

UNIVERSITY OF NAIROBI
SCHOOL OF NURSING SCIENCES

DETERMINANTS OF PNEUMOCOCCAL CONJUGATE VACCINE UPTAKE AMONG
CHILDREN ATTENDING IMMUNIZATION SERVICES AT KENYATTA NATIONAL HOSPITAL,
NAIROBI, KENYA.

INVESTIGATOR

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FOR THE AWARD OF THE DEGREE OF MASTER OF NURSING SCIENCES (PEDIATRIC) OF
THE UNIVERSITY OF NAIROBI.

DECLARATION

I, Ng'eno Lily Chepketer, declare that this research thesis is my own original work and has never been presented for an academic award in any university or institution of higher learning.

Signed Date.....

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DEDICATION

This work is dedicated to my lovely husband, Dr. Peter Lemayian, our children, Natasha Nemayian and Leyian Lekishon, my parents Mr. and Mrs. Thomas Ng'eno, for their love, support, sacrifices and encouragement.

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LIST OF ABBREVIATIONS

DMS-Director of Medical Services

DPT-Diphtheria Pentavalent Toxoid

FGD-Focused Group Discussion

HIV-Human Immune Virus

KEMRI-Kenya Medical Research Institute

KEPI-Kenya Expanded Programme on Immunization

KNH-Kenyatta National Hospital

MCH-Maternal Child Health Clinic

MDG-Millennium Development Goal

PCV -Pneumococcal Conjugate Vaccine

SPSS-statistical package for social science

SP-Streptococcal Pneumonia

UON-University of Nairobi

USA-United States of America

WHO-World Health Organization

OPERATIONAL DEFINITIONS

Age: The length of time during which a being has existed.

Attitude: An expression of favor or disfavor toward a person, place, thing or event

Belief: The psychological state in which an individual holds a proposition or premise to be true

Clinical health services: General services offered in the health care set up.

Education level: The level where one achieved academically

Employment: Contract between two parties, one being the employer and the other being the employee.

Feelings: The function or power of perceiving by touch

Income level: The consumption and savings opportunity gained by an entity within a specified time frame, which is expressed in monetary terms

Marital status: The condition of being married or unmarried.

Norms: Group held beliefs about how members should behave in a given context.

Occupation: A person's usual or principal work or business, especially as a means of earning a living.

Parity: The condition of having given birth.

Patient flow systems: It is framework that the patients follow in the hospital

Pneumococcal conjugate vaccine: Pneumococcal conjugate vaccine is a pneumococcal vaccine used to protect infants and young children against disease caused by the bacterium *Streptococcus pneumoniae*

Prevention: The act of hindering or staying away from dangerous things or situations.

Religion: Organized collection of belief systems, cultural systems, and world views that relate to humanity, spirituality and sometimes, to moral values.

Social group: Two or more humans who interact with one another, share similar characteristics and collectively have a sense of unity.

Traditions: Beliefs or behaviors passed down within a group of society with symbolic meaning and with origins in the past.

Treatment: Management and care of a patient.

ABSTRACT

Pneumonia is the leading cause of child mortality worldwide. Statistics have shown that pneumococcal infections kill approximately one million children worldwide (WHO, 2009). Routine childhood vaccination reduces the burden of pneumococcal disease in children (Reed, 2011). Since the introduction of Pneumococcal Conjugate Vaccine (PCV) a group of investigators have found a 69% drop in rate of invasive pneumococcal disease in children less than one year old.

This was a cross-sectional hospital-based quantitative and qualitative study conducted in Maternal Child Health (MCH) clinic and pediatric wards of KNH. It involved parents/caregivers (n= 66) bringing their children to the hospital and (n=37) caregivers of children admitted.

The main objective of this study was to establish the determinants of pneumococcal conjugate vaccine uptake among children brought to Kenyatta National Hospital.

Simple random sampling was used to identify parents/guardian of children aged below two years. A pretested questionnaire was used to collect data from the correspondents. Key informant interview with nurse in-charges was also conducted.

Data were analyzed using software Statistical Package for Social Sciences (SPSS) version 18.0. Research results were presented in frequency distribution tables, graphs pie charts and other forms of descriptive statistics.

Income $p=0.01$, parity= 0.03 , education level $p=0.01$, age $p=0.04$ and occupation $P=0.011$ of the caregivers showed statistical significance with vaccine uptake. Also a friendly attitude from health personnel was shown to motivate parents/guardians' adherence to vaccination schedules.

Government should develop an education package to educate the public on the availability and benefits of the vaccine to increase awareness to the public .Education of the girl child should be emphasized as the current study found that those with secondary level of education and higher were more likely to accept their children to receive PCV.

CHAPTER 1: INTRODUCTION AND BACKGROUND INFORMATION

1.1 Introduction

Pneumonia is an inflammatory condition of the lungs affecting primarily the air sacs known as alveoli (Luckie, 2009). It is the major cause of morbidity and mortality among children in Kenya. Among infants aged between 1 week and 59 months admitted in Kenyan district hospitals, 50% of all morbidities and mortalities are caused by pneumonia (WHO, 2009).

Streptococcal pneumoniae is the common cause of vaccine-preventable deaths in children under the age of five years. It is documented that, among pediatric in-patients in Kenyan district hospitals, the observed incidence rate of bacteremic pneumococcal disease was 241/100,000 for children aged less than 1 year, 213/100,000 for children aged <2 years and 111/100,000 among children aged <5 years. In June 2008 more than 20,000 died of *streptococcal pneumoniae* (Obrien et al, 2009).

Pneumococcal infections may be hard to treat because some strains of the bacteria have become resistant to the antibiotics that are used to treat them. This makes prevention of pneumococcal infections through vaccination even more important (WHO, 2009).

Pneumococcal conjugate vaccine 13 protects against streptococcal infections, for example pneumonia, meningitis and otitis media.

1.2 Background information

Pneumonia remains a leading killer among children in developing countries, where it accounts for up to 21% of deaths in children under the age of five years. The overall mortality rate for

children aged less than five years in developing countries ranges from 60% to 100%. One fifth of this is due to pneumonia. An estimated 1.9 million children die from pneumonia yearly. Half the world's deaths due to pneumonia in children under the age of five occur in Africa. In sub-Saharan Africa, the estimated proportion of death in children aged below 5 years attributed to pneumonia is 17-26% (Onyango et al, 2012).

In Kenya, Pneumonia has greatly affected children under the age of five. Currently, Kenya is ranked among the 15 countries with the highest estimated number of deaths due to clinical pneumonia, the mortality rate being 50 /10, 000 per year. It is the second leading cause of death among children under the age of five years and causes 16% of deaths in the age group (Onyango et al, 2012).

Pneumonia is currently diagnosed using Integrated Management of Childhood Illness (IMCI) criteria in public health facilities.

Treatment of pneumococcal infection with antibiotics such as Penicillin and other drugs used to be very effective, but expensive and some strains of the disease have become resistant to these drugs. Prevention of pneumonia has therefore become important.

According to the report by the Center for Disease Control (CDC), Department of health and Human Service, released in 2009, Pneumococcal Polysaccharide Vaccine (PPV) protects against twenty three types of pneumococcal bacteria including the most likely to cause serious disease.

In February 2011, the Kenya Expanded Programme on Immunization (KEPI), officially launched and included PCV-13 vaccine into the immunization schedule for the under fives as a free and compulsory vaccine. When launching the vaccine, KEPI was working with an estimate that it would potentially prevent pneumococcal deaths. Initially children would get the vaccine out of the parent's initiative at a fee, usually from a private practitioner who at times charged

exorbitant prices for the vaccine. This cost hindered many from accessing the vaccine. Many more were not even aware that the vaccine existed before its launch in 2011. Inclusion of PCV-13 was, therefore, a government strategy towards reducing pneumonia prevalence among the under five year old.

1.2 Problem statement

In Kenya, pneumonia is the second leading cause of death among children less than five years of age. It accounts to 16% of deaths in this age group (Onyango et al, 2012).

Despite the introduction of pneumococcal conjugate vaccine by the government and inclusion into the KEPI program, giving citizens free access to pneumonia prevention. Large numbers of children under five years of age, still present with pneumonia to Kenyatta National Hospital. According to the hospital statistics four children are admitted with severe streptococcal pneumonia in pediatric medical wards in a day, amounting to 120 children in a month.

1.4 Study justification

Pneumonia is an acute respiratory infection that commonly affects young children. It is the leading single cause of mortality in children less than 5 years. Many of these pneumonia-related deaths are vaccine-preventable. Since introduction of other vaccines into KEPI program i.e. Polio, BCG, Pentavalent vaccines there is a marked reduction of respective diseases for which they provide immunity.

Pneumococcal conjugate vaccine was introduced and launched as part of KEPI, with the aim of reducing mortality caused by streptococcal pneumonia among children aged less than five

years. Despite availability of the vaccine, statistics from records department indicate that pneumonia is still the leading cause of morbidity and mortality and therefore admissions among children less than 5 years at Kenyatta National Hospital is still high.

There is need therefore to establish the determinants of uptake of pneumococcal conjugate vaccine. It is therefore important to look into the determinants of the uptake of pneumococcal conjugate vaccine in children under two years of age to enhance vaccine uptake, hence reduce mortality and morbidity among children.

1.5 Purpose of the study

It is hoped that the results from this study can be utilized in formulating guidelines by the management of Kenyatta National Hospital to address those factors that may reduce vaccine uptake among eligible children.

1.6 Study benefits

It is hoped that the results of this study will provide information useful to improve intervention measures to reduce child morbidity and mortality caused by streptococcal pneumonia in Kenyatta National Hospital.

1.7 Research questions

1. What demographic factors affect pneumococcal conjugate vaccine uptake among children attending immunization services?

2. What socioeconomic factors affect pneumococcal conjugate vaccine uptake among children attending immunization services?
3. What cultural factors affect pneumococcal conjugate vaccine uptake among children attending immunization services?
4. What relationship do knowledge, attitude and practices of parents /guardians have on pneumococcal conjugate vaccine uptake among children attending immunization services?

1.8 Broad objective

The study sought to establish the determinants of pneumococcal conjugate vaccine uptake among children attending immunization services at Kenyatta National Hospital.

1.8.1 Specific objectives

1. To determine demographic factors related to pneumococcal conjugate vaccine uptake among children attending immunization services.
2. To establish socioeconomic factors related to pneumococcal conjugate vaccine uptake among children attending immunization services.
3. To establish cultural factors related to pneumococcal conjugate vaccine uptake among children attending immunization services.
4. To establish the relationship of knowledge, attitude and practices of parents /guardians to pneumococcal conjugate vaccine uptake among children attending immunization services.

CHAPTER 2: LITERATURE REVIEW

2.0 Introduction

“Vaccination is the medical sacrament corresponding to baptism. Whether it is or is not more efficacious, I do not know”. These are the words of one Samuel Butler (1835-1902). The 2015 deadline for achievement of the Millennium Development Goals (MDGs) is less than 3 years away. Kenya, together with the rest of Africa is significantly behind the rest of the world in achieving reduction of childhood mortality by two thirds as stipulated in the MDGs.

Pneumonia is the leading single cause of mortality in children under five years of age worldwide (Black et al, 2010). Many of these pneumonia-related deaths is vaccine-preventable. The global burden of disease of pneumococcal pneumonia is difficult to determine, particularly in developing countries with limited surveillance facilities and routine health and health-allied services data (Black et al, 2010). However, a recent systematic review of disease burden in children under the age of five reported that in 2000, an estimated 14.5 million episodes of severe pneumococcal disease occurred, causing 821,000 deaths (Obrien et al, 2009). Of these, 88,000 deaths occurred among HIV positive children. 61% of these deaths were in 10 countries located in Africa and Asia (Obrien et al, 2009). In Kenya mortality rate in children less than five years of age is estimated to be 16% (Onyango et al, 2012)

Streptococcus pneumonia (SP) has at least 92 serotypes. The most frequently used vaccine in Kenya is the PCV-13 protein conjugate vaccine (prevnar), protecting against the serotypes that are most common. These serotypes account for approximately 39% of the invasive, disease-causing serotypes in Africa, 48% in Asia and 53.4% in Latin America and the Caribbean (Lucero et al, 2004).

2.1 Pneumococcal conjugate vaccine

Pneumococcal conjugate vaccine (PCV 13) is a new vaccine that was introduced in Kenya on 16th February 2011. It protects against the serotypes which account for approximately 39% of the invasive disease-causing serotypes in Africa, 48% in Asia and 53.4% in Latin America and the Caribbean, due to the biological diversity of *s.pneumoniae* (Lucero et al, 2004).

It is a liquid in a two dose vial which must be discarded at end of each session, or after 6 hours from first opening. It is given in 3 doses; the minimum age to receive the dose is 6 weeks, with minimum 4 weeks interval between the three doses i.e. 6, 10, 14 weeks. This vaccine is given at the same time with Pentavalent or Diphtheria Pertusis and Tetanus vaccine, but on different sites of injection. For the children who have completed the other vaccines, and still under one year of age, they need to be given three doses of the vaccine, at least 4 weeks apart.

If used properly, it has the potential to substantially reduce morbidity and mortality from a major childhood killer. As a vaccine that is administered at the same time with pentavalent vaccine and oral polio vaccines, it provides convenience to the mother or caregiver by not requiring an additional visit to the health facility. However, this also means that the child receives an additional injection on the same day as receiving pentavalent vaccine.

2.2 Demographic factors

Location where one lives has an impact on one's health care. Those who live in the urban areas are more likely to travel shorter distances to health institutions than those in rural areas. This may indirectly influence the vaccine uptake.

In a study done in Nigeria, it found that Children of mothers who were 34 years or older had a 58% (OR = 1.58, 95% CI = 1.07–2.33) higher likelihood of receiving full immunization compared with children of mothers in the reference group (24–28) years (Antai 2009).

2.3 Socio -Economic factors

Immunization in the last decade have proven to be of substantial importance in health care particularly in reduction of the vaccine-preventable disease burden (Tove et al., 2008).It has been helpful in lives of millions of children (GAVI, 2010 updates).However despite the benefits of immunization, there are groups of persons who for one reason or another still will not accept immunization for their children or relatives. Mass media campaigns have the potential to increase immunization coverage. Women with health seeking behaviors are more likely to have their children immunized (Charles et al, 2012).

A study done in United States, observed that although refusal rates are low (Doren at al., 2004), some parents expressed concerns about the new vaccine due to unknown side effects. In the west, certain anti-vaccine proponents have even formed anti-vaccine movements that may be found on social websites including face book. These vaccine opponents purport vaccine- related adverse effects, infections and even death.

Others have, though with no scientific basis, linked vaccination to debilitating diseases such as autism, while still others claim that multiple vaccines can "overload" the immune system and even cause allergy. In general, vaccination is fundamentally "unnatural". Some believe that governments and scientists are holding evidence of actual harms caused by vaccines and according to them these are schemes to generate profits for large pharmaceutical companies. Others purport that vaccines contain harmful additives. Still others are convinced that occasional

resurfacing of certain endemics e.g. pertusis and measles in the developed world is a “time testimony” that vaccination does not work (Behrman, 2010).

A study carried out in Nigeria in 2009 to analyze individual and contextual determinants of immunization uptake found out that individual and community socioeconomic characteristics were important in explaining differences in full immunization among various children. Children of mothers from Igbo ethnic group had more than twice the likelihood of receiving full immunization than children of Hausi/Fulani/Kamuri mothers. This possibly reflects differences in social identity, attitudes and health-seeking behavior as well as disparities in socioeconomic status (Antai, 2009).

Geo-political differences also seem to affect vaccine uptake since the regions represented different religion and political situations, economic potential, population densities, infrastructure development and therefore varying level of accessibility to healthcare provision .Economic position especially education level of an individual and communities strongly influence health - seeking behaviors and ultimately child survival(Antai, 2009).

Income level has a significant impact on access to health care. The poor often have little access to affordable health care. Higher economic status was associated with better health. Household wealth and mother’s occupation influenced vaccination uptake .Occupations such as clerical and skilled manual laborers were associated with lower likelihood of full immunization due to the lower economic status, since people with such occupation need to get permission to take time off work to get their children vaccinated (Antai, 2009).

2.5 Cultural factors

Culture is a way of people's living. Cultural practices of a community may influence their demand for immunizations particularly in most rural societies where culture interact influences health -seeking behavior (calderon-ortis et al, 1996). However, as the world is evolving towards a global village, the attitudes of societies are changing too. Many appreciate the value of conventional health- care and gradually understand benefits that health service interventions like vaccinations could bring to their children. Studies done in Nigeria (Otuomabo et al, 1987) have all indicated greater increase in vaccine uptake with community involvement and education to prevent interference of cultural beliefs with conventional health-seeking behaviour.

2.6 Institutional factors

Despite the dangers posed by vaccine- preventable diseases, as well as efforts by the health care professionals to promote immunization, parent's resistance to routine childhood immunizations continue to grow, giving rise to frustrations among healthcare providers. This creates barriers in providing medical care to children in need. This resistance, especially by parents in the developed countries, in part is due to proliferation of articles, books and websites questioning safety and value of routine childhood immunization. This is further compounded by mixed messages parents receive from within the scientific and medical community. The particular study also found out that attitude and response by caregivers on questions raised by parents, if not properly addressed may result in parents not bringing back their children for vaccination (Salmon et al., 2005).

Mothers who deliver in the hospital stand a better chance of vaccine awareness. Some studies show that Hospital delivery was associated with increased vaccine uptake as a result of timely access to the maternal and child services (Antai, 2009).

2.7 Knowledge, attitude and practice of parents /guardians

Parents /guardians may or may not be aware of the availability of the vaccine and this might affect vaccine uptake. Knowledge or cognitive process of parents is a vital factor for demand of specific vaccines (Meszaros et al., 1996). This is obvious because mankind in general acts on basis of information available.

A study done in sub-Saharan Africa concluded that low vaccine uptake may be associated with low parental and community knowledge of immunization and or lack of access to information on childhood immunization. Parents or communities with media access have low rates of unimmunized children (Charles et al, 2012)

2.4 Theoretical statement

Many factors, like demographic, social, cultural, economic and healthcare factors, have been found to influence knowledge, attitude and practice of parents/care givers of children. This was, for instance, established by health care belief model which comprises of three components: Individual perception (attitude), modifying factors (demographic, social, cultural factors), and likelihood of action (outcomes) (Rosen stock, 1966).

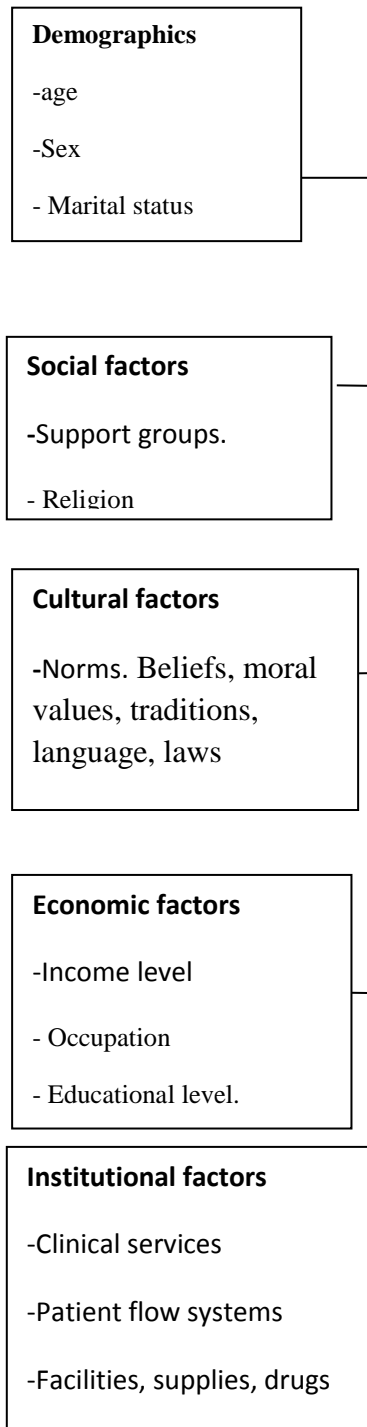
The model asserts that an individual takes an active role in engaging in health promotive behavior (Marriner \$Raile, 2005). The HBM assumes that there is a “cue to action” that may trigger of the decision-making process and may be either internal (i.e. symptoms) or external

(e.g. media and interpersonal influences). This model accepts that diverse demographical, socio-psychological and structural variables may affect the individual's perception and, as a result, influence health-related behavior (Janz and Becker, 1984).

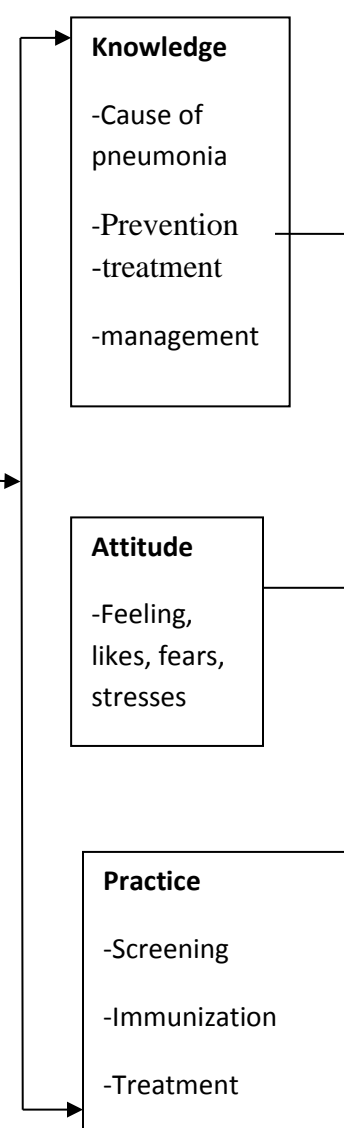
The above relationship could thus influence pneumococcal conjugate vaccine uptake among children attending immunization services. This theoretical statement has been used to design the conceptual framework.

2.9. OPERATIONAL FRAMEWORK

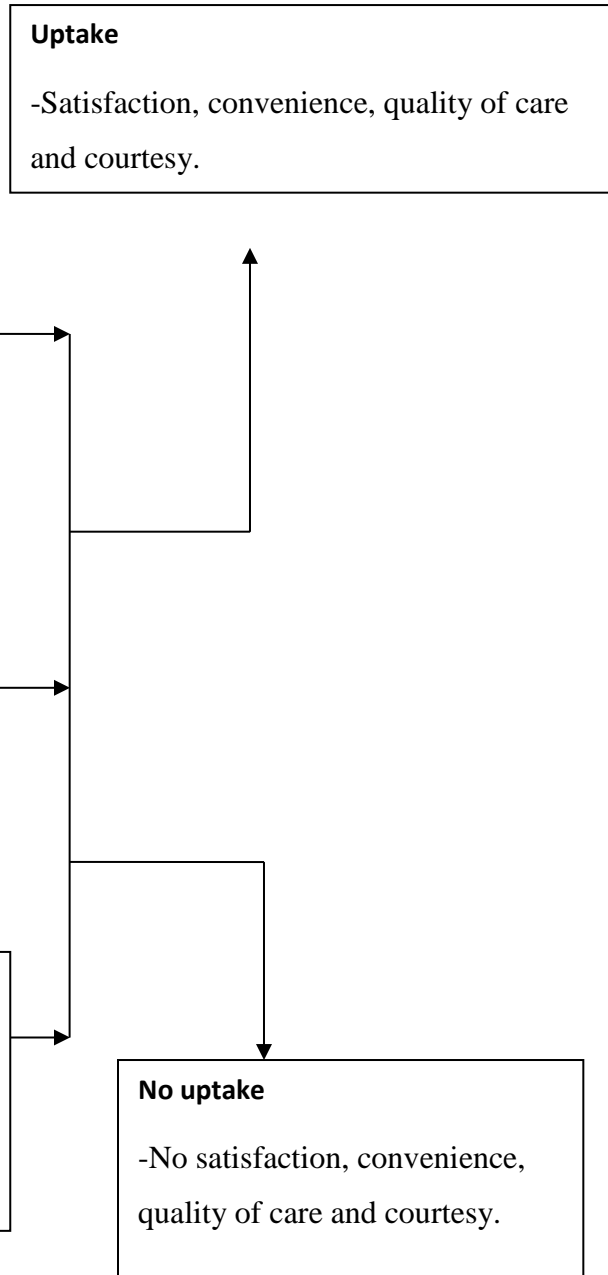
Independent variables



Intervening variables



Dependent variables



2.10 DEFINITION OF KEY VARIABLES

Independent variables

Demographic factors-Refers to characteristics of variables of an individual .e.g. age, sex, parity.

Social factors-Refers to how the person relates with others e.g. belonging to a social group, religion.

Cultural factors-These are factors pertaining to individuals or community's behavior and mannerisms deemed acceptable morally.

Economic factors-The basic matters that are affecting financial matters such as income, occupation and employment.

Institutional factors-Factors related to health care service i.e. availability of health clinics, supplies, facilities, number of personnel etc, their level of trainings, and attitudes towards work.

Intervening variables

Knowledge-Awareness and familiarity gained through experiences or learning; theoretical and practical understanding of a person on an issue.

Attitude-Hypothetical construct representing an individual's degree of like and dislike for an idea or item.

Practice- The usual habitual behavior.

Dependent variables

Uptake –Acceptance of an item

No uptake-Lack of acceptance

CHAPTER 3: METHODOLOGY

3.0 Study design

This was a descriptive cross-sectional institutional-based study that sought to establish the determinants of pneumococcal conjugate vaccine uptake among children attending immunization services.

3.1 Study area

Kenyatta National Hospital is a metropolitan, tertiary, referral and teaching hospital situated at Upper Hill area along Hospital Road about 5km from Nairobi city centre. It is one of the two main referral hospitals in Kenya, also serving the greater East and Central African region. Apart from this, the hospital is engaged in training of many cadres of health professionals.

This study aimed at establishing the determinants of pneumococcal conjugate vaccine uptake among children in Maternal Child Health immunization clinic and pediatric wards at Kenyatta National Hospital, putting in consideration the social, cultural, demographic, health and institutional factors. Maternal child health clinic is one of the outpatient clinics situated in clinic 66, and this is the point where immunization services are rendered. It is served by ten qualified nursing staff. Approximately 210 children are attended to in the clinic per month. Pediatric wards are located on the third floor of the hospital and subdivided into 4 units; A, B, C, D and it comprise of 18 qualified nurses in each unit. Approximately 4 children with pneumonia in all the four units are admitted per day.

3.2 Study population

Participants interviewed consisted 104 parents/guardians of children and four nurse in-charges (health personnel).

3.3 Inclusion criteria

- Consenting parent/guardian.
- Children under two years of age eligible for routine KEPI vaccine attending MCH or admitted into the hospital.

3.4 Exclusion criteria

- Non-consenting parents/guardians.
- Children above two years of age.

3.5 Sample size determination

Fisher formula was used for sample size determination as recommended by mugenda & mugenda, 2003

$$n = Z^2 p (1-p) / d^2$$

Where n=desired sample size

Z=95% confidence interval or 1.96

P=0.5 (pneumococcal conjugate vaccine uptake among children attending immunization services was assumed to be 16% mortality rate in children with pneumonia (Onyango et al, 2012).

d=the degree of precision was at 0.05 at 95% interval

$$N=1.96^2 \times 0.16 (1-0.16)/0.05^2$$

$$=1.96^2 \times 0.1344$$

$$=3.84 \times 0.1344$$

$$=207$$

Since the target population was less than 10,000 the alternative formula below was used.

$$nf=n(1+(n/N)(\text{mugenda \& mugenda,2003}))$$

Where:

nf =desired sample size for population less than 10,000

n=desired sample size for population more than 10,000

N=estimate of the population size =210

Hence the desired sample size (nf) Where population was less than 10,000 sample size was adjusted using following formula

$$nf= \frac{n}{1 + (n/N)}$$

$$1 + (n/N)$$

$$\text{Hence } nf = \frac{207}{1 + (207/120)} =$$

$$(1 + 207/120)$$

$$= 104 \text{ parent/guardians.}$$

3.6 Sampling interval

Sample interval = $\frac{\text{total estimated study population}}{\text{Sample population}}$

Sample population

Therefore sample interval = $210/104=2$

Since the sample interval was two every second child was picked.

Proportional allocation

n1- total number of children seen in a month in each setting

N- Total number of children seen in study area

$\frac{n1 \times \text{sample size}}{N}$

N

Maternal Child Health = $\frac{210 \times 104}{330} = 66$

330

Pediatric wards = $\frac{120 \times 104}{330} = 37$

330

Therefore, 66 parents/guardians of children were picked in maternal child health clinic.

And 37 parents/guardians of children admitted in pediatric wards. $37/4=9.9$ caretakers were picked from each pediatric wards.

3.7 Data collection tools

A pretested structured questionnaire (appendix 1) was administered to the mothers or caregivers to collect quantitative data, while key-informant interview guide (appendix 3) was used to interview nurse- in -charges to collect qualitative data.

3.8 Recruitment and training of research assistants

Study assistants were recruited from Kenyatta National Hospital Maternal Child Health Clinic. The two research assistants were qualified nurses who were fluent in English and Kiswahili. The assistants were also trained for four days on the objectives of the study and all data collection tools.

3.9 Pre testing of data collection tools

The principal investigator with the two research assistants pre-tested the questionnaire and the key-informant interview guide at Mbagathi District Hospital. This was to evaluate for validity and reliability of the tool.

3.10 Data collection, cleaning and storage

The principal investigator and research assistance collected data by administering the questionnaire to parents/guardians and key informant interview guide to nurse-in-charges. This data collection was done in the MCH clinic and the pediatric wards. After data collection, there was a careful scrutiny of the completed questionnaire and key-informant interview guide.

Cleaning of data was done to assure that the data was accurate and consistent with other facts that were gathered.

3.11 Quality control

Data collected was subjected to screening for consistency, completeness, accuracy and verification.

3.12 Data analysis and presentation

The collected data was edited to detect errors and omissions. This also involved a careful scrutiny of the completed questionnaire and field notes.

All information was entered into computer software for analysis, using statistical package for social sciences (SPSS) version 18 computer package and analyzed using descriptive and inferential statistics.

Descriptive data was presented using tables, graphs, charts, pie charts, frequency diagrams while inferential data was presented using p-values, t-test, odds ratios and degree of freedom.

Data collected by questionnaire was coded to enable analysis by statistical package for social scientist (SPSS). Descriptive statistics were calculated including measures of central tendencies (means and medians) and measures of variability (standard deviation and range), while frequency distribution were organized into tables, graphs, charts and other descriptive modes. Tabulation of data involved arranging data in concise and logical order.

Inferential statistics were also calculated using chi square, and t- test for comparing categorical and continuous variables, respectively. Qualitative data from key informant's interview data were organized into themes and then subjected to further thematic analysis. The results were used to validate the results from quantitative data.

3.13 Ethical consideration

Ethical clearance was obtained from the University of Nairobi / Kenyatta National Hospital Ethics and research Committee (Appendix3). Written informed consent was obtained from all participants. (Appendix4).

Confidentiality, dignity, respect and participants rights were respected. Participation was voluntary with participants having a right to withdraw their participation at any stage of the study. As such, the rights of service of participants were not be compromised.

CHAPTER FOUR: RESULTS

4.0 Introduction

A total of 66 mothers with infants attending the MCH clinic and 37 mothers, with infants admitted in the paediatric wards at Kenyatta National Hospital were enrolled into the study. The main objective of the study was, to determine the factors that influence pneumococcal conjugate vaccine uptake among children attending immunization services at Kenyatta National Hospital.

This chapter therefore, presents the enlisted data, highlighting only the predominant percentages, in accordance with the objectives and study questions. The presentations are under sub themes focusing mainly on factors that influence vaccine uptake.

4.1 Demographic characteristics of the respondents.

The demographic characteristics of the mothers are as presented in Table 1 below. The mean age of the mothers was 28.6 years (SD=4.7). The modal age group was 30-34 years representing 31.7% (n=33) of mothers in the study. Only 11.5% (n=13) of the mothers were aged above 35, most participants in the study were female representing 96.2% (n=100) while male participants represented 3.8% (n=4). (98.1%, n=102) of the participants in the study reported that they were married, 1.9% of the mothers (n=2) reported that they were single and never married. The 37.5% (n=39) reported that they had one child, the mothers who had two children were 34.6% (n=36), mothers who had three children accounted for 18.3% (n=34.6) of the study population, while 9.6% (n=10) had more than three children.

Table 1: Demographic factors related to caretakers of children attending immunization services at KNH.

| | Frequency (n) | Percent (%) |
|---------------------------|---------------|-------------|
| age in years | | |
| 20 - 24 | 30 | 28.9 |
| 25 - 29 | 29 | 27.9 |
| 30 - 34 | 33 | 31.7 |
| 35 - 40 | 12 | 11.5 |
| Marital status | | |
| Single | 2 | 1.9 |
| Married | 102 | 98.1 |
| Number of children | | |
| 1 | 39 | 37.5 |
| 2 | 36 | 34.6 |
| 3 | 19 | 18.3 |
| >3 | 10 | 9.6 |
| Gender | | |
| Male | 4 | 3.8 |
| Female | 100 | 96.2 |

4.1. Demographic characteristics of the participants versus vaccine uptake

As shown in table 2 below, there was a relationship between age and vaccine uptake. Age group (25-29years) $p=0.014$ had high likelihood to have their children immunized, unlike mothers in age group above and below the age bracket.

Immunization uptake was statistically significantly associated with parity. Uptake was low in higher order parities (Para 2 OR= 0.3[0.1-0.8], Para 3 0.2[0.1-0.7]). E.g. those parents with a

high parity (more than 2 children) had low vaccine uptake. The parents who had one child had high likelihood of vaccine uptake.

Marital status did not show any correlation with vaccine uptake. Marital status of the caretakers did not influence vaccine uptake.

Table 2: Demographic characteristics of the participants versus vaccine uptake

| Characteristic | | PCV uptake | | OR (95% CI) | Chi | p value |
|----------------|----------------|------------|-----------|---------------|-------|---------|
| | | Uptake | No uptake | | | |
| Age | 20 - 24 years | 18(60.0) | 12(40.0) | 1.0 | | - |
| | 25 - 29 years | 26(89.7) | 3(10.3) | 5.8(1.4-23.4) | 6.8 | 0.014 |
| | 30 - 34 years | 23(69.7) | 10(30.3) | 1.5(0.5-4.3) | 0.7 | 0.420 |
| | 35 - 40 years | 10(83.3) | 2(16.7) | 3.3(0.6-18.0) | 2.1 | 0.160 |
| Sex | Male | 3(75.0) | 1(25.0) | 1.0 | | - |
| | Female | 74(74.0) | 26(26.0) | 0.9(0.1-9.5) | 0.002 | 0.960 |
| Marital | Single | 2(100.0) | 0(0.0) | NA | - | - |
| | Married | 75(73.5) | 27(26.5) | NA | | |
| Parity | One | 34(87.2) | 5(12.8) | 1.0 | | |
| | Two | 23(63.9) | 13(36.1) | 0.3(0.1-0.8) | 5.0 | 0.023 |
| | Three | 11(57.9) | 8(42.1) | 0.2(0.10.7) | 5.8 | 0.017 |
| | Four and above | 9(90.0) | 1(10.0) | 1.3(0.1-12.8) | 0.1 | 0.810 |

4.2 Socio-economic characteristics of respondents versus PVC uptake.

Caretaker education showed strong correlation with vaccine uptake (table 4 below), Caretakers with higher education level (secondary and tertiary) had higher odds of vaccine uptake, OR = 5.8(1.5-22.4) and 4.9(1.6-15.0) respectively. Those who attained primary level had low vaccine uptake.

Occupation showed a statistical significance with vaccine uptake, salaried employed mothers had higher likelihood to have their children immunized (OR=6.5(1.5-27.6). Unemployed and self employed mothers had a low likelihood of vaccine uptake (table 4 below).

Family's income had a correlation with vaccine uptake. The odds of PCV uptake among caretakers whose spouses had incomes above KES 21000 was eight-fold (OR = 8.8, 95%CI 1.4-55.6) greater than uptake in the group earning less than KES 5000 monthly (Table 4 below). The remaining socio-economic factors were not significantly associated with PCV uptake.

Table 4: Socioeconomic characteristics of respondents versus PVC uptake

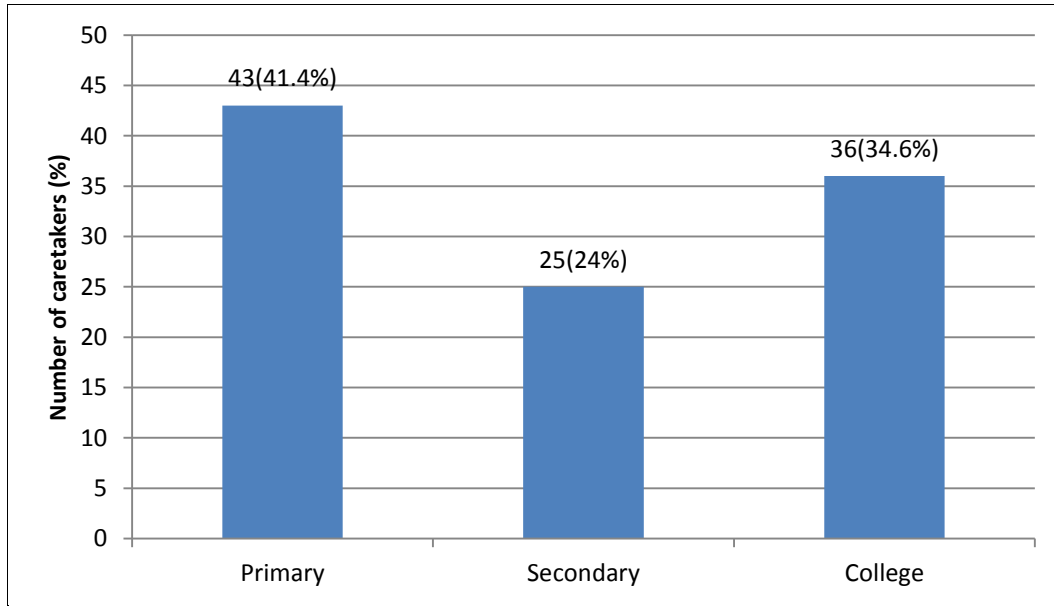
| Characteristic | | PCV uptake | | OR (95% CI) | Chi | p value |
|------------------------|---------------------|------------|-----------|---------------|------|---------|
| | | Uptake | No uptake | | | |
| Occupation | Unemployed | 5(50.0) | 5(50.0) | Ref | | |
| | Self employed | 18(56.3) | 14(43.8) | 1.3(0.3-5.3) | 0.1 | 0.730 |
| | Salaried employment | 52(86.7) | 8(13.3) | 6.5(1.5-27.6) | 7.6 | 0.011 |
| Education level | Primary | 24(55.8) | 19(44.2) | Ref | | |
| | Secondary | 22(88.0) | 3(12.0) | 5.8(1.5-22.4) | 7.0 | 0.010 |
| | College | 31(86.1) | 5(13.9) | 4.9(1.6-15.0) | 8.5 | 0.005 |
| Income | Below 5000 | 6(54.6) | 5(45.4) | Ref | | |
| | 6000-10000 | 5(35.7) | 9(64.3) | 0.5(0.1-3.0) | 0.89 | 0.350 |
| | 11000-15000 | 5(50) | 5(50) | 0.8(0.1-6.3) | 0.04 | 0.840 |
| | 16000-20000 | 10(76.9) | 3(23.1) | 2.8(0.4-23.9) | 1.34 | 0.250 |
| | Above 21000 | 42(91.3) | 4(8.7) | 8.8(1.4-55.6) | 9.2 | 0.001 |
| | | | | | | |

4.2.1 Education characteristics of participants

Figure 1 below summarizes findings on participants' educational attainment. Majority of participants 41.4 % (n=43) reported that they had attained primary level education followed by

secondary certificate qualifications which were held by 24% (n=25) of the participants. Mothers who had trained tertiary colleges accounted for 34.6% (n=36) of the total participants.

Figure1: Distribution of caretakers of children attending KNH for immunisation according to level of education



4.3 Cultural characteristics of the participants

4.3.1 Religious beliefs of the participants

Majority 45.2 % (n = 45) of participants were protestants (figure 2 below). Catholics accounted for 40.4% (n=42), and seventh day Adventists represented 13.5 % (n=14).

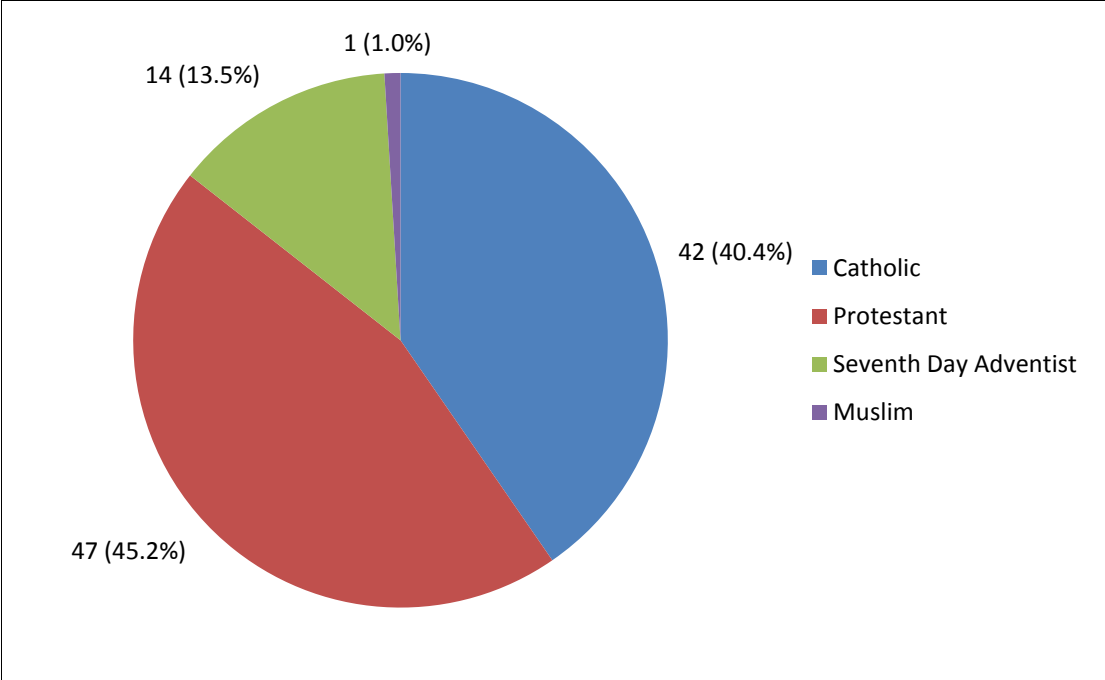


Figure 2: Religious beliefs of participants

4.3.2: Cultural factors of participants versus PCV uptake

Two caretakers reported that cultural practices prohibited immunization and both of these respondents did not take up PCV (table 5 below). There was no statistical association between cultural ($p = 0.54$) or religious values [OR = 0.6(0.1-2.5), $p = 0.53$] and PCV uptake.

Table 5: Cultural beliefs versus uptake

| | Uptake | | No uptake | | OR (95% CI) | P value |
|---|--------|------|-----------|------|--------------|---------|
| | N | % | N | % | | |
| Religious beliefs prohibit immunization | | | | | | |
| Yes | 3 | 25 | 9 | 75 | 0.6(0.1-2.5) | 0.530 |
| No | 30 | 37 | 51 | 63 | | |
| Cultural practices prohibit immunization | | | | | | |
| Yes | 0 | 0 | 2 | 100 | NA | 0.540 |
| No | 33 | 36.7 | 57 | 63.3 | | |

4.4: Knowledge of the participants on causes of pneumonia and vaccine schedule

Four items related to pneumococcal vaccine immunization schedule, and pneumonia etiologies were used to assess level of knowledge regarding PCV immunization (Table 6). Eighty nine percent of patients knew that they were required to attend MCH clinic every four weeks during PCV immunization and 57.8% were aware that infants receive three doses of vaccine. Twenty-one (20.6%) caretakers were aware that bacteria cause pneumonia.

Table 6: Knowledge of the participants on causes of pneumonia and vaccine schedule.

| | Frequency (n) | Percent (%) |
|---|---------------|-------------|
| Factors predisposing child to pneumonia | | |
| Dirt | 8 | 7.7 |
| Bathing a child | 42 | 40.4 |
| Bacteria | 26 | 25.0 |
| I don't know | 28 | 26.9 |
| Cause of pneumonia | | |
| Cold | 68 | 66.7 |
| Bacteria | 21 | 20.6 |
| Bathing child with cold water | 11 | 10.8 |
| Others | 2 | 2.0 |
| Number of scheduled pneumococcal vaccine doses | | |
| One | 3 | 2.9 |
| Two | 22 | 21.6 |
| Three | 59 | 57.8 |
| Don't know | 18 | 17.7 |
| Duration between administration of vaccine doses | | |
| One month | 91 | 89.2 |
| Three months | 2 | 2.0 |
| I don't know | 9 | 8.8 |

4.4.1: Source of information about PCV

Participants most frequently 86.4% (n = 89) reported that health workers were their main source of information regarding pneumococcal vaccination (Table 7 below). The other important source of information was social contacts including family, friends, neighbours and colleagues 7 (6.8%).

Table 7: Source of information about PCV

| | Frequency (n) | Percent (%) |
|---|---------------|-------------|
| Health workers | 89 | 86.4 |
| Family, friends, neighbors and colleagues | 7 | 6.8 |
| Teachers | 3 | 2.9 |
| News Media | 2 | 1.9 |
| Religious leaders | 1 | 1.0 |
| Brochures, posters and other printed material | 1 | 1.0 |
| Total | 103 | 100 |

4.4.2: Knowledge of participants on PCV versus vaccine uptake

PCV uptake was significantly associated with caretaker knowledge (table 8 below). Knowledgeable caretakers (60%) were more likely to take up PCV compared to those with inadequate knowledge (27%), OR = 4.1 (95% CI 1.1-15.2).

Table 8: Knowledge of participants versus uptake

| | Uptake | | No uptake | | OR (95% CI) | P value |
|----------------------|--------|----|-----------|----|---------------|---------|
| | N | % | N | % | | |
| Adequate knowledge | 9 | 60 | 6 | 40 | 4.1(1.1-15.2) | 0.011 |
| Inadequate knowledge | 24 | 27 | 65 | 73 | | |

4.5: Attitude of the correspondents towards pneumococcal conjugate vaccine

Most caretakers either strongly agreed (46.2%) or agreed (50.5%) that immunization ensures adequate protection for the child (Table 9 below) and also agreed that nurses treated them well at the clinic (61.3%) answering all question concerning vaccines (58.7%). Responses to negative attitude items indicate that most caretakers disagreed with propositions that immunization is prohibited by religious beliefs (63.4%), cultural practices (72.8%) or social norms (72.8%).

Table 9: Attitudes of correspondents towards pneumococcal conjugate vaccine

| | Strongly Agree | Agree | Do Not Know | Disagree | Strongly Disagree |
|---|----------------|----------|-------------|----------|-------------------|
| Child's immunization ensures adequate health protection | 43(46.2) | 47(50.5) | 0(0.0) | 2(2.2) | 1(1.1) |
| Childs immunization is against my religious belief | 3(3.2) | 9(9.7) | 5(5.4) | 59(63.4) | 17(18.3) |
| Nurses have treated me well when I bring my child for immunization | 31(33.3) | 57(61.3) | 2(2.2) | 2(2.2) | 1(1.1) |
| Nurses have answered all my questions concerning vaccine positively | 28(30.4) | 54(58.7) | 3(3.3) | 6(6.5) | 1(1.1) |
| Child's immunization is against the habit (cultural practice) of my community | 0(0.0) | 2(2.2) | 5(5.4) | 67(72.8) | 18(19.6) |
| Child's immunization is against the norms of my community | 1(1.1) | 2(2.2) | 3(3.3) | 67(72.8) | 19(20.7) |

4.5.1: Attitude of participants versus PCV uptake

As shown in table 10 below, PCV uptake was significantly associated with caretaker attitude towards immunization. Caretakers with a positive attitude (43.3%) were more likely to take up PCV compared to those with negative attitude (10.8%), OR = 6.3 (95% CI 1.9-26.8).

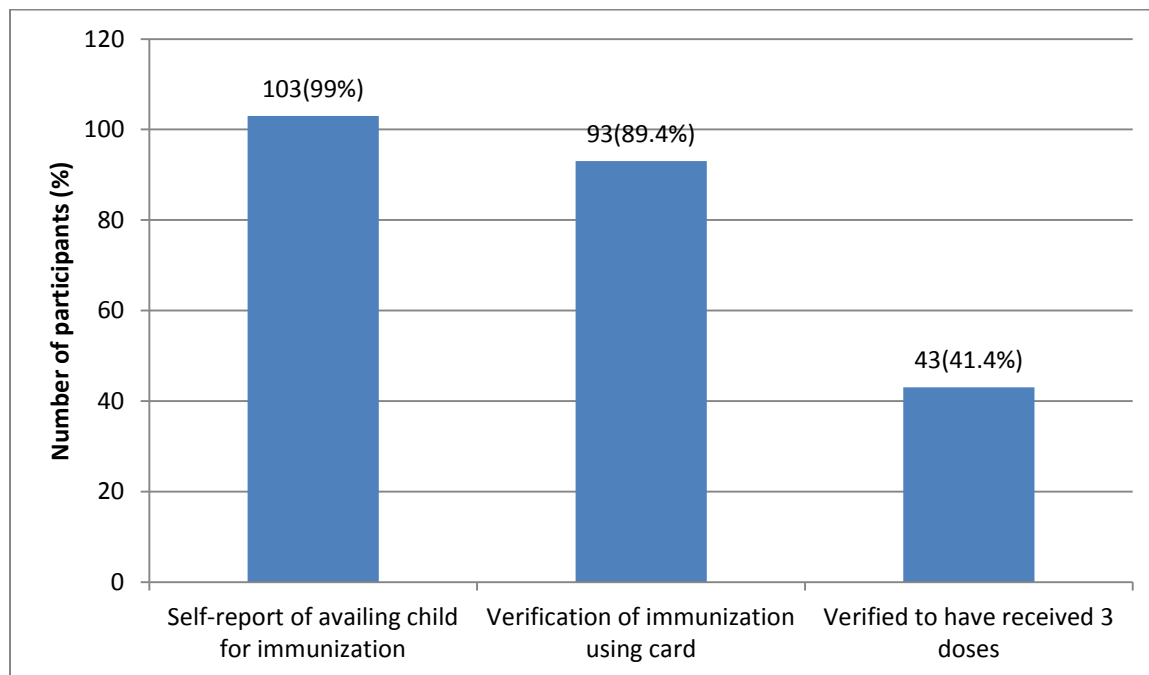
Table 10: Attitude of participants versus uptake

| | Uptake | | No uptake | | OR (95% CI) | P value |
|-------------------|--------|------|-----------|------|---------------|---------|
| | N | % | N | % | | |
| Positive attitude | 29 | 43.3 | 38 | 56.7 | 6.3(1.9-26.8) | 0.001 |
| Negative attitude | 4 | 10.8 | 33 | 89.2 | | |

4.6 Practice of participants on vaccine

Figure 3 below, compares reported caretaker practice and verified immunization status of infants in the study. Most 99% (n=103) caretakers indicate that they avail their children for vaccination, however, 89.4 % (n=93) had immunization cards verifying reported immunization with 41.4 % (n=43) showing that infants were fully immunized for age.

Figure3: Participants practices on vaccine



4.6.1: Participants practice on vaccine versus vaccine uptake

Spousal level of education and caretaker age were significantly associated with practice (Table 11 below). Caretakers reporting either secondary (OR = 5.0, 95% CI 1.5-16.5) or tertiary (OR = 2.4, 95% 0.8-7.0) education level for spouses were more likely to have good practices, compared to caretakers reporting that their spouses had primary level education .The odds of appropriate practice was consistently higher in older age groups with the odds being four-fold higher (OR =

4.3, 95% CI 1.2-15.8) among caretakers aged 30-34 years, compared to those aged 20-24 years.

Respondent's level of education did not have any significant association with practice.

Caretakers' socio-economic factors including occupation, income, spousal income or religion (all p values > 0.05), Table 11 did not show significant associations with Caretakers' immunization practices, e.g. socio-economic status of the respondents did not influence the PCV uptake in that it did not influence their practice

Table 11: Participants practice versus PCV uptake.

| Characteristic | | Practice | | OR (95% CI) | p value |
|----------------|----------------|----------|-----------|---------------|---------|
| | | uptake | No uptake | | |
| Age | 20 - 24 years | 24(80.0) | 6(20.0) | Ref | |
| | 25 - 29 years | 17(58.6) | 12(41.4) | 2.8(0.8-10.9) | 0.070 |
| | 30 - 34 years | 16(48.5) | 17(51.5) | 4.3(1.2-15.8) | 0.010 |
| | 35 - 40 years | 7(58.3) | 5(41.7) | 2.9(0.5-15.3) | 0.150 |
| Sex | Male | 4(100.0) | 0(0.0) | NA | |
| | Female | 60(60.0) | 40(40.0) | | |
| Marital | Single | 1(50.0) | 1(50.0) | NA | |
| | Married | 63(61.8) | 39(38.2) | | |
| Parity | One | 24(61.5) | 15(38.5) | Ref | |
| | Two | 24(66.7) | 12(33.3) | 0.8(0.3-2.3) | 0.640 |
| | Three | 10(52.6) | 9(47.4) | 1.4(0.4-5.0) | 0.520 |
| | Four and above | 6(60.0) | 4(40.0) | 1.1(0.2-5.4) | 0.920 |
| Education | Primary | 8(80.0) | 2(20.0) | 0.4(0.04-2.7) | 0.310 |
| | Secondary | 20(62.5) | 12(37.5) | Ref | |
| | College | 35(58.3) | 25(41.7) | 1.2(0.5-3.2) | 0.700 |
| Spouse's | Primary | 33(76.7) | 10(23.3) | Ref | |

| | | | | | |
|------------|----------------------|----------|----------|---------------|-------|
| education | Secondary | 10(40.0) | 15(60.0) | 5.0(1.5-16.5) | 0.002 |
| | College | 21(58.3) | 15(41.7) | 2.4(0.8-7.0) | 0.080 |
| Occupation | Unemployed | 2(100.0) | 0(0.0) | NA | |
| | Housewife | 36(63.2) | 21(36.8) | Ref | |
| | Casual worker | 7(46.7) | 8(53.3) | 2.0(0.5-7.3) | 0.250 |
| | Business | 11(61.1) | 7(38.9) | 1.1(0.3-3.7) | 0.880 |
| | Formal employment | 8(66.7) | 4(33.3) | 0.9(0.2-3.7) | 0.820 |
| Income | Below 5000 | 36(64.3) | 20(35.7) | Ref | |
| | 6000-10000 | 9(64.3) | 5(35.7) | 1.0(0.2-3.9) | 1.000 |
| | 11000-15000 | 5(50.0) | 5(50.0) | 1.8(0.4-8.8) | 0.390 |
| | 16000-20000 | 4(40.0) | 6(60.0) | 2.7(0.6-14.4) | 0.150 |
| | Above 21000 | 8(66.7) | 4(33.3) | 0.9(0.2-3.9) | 0.880 |
| Religion | Catholic | 27(64.3) | 15(35.7) | Ref | |
| | Protestant | 26(55.3) | 21(44.7) | 1.5(0.6-3.7) | 0.390 |
| | SDA | 10(71.4) | 4(28.6) | 0.7(0.1-3.1) | 0.620 |
| | Muslim | 1(100.0) | 0(0.0) | NA | |

KEY INFORMANT INTERVIEW GUIDE WITH NURSE -INCHARGE

4.6.1 Pneumococcal Vaccine availability at KNH

During the Key informant interview, the respondent, a nurse manager in-charge of immunization services in KNH reported that pneumococcal vaccine is procured through the Kenya Expanded Programme on Immunization (KEPI). Since the inception of routine infant immunization with the vaccine in February 2011 no major problems have been reported with the vaccine's procurement. In fact it was noted that previously when there have been problems with supply of the other antigens provided for infant immunization in the KEPI schedule KNH was prioritized to receive a steady vaccine supply. The nurse in charge claimed that majority of their clients were from the other health facilities, with claims that there is no consistency of vaccine availability in those centers.

4.6.2 Refusal rates of pneumococcal conjugate vaccine by the parents

No specific cases of complete refusal to initiate immunization of newborns with pneumococcal vaccine were reported by the Key Informant. Although refusal to continue with the second pneumococcal dose was rare the respondent noted that there were known cases of such refusals resulting from individual newborn's reactions to the first administration of pneumococcal vaccine. The respondent reported a case of a parent who refused subsequent vaccine doses due to admission of the child post immunization with high fever. Other known vaccination reactions that were associated with parental refusal to take up immunization included convulsions, gastrointestinal disturbances, and vomiting. Such cases were handled through health education. Otherwise, parents were eager to have their children vaccinated and some were aware of the

pneumococcal vaccine and indeed asked for it when they brought their children for immunization.

CHAPTER FIVE: DISCUSSION, RECOMMENDATIONS AND CONCLUSION

5.0 Introduction

This study was conducted among caretakers of infants at KNH, the main teaching and referral hospital in Nairobi, aimed to determine the factors that influence uptake of the recently introduced pneumococcal conjugate vaccine among infants admitted to the hospital's paediatric wards and those visiting the outpatient department. In addition, the study explored caregiver knowledge, attitude and practices related to infant immunizations.

5.1 Gender versus vaccine uptake

The recruited caretakers mainly comprised married (98%) females and (2%) single and never married. These respondents commonly reported having other children in addition to the index child involved in the study. Out of one hundred and four caretakers interviewed for this study, there were only four men implying that mothers are the primary caregivers in this setting as reported in other studies (Mutua, 2011) among Kenyan infants. There however remains the need to incorporate fathers in the care of infants as advocated in family centered care model for healthcare (Pamela, 2006). Furthermore, fathers' involvement in childcare has been shown to have a positive influence on child social behavior, psychological outcome and general wellbeing (Ball, Mossele & Pedersen 2007).

In the current study there appeared to have been minimal involvement of fathers or other male caregivers in caring for children during infancy. It is also noteworthy that while most females in the study were housewives their spouses were commonly engaged in occupational activities that

required them to be away from home either as salaried employees or business persons further explaining their limited involvement in seeking healthcare services for the infant.

Conversely, the finding that majority of the respondent were mothers (mothers were the primary caregiver) is explained by the fact that infants in this study were still breastfeeding, hence totally dependent on the mothers (the high numbers of maternal primary caregivers). While emphasizing the need to incorporate male caregivers in providing care for infants, it is important to reinforce maternal caregiver role in order to improve child health.

5.2 Parity versus conjugate pneumococcal vaccine uptake

Maternal Parity showed a significant with vaccine uptake $p=0.003$, with 3 times more likelihood of parents with two children, and 2 times likelihood of parents with three children showing poor vaccine uptake compared with mothers who had one child. The mothers with one child were more likely to accept vaccine in this study. This study's finding is similar to study by Antai (2009) in Nigeria which showed that, children of birth order 5+ had a 49% lower likelihood of receiving full immunization (OR = 0.51, 95% CI = 0.33 - 0.79) compared with the reference group. It is also supported by study done by Mutua (2011) in Nairobi urban settlements which demonstrates that higher maternal parity was associated with a lower likelihood of full vaccination among children.

5.3 Mothers age versus vaccine uptake

Practice was inversely proportional to maternal age and showed statistical significance with vaccine uptake (25-29 years) $p= 0.014$ and (30-34) years of age (OR = 4.3, 95% CI 1.2-15.8). This age group was more likely to accept their children to be immunized. This group comprised of the mothers in middle adulthood, the difference can be explained by the fact that, the younger mothers are more educated and hence their knowledge on immunization is consequently more than the older mothers.

This agrees with study by Mutua (2011) that maternal age strongly influences the likelihood of child immunization with older mothers (25-34years) more likely to have children vaccinated compared with mothers aged less than 20 years. It also agrees with study by Kamau (2001) which describes that mothers in middle adulthood had their children immunized than younger mothers. This finding was in contrast with that of Charles *et al* (2011) which state that children of older mothers (above 35years) were more likely to be immunized unlike children of young mothers. Older mothers have better experience with vaccine use, unlike the young mothers below 20 years who are unlikely to accept immunization of their children.

5.4 Marital status showed no significance with vaccine uptake

Marital status did not show any statistical significance with vaccine uptake in this study. Out of 104 parents only two mothers were single and 102 were married. This finding agrees with study done in Nairobi urban settlement by Mutua (2011). which stated that marital status of the mother was not significantly associated with full child vaccination, but the finding in this study is in contrast with other studies of Pickering *et al* (2009) that described that, risk factors associated

with under immunization at 3 months were unmarried respondents. It is also in contrast with study by Charles (2011) done in sub Saharan Africa, which explains that children of single mothers (OR 0.88, 95% CI 0.82 to 0.93) were less likely to be unimmunized.

5.5 Mothers education level versus vaccine uptake

In the present study, level of education was significantly associated with vaccination uptake $p=0.001$. The higher the level of education the more advanced the reasoning and better decision making. Majority of the participants 41.4% attained primary level, while 34.6% completed tertiary education. Caretakers with higher education level-secondary and tertiary had higher odds of uptake, OR = 5.8(1.5-22.4) and 4.9(1.6-15.0) respectively. The higher the level of formal education the better the vaccine uptake as elicited in the study. This finding agreed with earlier findings by Nankabirwa *et al* (2010) and Masaharu *et al* (2007) indicating that higher caretaker's education was associated with increased knowledge and opportunity to get children vaccinated. This can be explained by the fact that the more educated the person the easier the access to social media. Another factor is that education influences the behavior of individual and thereby influences health seeking behavior. This finding correlates with that of Charles (2011) which demonstrated that children of uneducated parents, mothers with no access to media, and mothers with low health seeking behaviours were more likely to be unimmunized.

Studies have shown that maternal education influences health seeking behaviour and that when a mother is educated, she more likely to seek health care for her children (Bhuiya, 1995). However, for optimal vaccination coverage, secondary and tertiary education may further contribute to enhancing vaccination coverage. Finding from this study is consistent with other

Studies elsewhere, which have also found that level of knowledge and use of vaccination services are greater for women with secondary and tertiary education (Racine, 2007). It also agrees with that of Charles (2011) which states that Children born to mothers (OR 1.48, 95% CI 1.31 to 1.67) or fathers (OR 1.19, 95% CI 1.07 to 1.31) with no formal education were more likely to be unimmunized than those born to parents with secondary or higher education respectively. The second millennium development goal is dedicated to ensuring that all children everywhere attain a full course of primary education [MDG, 2008].

5.6 Family's economic status versus vaccine uptake

Income level has a significant impact on vaccine uptake as elicited in this study, (mother's income $p = 0.03$). Children from the poorest households were more likely to be unimmunized than their counterparts from the richest households. Similar findings have been reported in previous study by Antai (2009) on inequitable immunization uptake in Nigeria, that mothers' household wealth was significantly and proportionally associated with the likelihood of full immunization. With higher position in the wealth index being associated with increased likelihood of full immunization.

5.7 Mother's occupation and vaccine uptake

In this study mothers occupation was significantly associated with vaccine uptake $p = 0.011$, with mothers who were employed, having higher likelihood to accept vaccine than the house wives and casual laborers. This findings correlate with that of Diddy (2009) ,which demonstrated

that Children of mothers working as clerical, skilled manual employees had lower likelihood of being fully immunized (OR = 0.62, 95% CI = 0.40 - 0.96) compared to children of professional/technical/management employees. This group of parents need to ask for permission to take the children for immunization.

The result findings in this study is also supported by that of Mathews *et al*(1997),which described that, parental occupation defined as the socio-economic condition of the household was shown to have statistically significant association with acceptance (occupation) of immunization. It further agrees with study by Charles (2011) that Children whose mothers were unemployed were more likely to be unimmunized than those whose mothers were employed (OR 1.09, 95% CI 1.01 to 1.17). Unemployed parents/guardian will have financial challenges; this will cause them to lack fare to board a car if the health facility is far from where they reside unlike their counterparts who are employed.

5.8 Clients health awareness versus uptake

Client's awareness of vaccine in this study implied to the knowledge on vaccine and access to information. Client's awareness showed a statistical significance with vaccine uptake $p=0.004$. These findings are in agreement with other study by Bhuiya (1995) which revealed that, low parental and community knowledge of immunization and/or, lack of access to information on childhood immunization could be an important contributor to the high burden of unimmunized children in sub-Saharan Africa (Bhuiya, 1995). This finding also support the study done by Mutua (2011) which showed significant reductions in the number of unimmunized children among parents and communities with access to mass media. Maternal access to media improves

the knowledge of the caretaker on the availability of Health interventions and vaccine is not an exception.

This study finding also agrees with study done by Charles (2011) that revealed that maternal access to media reduced the odds of a child being unimmunized by 6% (OR 0.94, 95% CI 0.94 to 0.98). The mothers who access media easily get updated with the current affairs and are more likely to have their children receive immunization.

5.9 Cultural factors influence on pneumococcal conjugate vaccine uptake

There was no significant association of vaccine uptake in this study (in relation to cultural practices, religious beliefs, norms). Despite the fact that cultural practices still influence health seeking behaviour in Kenya, it is not a predominant factor among the respondents at KNH and it did not interfere with vaccination of the children against the killer diseases for instance pneumonia. This was affected by the fact that majority of the participants are from within the urban area (Nairobi county) hence the cultural practice is fading off, for instance use of herbal medicine to cure diseases. The Muslims were the minority in the study (1%). This does not mean that their children are not immunized. They may be residing far from the health facility and it could also be a sampling error.

5.10 Health care providers' attitude's influence on client PCV uptake

There is a high level of awareness regarding the PCV availability, with majority of parents /caregivers getting information on pneumococcal conjugate vaccine from the health workers. The

main source of information was from health care providers (86.4%). This showed that health care providers are a vital source of information on pneumococcal conjugate vaccine and vaccines in general, majority of the respondents were of the opinion that immunization ensures adequate health protection to the child. A greater number of these parents were impressed with the attitude of nurses (health personnel) during immunization process of their children. This also agrees with study by Pickering *et al* (2009) which claimed that for an optimal uptake of PCV, it would be vital for health personnel to adopt an approach which is effective and empathetic as it will reduce the vaccine risk, communication and misinformation while assisting parents in understanding the ultimate need of immunization.

The positive attitude of the parents can be explained by the fact that the immunization services of the under five years has been made affordable and accessible to the respondent in the study area and (Chege et al. 2002).

CONCLUSIONS

Based on the findings of this study the following conclusions are reached:

1. The parents /guardians educational level is a predictor to the uptake of pneumococcal conjugate vaccine among children under two years of age attending immunization services at Kenyatta National hospital.
2. Socio-economic status of the client positively influences positively influences the immunization of the child with pneumococcal conjugate vaccine.
3. The health care workers' attitudes influences the uptake of pneumococcal conjugate vaccine by parents of children less than two years of age at Kenyatta National hospital
4. The Marital status has no influence on vaccine uptake among parents of children attending immunization services at KNH.
5. The Parity of the client is a predictor to the uptake of vaccine among the parents of children less than two years at Kenyatta National hospital.

RECOMMENDATIONS

Based on the findings of this study, the following are recommended:

1. Kenyatta National Hospital should develop an education package to educate the public on the availability and benefits of the vaccine to increase awareness to the public.
2. Education of the girl child should be emphasized as the current study found that those with secondary level of education and higher were more likely to accept their children to receive PCV.
3. The vaccine should be made available in primary health facilities as the study found that most clients attending KNH MCH were from the health centers claiming lack of vaccine availability in the health centers.

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APPENDIXES

APPENDIX 1: QUESTIONNAIRE

DETERMINANTS OF PNEUMOCOCCAL CONJUGATE VACCINE UPTAKE AMONG CHILDREN ATTENDING IMMUNIZATION SERVICES AT KENYATTA NATIONAL HOSPITAL, NAIROBI, KENYA.

Questionnaire number

Ward

INSTRUCTIONS

Please do not write your name anywhere in the questionnaire.

Put a tick (✓) in box next to the right response.

Where no responses/choices are provided please write the response in the spaces provided

Section 1. Demographic factors

1.1 How old are you? _____ years

1.2 What is your gender(tick one)

1. ?m

2. ?F

1.6 What is your current marital status? (tick one)

1.? Single-never married

2.? Married

3.? Separated

4.? Divorced

5.? Widowed

6.? Other, please specify _____

1.8. How many children do you have?

- 1. ? One
- 2. ? Two
- 3. ? three
- 4. ? four and above children

Section 2:socioeconomic

2.1 How would you describe your primary work situation? (tick one)

- 1.? Unemployed
- 2.? Housewife
- 3.? Casual worker
- 4.? Other, please specify _____

2.2 What is your monthly income income(tick one):

- 1.?Below 5000
- 2.?6000-10000
- 3.?11000-15000
- 4.?16000-20000
- 5.?Above21000

2.3 How would you describe your Spouse's occupation if applicable(tick one);

1.? Unemployed

2.? Self employed

3. ?Salaried employed

2.3 What is your monthly income (tick one):

1.?Below 5000

2.?6000-10000

3.?11000-15000

4.?16000-20000

5.?Above21000

6.?Other specify-----

2.4 What is the last level of education you completed? (tick one)

1.? None

2.? Primary

3.? Secondary

4.? College

2.5 How would you describe your primary religious affiliation? (tick one)

1.? Catholic

2.? Protestant

3.? Seventh Day Adventist

4.? Muslim

5.? Other, please specify_____

Part 5: Knowledge, attitudes and practices of care givers on immunization

5.1. What factors predispose a child to pneumonia?

- 1. ? Dirt
- 2. ? Bathing a child
- 3. ? Bacteria
- 4. ? I don't know

5.2. What is the cause of pneumonia?

- 1. ?Cold
- 2.? Bacteria
- 3. ?Bathing child with cold water
- 4. ? Others specify

5.3 Where did you first learn about pneumococcal conjugate vaccine? (Tick one)

- 1.? News Media
- 2. ? Brochures, posters and other printed materials
- 3.? Health workers
- 4.? Family, friends, neighbors and colleagues
- 5.? Religious leaders
- 6. ?Teachers
- 7.? Other (please explain)

5.4 Do you make your child available for vaccine? (Tick one)

- 1.? Yes
- 2. ? No

5.5 If no to question (5.4) please state why.....

5.6 How many injections of vaccine does the child receive to protect him or her from pneumonia? (Tick one)

- 1. ? One
- 2. ? Two
- 3. ? Four
- 4. ? Do not know

5.7 Once your child is immunized with pneumococcal vaccine how long do you take to come for the next injection? (Tick one)

- 1. ?One month
- 2. ? Two
- 3. ? Three months
- 4. ?Four months
- 5. ? I don't know

5.8 Is your child sick now?

- 1. ?Yes
- 2. ? No

5.9. If yes what is your child suffering from? (Tick one)

- 1. ?Malaria
- 2. ?Pneumonia
- 3. ?Common cold
- 4. ?Asthma

5.10. Was your child, immunized against pneumonia? (Verify with card)

- 1. ?Yes

2. ?No

5.11. How many injections in total did the child receive? (Tick one)

1. ?One

2. ?Two

3. ?Three

4. ?Four

5. ?I don't know

5.13. Did the child miss any injection? (Tick one)

1. ?Yes

2. ?No

5.14. If yes explain why.....

In question (23-27) describe how best you can express your feelings about following statements? Likert scale

| | Strongly agree | agree | I don't know | Disagree | Strongly disagree |
|---|-----------------------|--------------|---------------------|-----------------|--------------------------|
| Child's immunization ensures adequate health protection | | | | | |
| Childs immunization is against my religious belief | | | | | |
| Nurses have treated me well when I bring my child to the clinic | | | | | |
| Nurses have answered all my questions concerning vaccine positively | | | | | |
| To allow the child been vaccinated is against the habit (cultural practice) of my community | | | | | |
| To allow child been vaccinated is against the norms of my community | | | | | |

APPENDIX 2: KEY INFORMANT’S INTERVIEW GUIDE WITH NURSE-INCHARGE

I am Ng’eno Lily Chepketer. I am pursuing my master’s degree in nursing sciences at the University of Nairobi. Presently I am conducting a study on “determinants of pneumococcal conjugate vaccine uptake among children attending immunization services at Kenyatta National Hospital, Nairobi, Kenya”. With me are my two research assistants, Mrs.and Mrs....., who will be assisting me with the study. We have selected you as one of the key informants because of your special relationship to the area of the research topic. This is a voluntary participation without any other interest attached. In case you are not comfortable with any part of the interview you are not compelled to respond. As evidence of your free and voluntary participation I would kindly request you to sign below.

Initials-----Signature -----date-----

We are going to ask you a few questions. We expect this session to be as interactive as possible. Be as truthful as you can. In the process of discussions taped record of the proceedings may take place. In all issues respect, confidentiality, dignity and responsible behavior will be observed. All issues discussed will be only for the purposes of this research and will never be mentioned in any other forum. In case you don’t understand any of the questions kindly seek clarification. Let us now discuss each of the following questions.

1. Are there any challenges you encounter with the procurement of the pneumococcal conjugate vaccine?
2. Are there any problems with storage of pneumococcal conjugate vaccine?
3. Are there situations when a caregiver refuses his/her child to be immunized with pneumococcal conjugate vaccine?
4. If yes what factors do you attribute to such decline/refusal?
5. What do you do when a parent/guardian declines?
4. Do you get parents who specifically come to inquire about the pneumococcal conjugate vaccine?

5. From your observations do you think parents are eager to have their children immunized with pneumococcal conjugate vaccine?

Thank you very much for your participation.

APPENDIX 3: CONSENT FORM

Study number.....

Hospital Number.....

Title of study: Determinants of pneumococcal conjugate vaccine uptake among children attending immunization services at Kenyatta national hospital, Nairobi, Kenya.

Investigator: Ng'eno Lily Chepketer. Tel: 0708844434.

School of Nursing Sciences,
University of Nairobi,
Po Box 19676, Nairobi.

Introduction:

Hello,

I am Lily Ng'eno Chepketer, a Master of Science in nursing student at the School of Nursing Sciences, University of Nairobi. I am conducting a research study on determinants of pneumococcal conjugate vaccine uptake among children attending immunization services at Kenyatta national hospital, Nairobi, Kenya.

Objective: "The objective of this study is to establish determinants of pneumococcal conjugate vaccine uptake among children attending immunization services at Kenyatta national hospital, Nairobi, Kenya.

I am requesting you to participate in this study. The study has been approved by the Department of Nursing , University of Nairobi and The Kenyatta National Hospital Ethics and Research Committee (KNH/UON-ERC) vide approval number

Confidentiality

Your name will not appear on the transcript .What you tell me will be treated confidentially and will only be between you and me. At no time will you be identified by name or your opinion be shared with anybody else.

Benefits

There is no compensation for participating in the study. Information from this study will establish a basis of enhancing encouragement of mothers to take up the vaccine and improve on

child care. The findings of this study will be available from the author. They will be published in scientific journals.

Risks

There are no perceived risks for your participation in this study. However, if a question makes you uncomfortable, you may decide not to answer it.

Voluntary

Participation in this study is voluntary. You are free to decline or withdraw from the study any time. Refusal to take part will not attract any penalty. You retain the right to withdraw from the study without any consequences.

Participation or non participation does not come with any financial cost. Equally, there is no compensation for participating in the study.

I Do hereby consent to participate in this study as explained to me by. I have been informed of the nature of the study being undertaken and that there are no risks or invasive procedures involved. I also understand that my participation in the study is voluntary and the decision to participate or not to participate will not affect my treatment in any way whatsoever. I may also choose to discontinue my involvement in the study at any stage without any explanation or consequences. I have also been reassured that my personal details and the information I will relay will be kept confidential. I confirm that all my concerns about my participation in the study have been adequately addressed by the investigator.

Participant’s Signature (or thumbprint).....

Date.....

I confirm that I have clearly explained to the participant the nature of the study and the contents of this consent form in detail and the participant has decided to participate voluntarily without any coercion or undue pressure.

Investigator’s Signature..... Date

Witness's signature()

Date.....

For Any Enquiries, please contact:

- Ng'eno lily Chepketer
Principle investigator
Mobile Number: 0708844438
Email; ngenolily@ymail.com

- The Chairman,
Kenyatta National Hospital Ethics and Research Committee
Tel: 020-2726300 Ext 44355

APPENDIX 4: APPLICATION LETTER

Ng'eno Lily Chepketer

University of Nairobi,

School of Nursing Science

The Chairperson,

KNH Ethics & Research Committee,

P.O. Box 20723-00202,

Nairobi

20th, may, 2013

Dear Sir/Madam,

RE: RESEARCH AUTHORISATION REQUEST

I am a postgraduate student pursuing a Master's Degree in nursing (pediatrics). I wish to request permission to carry out research on *“determinants of pneumococcal conjugate vaccine uptake in children at Kenyatta National Hospital”*. The study will be carried out in Kenyatta National Hospital, Maternal Child Health.

Your kind consideration will be highly appreciated and it will go a long way in facilitating completion of my study. The research findings will be utilized both locally and nationally in improving access to quality renal replacement therapy.

Thank you.

Yours faithfully,

ngenolily@gmail.com Email:

Mobile number: 0708844438

APPEDIX 5: APPROVAL LETTER FROM ETHICS



UNIVERSITY OF NAIROBI
COLLEGE OF HEALTH SCIENCES
P O BOX 19676 Code 00202
Telegrams: varsity
(254-020) 2726300 Ext 44355

Ref: KNH-ERC/A/154

Ngeno Lily Chepketer
School of Nursing
University of Nairobi

Dear Lily

RESEARCH PROPOSAL: DETERMINANTS OF PNEUMOCOCCAL CONJUGATE VACCINE UPTAKE AMONG CHILDREN ATTENDING IMMUNIZATION SERVICES AT KENYATTA NATIONAL HOSPITAL (P128/3/2013)

This is to inform you that the KNH/UoN-Ethics & Research Committee (KNH/UoN-ERC) has reviewed and **approved** your above proposal. The approval periods are 6th June 2013 to 5th June 2014.

This approval is subject to compliance with the following requirements:

- a) Only approved documents (informed consents, study instruments, advertising materials etc) will be used.
- b) All changes (amendments, deviations, violations etc) are submitted for review and approval by KNH/UoN ERC before implementation.
- c) Death and life threatening problems and severe adverse events (SAEs) or unexpected adverse events whether related or unrelated to the study must be reported to the KNH/UoN ERC within 72 hours of notification.
- d) Any changes, anticipated or otherwise that may increase the risks or affect safety or welfare of study participants and others or affect the integrity of the research must be reported to KNH/UoN ERC within 72 hours.
- e) Submission of a request for renewal of approval at least 60 days prior to expiry of the approval period. (*Attach a comprehensive progress report to support the renewal*).
- f) Clearance for export of biological specimens must be obtained from KNH/UoN-Ethics & Research Committee for each batch of shipment.
- g) Submission of an *executive summary* report within 90 days upon completion of the study
This information will form part of the data base that will be consulted in future when processing related research studies so as to minimize chances of study duplication and/or plagiarism.



KNH/UoN-ERC
Email: uonknh_erc@uonbi.ac.ke
Website: www.uonbi.ac.ke

Link: www.uonbi.ac.ke/activities/KNHUoN



KENYATTA NATIONAL HOSPITAL
P O BOX 20723 Code 00202
Tel: 726300-9
Fax: 725272
Telegrams: MEDSUP, Nairobi

6th June 2013

For more details consult the KNH/UoN ERC website www.uonbi.ac.ke/activities/KNHUoN.

Yours sincerely



PROF. M. L. CHINDIA
SECRETARY, KNH/UON-ERC

c.c. Prof. A.N. Guantai, Chairperson, KNH/UoN-ERC
The Deputy Director CS, KNH
The HOD, Records, KNH
Principal College of Health Sciences, UON
The Director, School of Nursing, UON
Supervisors: Dr. Margaret Chege, Dr. Blasio Onsogo Omuga

APPENDIX 6: APPLICATION LETTER

NG'ENO LILY CHEPKETER

P.O.BOX 7628-00300,

NAIROBI.

THE CHIEF EXECUTIVE OFFICER,

KENYATTA NATIONAL HOSPITAL,

P.O BOX 20723-00202,

10TH APRIL, 2012

Dear Sir,

RE: REQUEST FOR PERMISSION TO CARRY OUT ACADEMIC RESEARCH IN YOUR INSTITUTION

I am a student of University of Nairobi pursuing a Master of Science in nursing (pediatric).

I wish to conduct an academic research *on determinants of pneumococcal conjugate vaccine uptake among children attending immunization at Kenyatta National Hospital*. The purpose of this letter is to request to be allowed to conduct this research in your institution.

Thanking you in advance.

Yours faithfully

Email:ngenolily@ymail.com

Mobile number 0708844438

MAP OF STUDY AREA

