23**(1).

Baguune, B., et al. (2017). "Immunization dropout rate and data quality among children 12–23 months of age in Ghana." Archives of Public Health **75**(1): 18.

Bartlett, E. E., et al. (1984). "The effects of physician communications skills on patient satisfaction; recall, and adherence." Journal of chronic diseases **37**(9-10): 755-764.

Bbaale, E. (2013). "Factors influencing childhood immunization in Uganda." Journal of health, population, and nutrition **31**(1): 118.

Bernsen, R. M., et al. (2011). "Knowledge, attitude and practice towards immunizations among mothers in a traditional city in the United Arab Emirates." J Med Sci **4**(3): 114-121.

Birhanu, S., et al. (2016). "Knowledge, attitude and practice of mothers towards immunization of infants in health centres at Addis Ababa, Ethiopia." Am J Health Res **4**(1): 6-17.

Bland, J. and C. J. Clements (1998). Protecting the world's children: the story of WHO's immunization programme. World health forum 1998; 19 (2): 162-173.

Bofarraj, M. A. (2011). "Knowledge, attitude and practices of mothers regarding immunization of infants and preschool children at Al-Beida City, Libya 2008." Egyptian Journal of Pediatric Allergy and Immunology (The) **9**(1).

Brieger, W., et al. (2004). "Catchment area planning and action: documentation of the community-based approach in Nigeria."

Brown, K. F., et al. (2010). "Factors underlying parental decisions about combination childhood vaccinations including MMR: a systematic review." Vaccine **28**(26): 4235-4248.

Brown, V. B., et al. (2017). "Impact of training intervention on immunization providers' knowledge and practice of routine immunization in Ibadan, south-western Nigeria: a primary health care experience." Pan African Medical Journal **26**(216).

Canavati, S., et al. (2011). "Barriers to immunization among children of migrant workers from Myanmar living in Tak province, Thailand." Bulletin of the World Health Organization **89**: 528-531.

Chan, M. (2014). "Beyond expectations: 40 years of EPI." Lancet **383**(9930): 1697-1698.

Cooper, L. Z., et al. (2008). "Protecting public trust in immunization." Pediatrics **122**(1): 149-153.

Debie, A. and B. Taye (2014). "Assessment of fully vaccination coverage and associated factors among children aged 12–23 months in Mecha District, North West Ethiopia: A cross-sectional study." Sci J Public Health **2**(4): 342-348.

Dickerson, P. S. (2010). "Continuing nursing education: enhancing professional development." The Journal of Continuing Education in Nursing **41**(3): 100-101.

Dubé, E., et al. (2013). "Vaccine hesitancy: an overview." Human vaccines & immunotherapeutics **9**(8): 1763-1773.

Etana, B. (2011). Factors Affecting Immunization Status of Children Aged 12-23 Months in Ambo Woreda, West Shewa Zone of Oromia Regional State, Addis Ababa University.

Etana, B. and W. Deressa (2012). "Factors associated with complete immunization coverage in children aged 12–23 months in Ambo Woreda, Central Ethiopia." BMC Public health **12**(1): 566.

Favin, M., et al. (2012). "Why children are not vaccinated: a review of the grey literature." International health **4**(4): 229-238.

Gellin, B. G., et al. (2000). "Do parents understand immunizations? A national telephone survey." Pediatrics **106**(5): 1097-1102.

Gidado, S., et al. (2014). "Determinants of routine immunization coverage in Bungudu, Zamfara state, northern Nigeria, may 2010." The Pan African Medical Journal **18**(Suppl 1).

Gurmu, E. and D. Etana (2016). "Factors influencing Children's full immunization in Ethiopia." African Population Studies **30**(2).

Hamid, S., et al. (2012). "Immunization of Children in a Rural Area of North Kashmir, India: A KAP Study." Online Journal Of Health and Allied Sciences **11**(1 (10)).

Hariweni, T., et al. (2004). "Knowledge, attitude, and practice of underfive children stimulation of working and nonworking mothers." Paediatrica Indonesiana **44**(2): 51-54.

Hilton, S., et al. (2006). "Combined vaccines are like a sudden onslaught to the body's immune system': Parental concerns about vaccine 'overload'and 'immune-vulnerability.'" Vaccine **24**(20): 4321-4327.

Hu, Y., et al. (2017). "Prenatal vaccination education intervention improves both the mothers' knowledge and children's vaccination coverage: Evidence from randomized controlled trial from eastern China." Human vaccines & immunotherapeutics **13**(6): 1477-1484.

Ibnouf, A., et al. (2007). "Factors influencing immunisation coverage among children under five years of age in Khartoum State, Sudan." South African Family Practice **49**(8): 14-14f.

Imoh, G. (1991). "Communication for Social Mobilization: An Evaluation of EPI in Nigeria." Unpublished Doctoral Thesis, University of Ibadan.

Jacobson, T. A., et al. (1999). "Use of a low-literacy patient education tool to enhance pneumococcal vaccination rates: a randomized controlled trial." Jama **282**(7): 646-650.

Kapoor, R. and S. Vyas (2010). "Awareness and knowledge of mothers of under five children regarding immunization in Ahmedabad." Age **21**(30): 73.

Kassahun, M. B., et al. (2015). "Level of immunization coverage and associated factors among children aged 12–23 months in Lay Armachiho District, North Gondar Zone, Northwest Ethiopia: a community based cross sectional study." BMC research notes **8**(1): 239.

Kempe, A., et al. (2011). "Prevalence of parental concerns about childhood vaccines: the experience of primary care physicians." American journal of preventive medicine **40**(5): 548-555.

Kennedy, A., et al. (2011). "Confidence about vaccines in the United States: understanding parents' perceptions." Health affairs **30**(6): 1151-1159.

Kidane, T., et al. (2008). "National EPI coverage survey report in Ethiopia, 2006." Ethiopian Journal of Health Development **22**(2): 148-157.

Kimani-Murage, E., et al. (2017). "Childhood vaccination in informal urban settlements in Nairobi, Kenya: Who gets vaccinated?".

Kimura, A. C., et al. (2007). "The effectiveness of vaccine day and educational interventions on influenza vaccine coverage among health care workers at long-term care facilities." American Journal of Public Health **97**(4): 684-690.

Kroger, A. T. (2013). "General recommendations on immunization."

Kunle-Olowu, A., et al. (2011). "Immunization coverage of antenatal and immunization clinics attendees in the Niger Delta University Teaching Hospital." Journal of Public Health and Epidemiology **3**(3): 90-93.

Landoh, D. E., et al. (2016). "Predictors of incomplete immunization coverage among one to five years old children in Togo." BMC Public health **16**(1): 968.

Lee, J.-w. (2003). "Child survival: a global health challenge." The Lancet **362**(9380): 262.

Legesse, E. and W. Dechasa (2015). "An assessment of child immunization coverage and its determinants in Sinana District, Southeast Ethiopia." BMC pediatrics **15**(1): 31.

Lewandowsky, S., et al. (2012). "Misinformation and its correction: Continued influence and successful debiasing." Psychological Science in the Public Interest **13**(3): 106-131.

Likert, R. (1932). "A technique for the measurement of attitudes." Archives of psychology.

Mathew, J. L. (2012). "Inequity in childhood immunization in India: a systematic review." Indian pediatrics **49**(3): 203-223.

Mbengue, M. A. S., et al. (2017). "Determinants of complete immunization among senegalese children aged 12–23 months: evidence from the demographic and health survey." BMC Public health **17**(1): 630.

Negussie, A., et al. (2015). "Factors associated with incomplete childhood immunization in Arbegona district, southern Ethiopia: a case–control study." BMC Public health **16**(1): 27.

Nicholas, D. D., et al. (1991). "The Quality Assurance Project: introducing quality improvement to primary health care in less developed countries." International Journal for Quality in Health Care **3**(3): 147-165.

Nolna, S. K., et al. (2018). "Factors influencing the performance of routine immunization in urban areas: A comparative case study of two cities in Cameroon: Douala and Yaoundé." Vaccine **36**(49): 7549-7555.

Obasohan, P. E., et al. "Knowledge, Attitude and Practice of Immunization Processes and its Coverage in Rural Communities of Bida Emirate Area, Niger State, Nigeria." ARC Journal of Nursing and Healthcare (AJNH) Volume **1**: 29-37.

Obioha, E., et al. (2010). "Analysis of the Performance of Expanded Programme on Immunization (EPI) for Four Child Killer Diseases under the Military and Civilian Regimes in Nigeria, 1995-1999; 2000-2005." Studies on Ethno-Medicine **4**(1): 43-52.

Obregón, R., et al. (2009). "Achieving polio eradication: a review of health communication evidence and lessons learned in India and Pakistan." Bulletin of the World Health Organization **87**: 624-630.

Odusanya, O. O., et al. (2008). "Determinants of vaccination coverage in rural Nigeria." BMC Public health **8**(1): 381.

Oku, A., et al. (2016). "Communication strategies to promote the uptake of childhood vaccination in Nigeria: a systematic map." Global health action **9**(1): 30337.

Okwo-Bele, J.-M. and T. Cherian (2011). "The expanded programme on immunization: a lasting legacy of smallpox eradication." Vaccine **29**: D74-D79.

Ophori, E. A., et al. (2014). "Current trends of immunization in Nigeria: prospect and challenges." Tropical medicine and health **42**(2): 67-75.

Organization, W. H. (2005). Immunization coverage cluster survey: Reference manual, Geneva: World Health Organization.

Organization, W. H. (2008). "Module 7. The EPI coverage survey." Training for mid-level managers (MLM). Volume WHO/IVB/08.07 edn. Geneva, Switzerland.

Organization, W. H. (2013). "Health topics: immunization." Internet] World Health Organization Available from: www. who. int/topics/immunization/en. Assessed **15**: 18.

Ozawa, S. and M. L. Stack (2013). "Public trust and vaccine acceptance-international perspectives." Human vaccines & immunotherapeutics **9**(8): 1774-1778.

Payne, S., et al. (2013). "Achieving comprehensive childhood immunization: an analysis of obstacles and opportunities in The Gambia." Health policy and planning **29**(2): 193-203.

Rainey, J. J., et al. (2011). "Reasons related to non-vaccination and under-vaccination of children in low and middle income countries: findings from a systematic review of the published literature, 1999–2009." Vaccine **29**(46): 8215-8221.

Ransome-Kuti, O. (1986). "Child health in Nigeria: past, present, and future." Archives of disease in childhood **61**(2): 198.

Russo, G., et al. (2015). "Vaccine coverage and determinants of incomplete vaccination in children aged 12–23 months in Dschang, West Region, Cameroon: a cross-sectional survey during a polio outbreak." BMC Public health **15**(1): 630.

Salako, A. and F. Oluwole (2009). "An appraisal of immunisation in Nigeria: towards improving coverage." Nigerian Hospital Practice **3**(3-4).

Sedney, M. A. (1981). "Comments on median split procedures for scoring androgyny measures." Sex Roles **7**(2): 217-222.

Shen, A. K., et al. (2014). "The future of routine immunization in the developing world: challenges and opportunities." Global Health: Science and Practice **2**(4): 381-394.

Siddiqi, N., et al. (2010). "Mothers' knowledge about EPI and its relation with age-appropriate vaccination of infants in peri-urban Karachi." JPMA-Journal of the Pakistan Medical Association **60**(11): 940.

Simpson, M., et al. (1991). "Doctor-patient communication: the Toronto consensus statement." BMJ: British Medical Journal **303**(6814): 1385.

Spencer, J. P., et al. (2017). "Vaccine Adverse Events: Separating Myth from Reality." American family physician **95**(12).

Stewart, M. A. (1995). "Effective physician-patient communication and health outcomes: a review." CMAJ: Canadian Medical Association Journal **152**(9): 1423.

Stockwell, M. S., et al. (2011). "How parents' negative experiences at immunization visits affect child immunization status in a community in New York City." Public Health Reports **126**(2_suppl): 24-32.

Streefland, P., et al. (1999). "Patterns of vaccination acceptance." Social science & medicine **49**(12): 1705-1716.

Sturm, L. A., et al. (2010). "Talking with concerned parents about immunization." Zero to Three (J) **30**(5): 11-18.

Subhani, S., et al. (2015). "Impact of mother's education on child immunization: a comparative study of India and Pakistan." Int J Finance Econ **3**: 51-54.

Tagbo, B., et al. (2013). "Mothers' knowledge and perception of Adverse Events following immunization in Enugu, Southeast Nigeria." J Vaccines Vaccin **4**(202): 2.

Tagbo, B., et al. (2013). "Mothers' Perception of Adverse Events Following Routine Immunization." Journal of Vaccines & Vaccination **4**: 202.

Tagbo, B. N., et al. (2014). "Vaccination coverage and its determinants in children aged 11-23 months in an urban district of Nigeria." World Journal of Vaccines **4**(04): 175.

Taiwo, L., et al. (2017). "Factors affecting access to information on routine immunization among mothers of under 5 children in Kaduna State Nigeria, 2015." Pan African Medical Journal **27**(1).

Usman, H. R., et al. (2009). "Redesigned immunization card and center-based education to reduce childhood immunization dropouts in urban Pakistan: a randomized controlled trial." Vaccine **27**(3): 467-472.

Waisbord, S. (2004). "Assessment of communication programs in support of polio eradication: global trends and case studies." Washington, DC: The CHANGE Project Academy for Educational Development/The Manoff Group.

Waisbord, S. and H. Larson (2005). "Why invest in communication for immunization? Evidence and lessons learned."

Wang, Y., et al. (2007). "Status of mother's KAP on child immunization in minority areas, Guizhou Province." Beijing da xue xue bao. Yi xue ban= Journal of Peking University. Health sciences **39**(2): 136-139.

WHO, G. V. A. P. (2013). Plan 2011-2020, WHO.

Who, U. (2009). "World Bank. State of the world's vaccines and immunization, Geneva." World Health Organization: 130-145.

Willis, N., et al. (2013). "'Communicate to vaccinate': the development of a taxonomy of communication interventions to improve routine childhood vaccination." BMC international health and human rights **13**(1): 23.

Wiysonge, C. S., et al. (2012). "Individual and contextual factors associated with low childhood immunisation coverage in sub-Saharan Africa: a multilevel analysis." PLoS One **7**(5): e37905.

Wonodi, C. B., et al. (2012). "Using social network analysis to examine the decision-making process on new vaccine introduction in Nigeria." Health policy and planning **27**(suppl_2): ii27-ii38.

Yadav, K., et al. (2011). "Significant vaccination delay can occur even in a community with very high vaccination coverage: evidence from Ballabgarh, India." Journal of tropical pediatrics **58**(2): 133-138.

You, D., et al. (2015). "United Nations Inter-agency Group for Child Mortality Estimation (UN IGME). Global, regional, and national levels and trends in under-5 mortality between 1990 and 2015, with scenario-based projections to 2030: a systematic analysis by the UN Inter-agency Group for Child Mortality Estimation." Lancet **386**(10010): 2275-2286.

Yousif, M., et al. (2014). "Parentsand# 8242; Knowledge and Attitudes on Childhood Immunization, Taif, Saudi Arabia." Journal of Vaccines & Vaccination **5**(1): 1-5.

VITA

NAME Saudat Abdullahi Basheer

DATE OF BIRTH 9th August 1964

PLACE OF BIRTH Birnin Kebbi

INSTITUTIONS ATTENDED

1. School of Nursing and Midwifery, Sokoto, Nigeria. 1978 - 1983
2. Usman Danfodio University Teaching Hospital 1986 -1987
3. University of Jos 1991 -1992
4. Bayero Univesity, Kano, Nigeria. 1996 -1997
5. College of Public Health Sciences, Chulalongkorn University, Bangkok, Thailand. 2012 -2013

HOME ADDRESS JB 13, Jekadafari Ward, Doma Street, Gombe. Gombe State Nigeria.

PUBLICATION Factors influencing immunization coverage among children under 2 years of age in rural local government areas of Kebbi State Nigeria. (Pakistan Journal of Public Health, Vol 9, No 1, March 2019)