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Abstract

The study sought to determine demographic factors related to pneumococcal conjugate vaccine uptake among children attending immunization services. This was a descriptive cross-sectional hospital-based quantitative and qualitative study. The study was conducted in Maternal Child Health (MCH) clinic and pediatric wards. It involved parents/caregivers (n= 104) bringing their children to the hospital. Simple random sampling was used to identify parent's/guardian respondents. A pretested questionnaire was used to collect data from the correspondents. A key informant interview with the nurse in charge was also conducted. Data were analyzed using the software Statistical Package for Social Sciences (SPSS) version 18.0 computer package. Research results were presented in frequency distribution tables, graphs pie charts and other forms of descriptive statistics. The study findings revealed that immunization uptake was statistically significantly associated with parity. The occupation of the guardian however didn't show any significance to vaccine uptake. This study recommends that: For PCV to reach effectively every child parents/guardians would need updated information tailored to the understanding of pneumonia disease burden and prevention. Information on PCV must be provided by well-informed and experience health personnel. Increase awareness in the community through increased sensitization and mass campaigns

Keywords: *Demographic factors, Pneumococcal conjugate vaccine, Parity, Occupation, Immunization services*

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1.0 Introduction

Pneumonia is an inflammatory condition of the lungs affecting primarily the air sacs known as alveoli (Luckie, Irion & Khattar, 2009). It is the major cause of morbidity and mortality among children in Kenya. Among infants aged between 1 week and 59 months admitted to 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 bacteria 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 pneumonia (Obrien *et al*, 2009). Pneumococcal infections may be difficult to cure because some strains of the bacteria have developed resistance to the antibiotics used to treat them. This highlights the importance of pneumococcal infection prevention through immunization (WHO, 2009). Pneumococcal conjugate vaccination 13 protects against thirteen serotypes of pneumococcal bacteria, including those that are most likely to cause serious disease. 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). It 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 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 Services, 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 the 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-olds.

1.1 Statement of the Problem

In Kenya, pneumonia is the second leading cause of death among children less than five years of age. It accounts for 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 at 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. This puts into question the degree of uptake of the vaccine among the target group. It is therefore important to look into the demographic factors related to pneumococcal conjugate vaccine uptake among children attending immunization services

1.2 Objective of the Study

To determine demographic factors related to pneumococcal conjugate vaccine uptake among children attending immunization services

2.0 Literature Review

2.1 Empirical Review

Sandrine (2018) investigated the impact of monitoring and evaluation systems on the success of the Pneumococcal conjugate vaccine (PCV 13) 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 pneumonia (Lucero et al, 2004). It is a liquid in a two-dose vial that must be destroyed at the end of each session or after 6 hours from the first opening. It is given in three doses; the minimum age to take the dose is six weeks, with a minimum four-week delay between the three doses, i.e. six, ten, and fourteen weeks. This vaccine is given at the same time as the Pentavalent or Diphtheria, Pertussis, and Tetanus vaccines, but at distinct injection sites. Children who have had all of their prior immunizations but are under the age of one year must have three doses of the vaccine at least four weeks apart. If used appropriately, it has the potential to significantly reduce morbidity and mortality from a major children killer. As a vaccination that is delivered concurrently with pentavalent vaccine and oral polio vaccines, it saves the mother or caregiver time by not requiring an additional visit to the health facility. However, this also implies that the youngster will receive an additional injection on the same day as the pentavalent vaccine. The area in which one lives has an impact on one's health care. People who reside in cities are more likely to travel shorter distances to health care facilities than those who live in rural areas. This may have an indirect impact on vaccine uptake.

3.0 Methodology

This was a descriptive cross-sectional hospital-based quantitative and qualitative study. The study was conducted in Maternal Child Health (MCH) clinic and pediatric wards. It involved parents/caregivers (n= 104) bringing their children to the hospital. Simple random sampling was used to identify parent's/guardian respondents. A pretested questionnaire was used to collect data from the correspondents. A key informant interview with the nurse in charge was also conducted. Data were analyzed using the software Statistical Package for Social Sciences (SPSS) version 18.0 computer package. Research results were presented in frequency distribution tables, graphs pie charts and other forms of descriptive statistics.

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4.0 Findings and Discussions

4.1 Demographic characteristics of the respondents

4.1.1 Age

The demographic characteristics of the mothers are 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 years while 30% (n=30) were aged below 24 years. Average age 28.4 (SD = 4.7).

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

4.1.2 Marital status and parity of caretakers of children attending immunization services at KNH

As shown in table 1 below, most of the participants in the study reported that they were married (98.1%, n=102). 1.9%of the mothers (n=2) reported that they were single and never married. The majority of the participants 37.5% (n=39) reported having one child. Mothers with 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 four or more children.

4.1.3 Gender of caretakers of children attending immunization services at KNH

As shown in figure 1 below, most participants in the study were female representing 92.8% (n=100) while male participants represented 3.8% (n=4). This indicates that the majority of women take the responsibility of bringing children to the clinic and accompanying sick children to the hospital unlike males.

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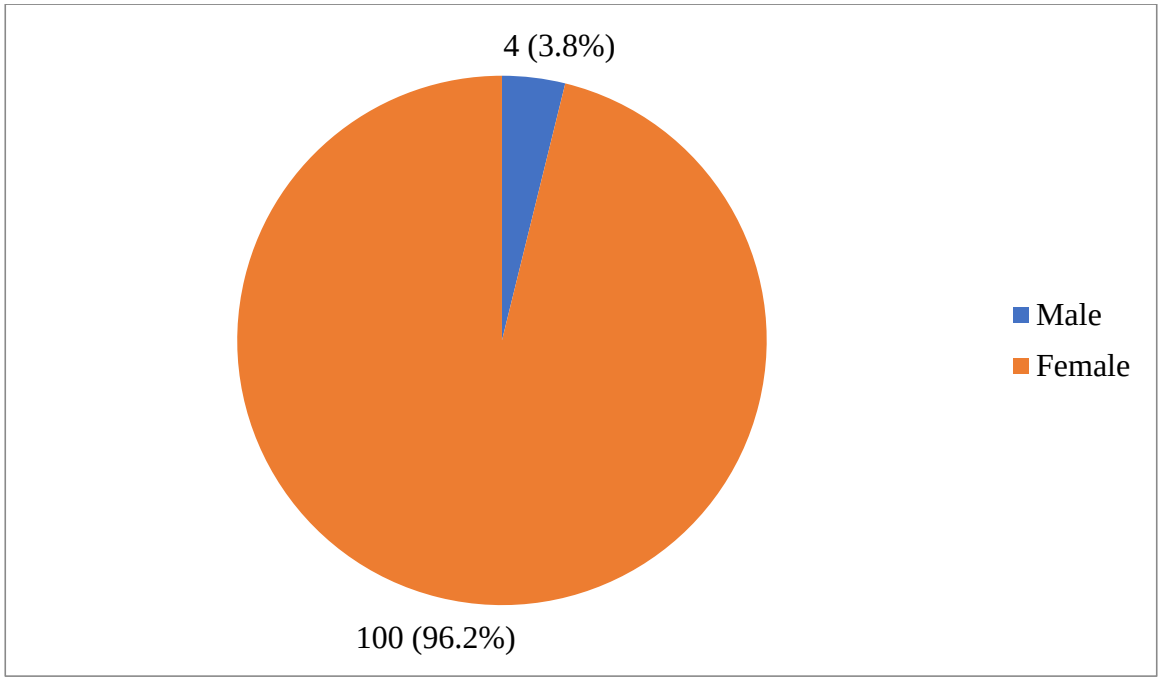

Figure 1: Gender of caretakers of children attending immunization services at KNH

4.2 Bivariate analysis

Table 2: Bivariate Analysis

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	0.42
	35 - 40 years		10(83.3)	2(16.7)	3.3(0.6-18.0)	2.1	0.16
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	0.96
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	0.81
Occupation	Unemployed		5(50.0)	5(50.0)	1.0		
	Self employed		18(56.3)	14(43.8)	1.3(0.3-5.3)	0.1	0.73
	Salaried employment		52(86.7)	8(13.3)	6.5(1.5-27.6)	7.6	0.011
	Primary		24(55.8)	19(44.2)	1.0		
Education	Secondary		22(88.0)	3(12.0)	5.8(1.5-22.4)	7.0	0.01
	College		31(86.1)	5(13.9)	4.9(1.6-15.0)	8.5	0.005

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4.3 Multivariate analysis

Table 3: Multivariate analysis

	PCV uptake		**Odds Ratio**	**Standard error**	**Z statistic**	**P value**	**95% Confidence Interval**	
Age category	Uptake	No uptake						
20 - 24 years	18(60.0)	12(40.0)	1.0	-	-	-	-	-
25 - 29 years	26(89.7)	3(10.3)	2.5	2.1	1.0	0.30	0.5	13.5
30 - 34 years	23(69.7)	10(30.3)	0.9	0.7	-0.2	0.87	0.2	4.1
35 - 40 years	10(83.3)	2(16.7)	0.8	0.9	-0.2	0.82	0.1	8.5
Parity	3(75.0)	1(25.0)						
1	74(74.0)	26(26.0)	1.0	-	-	-	-	-
2	2(100.0)	0(0.0)	0.4	0.3	-1.2	0.22	0.1	1.7
3	75(73.5)	27(26.5)	0.2	0.2	-1.9	0.05	0.0	1.0
>3	34(87.2)	5(12.8)	1.6	2.2	0.4	0.72	0.1	23.7
Occupation	23(63.9)	13(36.1)						
Unemployed	11(57.9)	8(42.1)	1.0	-	-	-	-	-
Self employed	9(90.0)	1(10.0)	2.0	1.9	0.7	0.47	0.3	12.4
Salaried employment	5(50.0)	5(50.0)	9.4	9.2	2.3	0.02	1.4	64.0
Level of education	18(56.3)	14(43.8)						
Primary	52(86.7)	8(13.3)	1.0	-	-	-	-	-
Secondary	24(55.8)	19(44.2)	6.5	5.4	2.3	0.02	1.3	32.7
College	22(88.0)	3(12.0)	3.4	2.6	1.6	0.11	0.8	15.3
	31(86.1)	5(13.9)						

4.4 PCV immunization uptake

Uptake of pneumococcal vaccination determined by caretaker report that infant had received all the three scheduled doses of pneumococcal vaccine was 74% (n = 77), Figure 2

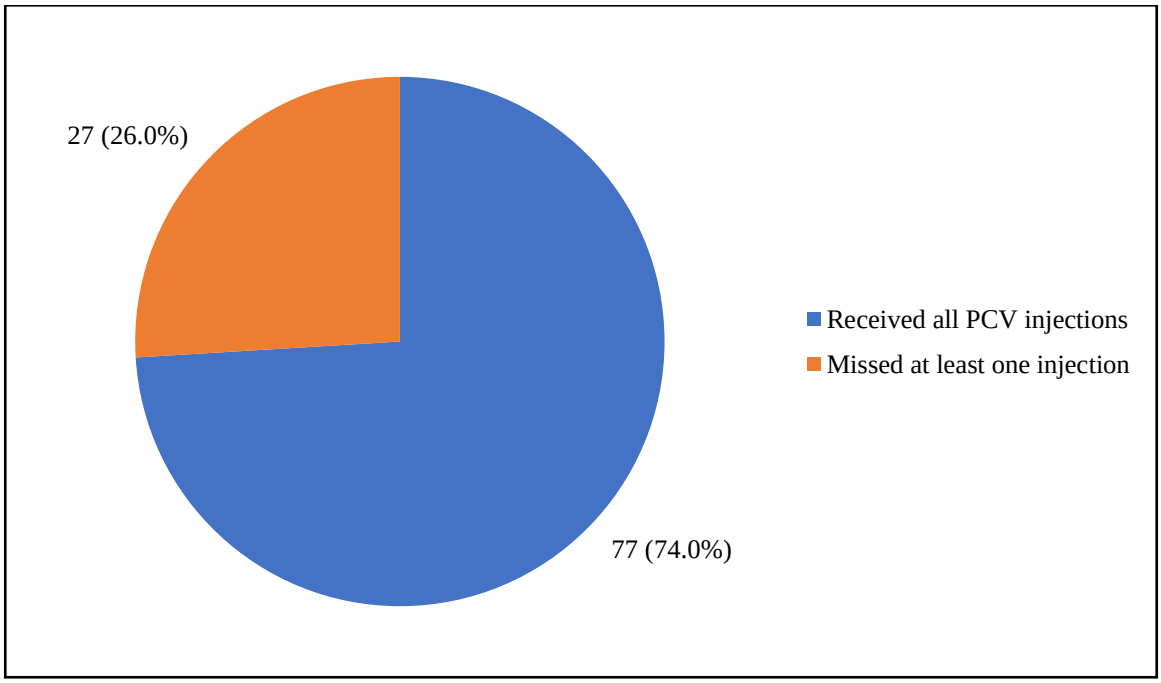

Figure 2: PCV immunization uptake

4.5 PCV uptake versus demographic factors

Immunization uptake was statistically significantly associated with parity ($p = 0.02$), caretaker education ($p<0.001$) and spousal education ($p < 0.001$), Table 4. Caretakers with higher education levels, higher parity and caretakers reporting higher spousal education all had high uptake of immunization. Age ($p = 0.05$), gender ($p = 1.00$) and marital status ($p = 1.00$) were not significantly associated with immunization uptake.

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Table 4: PCV uptake versus demographic factors

Characteristic		Immunization uptake		p value
		Good	Poor	
Age	20 - 24 years	18(60.0)	12(40.0)	0.05
	25 - 29 years	26(89.7)	3(10.3)	
	30 - 34 years	23(69.7)	10(30.3)	
	35 - 40 years	10(83.3)	2(16.7)	
Sex	Male	3(75.0)	1(25.0)	1.00
	Female	74(74.0)	26(26.0)	
Marital	Single	2(100.0)	0(0.0)	1.00
	Married	75(73.5)	27(26.5)	
Parity	One	34(87.2)	5(12.8)	0.02
	Two	23(63.9)	13(36.1)	
	Three	11(57.9)	8(42.1)	
	Four and above	9(90.0)	1(10.0)	
Education	Primary	5(50.0)	5(50.0)	<0.001
	Secondary	18(56.3)	14(43.8)	
	College	52(86.7)	8(13.3)	
Spouse's education	Primary	24(55.8)	19(44.2)	<0.001
	Secondary	22(88.0)	3(12.0)	
	College	31(86.1)	5(13.9)	

5.0 Conclusions

Parents of Children aged less than two years of age were recruited to participate in the study, 98% (n=102) were married, and 1.9% (n=2) were single and never married. Most of the caregivers had two children and above. At the time of the interview, they reported that their children were still breastfeeding. Though the majority of participants were housewives their spouses had formal employment. Out of one hundred and four caretakers interviewed for this study, there were only four men. This implies that the females are primary caregivers and the need for fathers to be involved in family-centered care still needs emphasis. Father's role has traditionally been associated with being the sole provider of the family breadwinner but this preoccupation is shifting making them more accountable for the family's health. In the case of this study, the father's role seems to have been so poor. Regarding the age of the child, the fact that these children were still breastfeeding and optimally under the care of the mother explains the reason for the high numbers of the mother caregivers' attendance. another factor is the fact that the majority of women were housewives and their spouses were in formal employment, so most mothers had the time to bring the children for immunization, unlike the fathers.

Men should be sensitized on the importance of participation in the health care of the children. This is informed by the fact that both parents are supposed to be involved in the positive reinforcement of good health habits in the family as envisaged in the health belief model theory this study was based. The emphasis on the involvement of the male caregiver cannot be the only way to improve health care and therefore the role of the mother in childcare should not be negated. The high number of mother caregivers can be taken as a positive implication of medication education by nurses to the caregivers and this likelihood of continuity of care at home upon the child's discharge is almost guaranteed. Parents who have more than one child have a good experience with child immunization and they are well educated on the schedules of vaccines, in this study Immunization uptake was statistically significantly associated with parity.

6.0 Recommendations

This study recommends that: For PCV to reach effectively every child parents/guardians would need updated information tailored to the understanding of pneumonia disease burden and prevention. Information on PCV must be provided by well-informed and experience health personnel. Increase awareness in the community through increased sensitization and mass campaigns.

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