FACTORS ASSOCIATED TO THE NON-ADHERENCE TO VACCINATION APPOINTMENTS IN THE NGAMBE HEALTH DISTRICT, LITTORAL REGION, CAMEROON: A CASE CONTROL STUDY

ABSTRACT

Background: Vaccination is what is strongly recommended in protecting against childhood diseases. The Expanded Program of Immunization (EPI) in Cameroon started in 1976 as a pilot project and became operational all over the country in 1982 where vaccination is seen a fundamental right of every child in the country. However, rural areas have lots of constrains to the effective implementation of vaccination programs some of which are population-related.

Purpose: This study aimed to assess the association between some factors and adherence to vaccination appointments in Ngambe Health District; a typical rural health district in Cameroon.

Methods: This was a case control study where the vaccination records of health facilities in the district were reviewed and parents who respected their vaccination appointments formed the controls while those who missed a vaccination appointment were the cases. They were then traced for interviewed and data analyzed using Epi infos version 3.5.4.

Results: Out of 94 parents, 37.2% had missed a vaccination appointment. In parents older than 36, the odds of missing an appointment was 11 (95%CI 3.69-34.43) while those with <4 children were 0.10 less likely to miss an appointment (95%CI 0.04-0.28). Parent's education, household size and ANC attendance also influenced adherence to vaccination appointments. After adjustment, only age and whether or not child was born in the hospital remained statistically significant associated with outcome.

Conclusion: User related factors influence uptake of vaccination services in the Ngambe Health District od Cameroon; a rural area, some of which are age of the parents, number of children the parent has and the total household size. Therefore, adding to the availability of vaccines, a high-level political commitment aimed at increasing utilization of health services and effectively taking vaccination to the population are indispensable.

Keywords: Factors, Associated, Adherence, Vaccination Appointments, Ngambe Health District, Cameroon

1. INTRODUCTION

When it concerns protection against certain childhood diseases, vaccination is what is strongly recommended by the medical community[1, 2]. Vaccines are available to prevent many diseases in people of all ages. The primary vaccine-preventable diseases of childhood are diphtheria, invasive diseases caused by the *Haemophilus influenza* type b (Hib)

bacterium, measles, poliomyelitis (polio), rubella ("German" measles), Tuberculosis (TB), tetanus, mumps, varicella (chickenpox), pertussis (whooping cough) pneumococcal infections, and diarrhea with rotavirus[3, 4]

Parental decisions regarding immunization are very important for increasing the immunization rate and compliance, decreasing any possible immunization errors. Deficiencies in parents' knowledge about the importance of vaccination, lack of knowledge on the various diseases for which their children are being protected, the adverse effects and contraindications of vaccines often lead to many immunization errors children up-to-date vaccinations[5, 6]. Parental decision to take their children for vaccination is also affected by socio-demographic variables. Some of these factors include whether or not a child is in a rural area, the distance to the hospital where vaccination is to take place and many other socio-demographic parameters like single parenthood, family size, and age of the mother [7–9].

In Cameroon, Expanded Program of Immunization (EPI) started in 1976 as a pilot project that was coordinated by the Organization for the Coordination of the Control of Endemic Diseases in Central Africa (OCEAC). This pilot became operational in all the regions of the country in 1982 where vaccination is seen a fundament right of every child in the country [4]. However, immunization coverage is still below target. Recent WHO and UNICEF reports showed a decline in the immunization coverage between 2009 and 2011 from about 91% to 75% and a slight increase to 85% in 2013[10].
The Cameroon government is already doing a lot to take vaccines to the target population and reduce any inequality to accessibility to immunization activities. This is done using various strategies like the outreach and the mobile strategies where health teams leave the health facilities with vaccines to meet the population in their localities. Also, punctual supplementary immunization activities (SIAs) are carried out after every 6 months and when need arises. Still, children are not being vaccinated and on time as scheduled. In the rural settings where outreach strategies are primordial in achieving vaccination target, after vaccination sessions, some vaccines can't go back to the cold chain if the condition are not met. This leads to unopened vial vaccine wastage, translating to less vaccines available, further leading to low immunization coverage. This study therefore seek to investigate how some factors relate to the non-adherence to vaccination appointments in a typical rural health district in Cameroon.

2. MATERIAL AND METHODS

2.1. Study design

This was a community based case control study where health facility records were reviewed to identify the cases and the controls. They all were traced and questionnaire administered after obtaining written consent to participate in the study. Targeted were parents who started to vaccinate their children (with BCG) in January 2015. Cases were parents who had missed at least one vaccination appointment between January and April 2015 (between BCG up to and including the 3rd DPT dose). While the control group were parents who had not missed any appointment within the same time frame.

2.2. Study setting and procedure

The study was carried out in the Ngambe Health District (NHD), Littoral region, Cameroon. Ngambe is a typical rural area in the Sanagal Maritime Division of the Littoral region, Republic of Cameroon. This Health District embodies two Sub-Divisions which are the Massouk-Songloulou Sub Division and the Ngambe sub- Division. Ngambe Health District has 7 health areas; each of these health areas has at least an Integrated Health Center (IHC) to cater for the health needs of the population.

Firstly, vaccination registers in all the health functional health facilities in the heath District were reviewed to identify the cases and the controls. Then they were traced back to their respective communities for data collection as shown in figure 1.

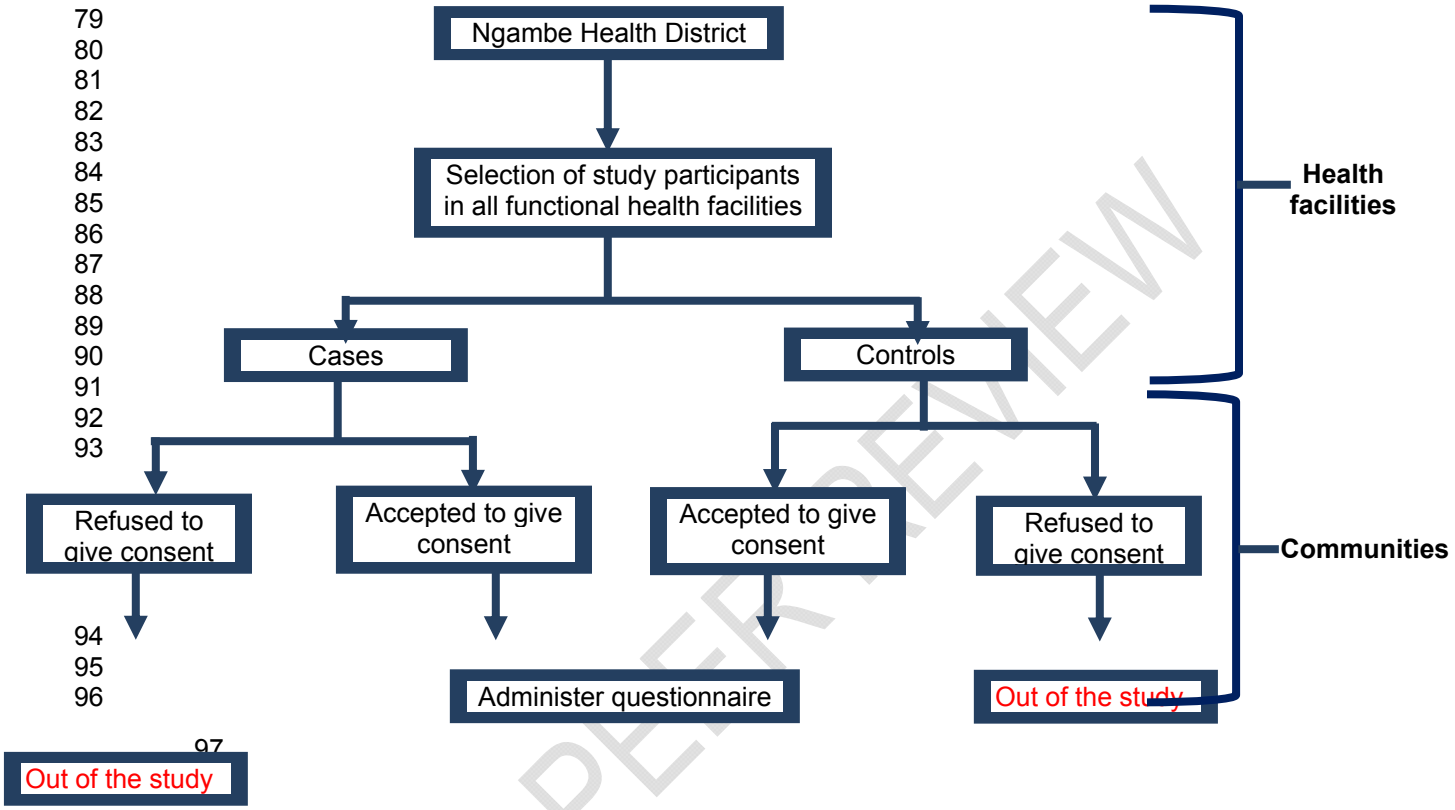

Figure 1: Procedure of data collection (study flow chart)

2.3. Data analysis

Information from the questionnaire were entered into Epi infos version 3.5.4. where data analysis was done. The chi square (χ^2) test was used and level of significance was set at the 5%. A multivariate logistic regression analysis was performed, where variables that were statistically significant at the bivariate level were included in a multivariate logistic regression analysis to adjust for possible confounders.

2.4. Ethical approval

Ethical review was done and approved by the Faculty of Health Sciences Institutional Review Board (FHS-IRB). Administrative authorization was gotten from the Regional Delegation of Public Health of the Litoral region and from the DMO for the Ngambe Health District.

3. RESULT AND DISCUSSION

3.1. Results

Of the 94 parents sampled, 4(4.3%) were male. Mean age of parents was 28.4 years (SD= 6.7) years. Close to half, 43(45.7%) of the participants were single and 42 (44.7%) of them were married. The mean age of the index children was 5.32 months and more than half (57.3%) of them were male.

Majority of the respondents 29(30.9%) were from the Ngambe Centre Health Area while Saha and Ngogbog Health Areas contributed just 5 (5.3%) each. Bikat is the only health area where those who missed their vaccination appointment (cases) were more than those who adhered to their vaccination appointment (controls) (figure 1).

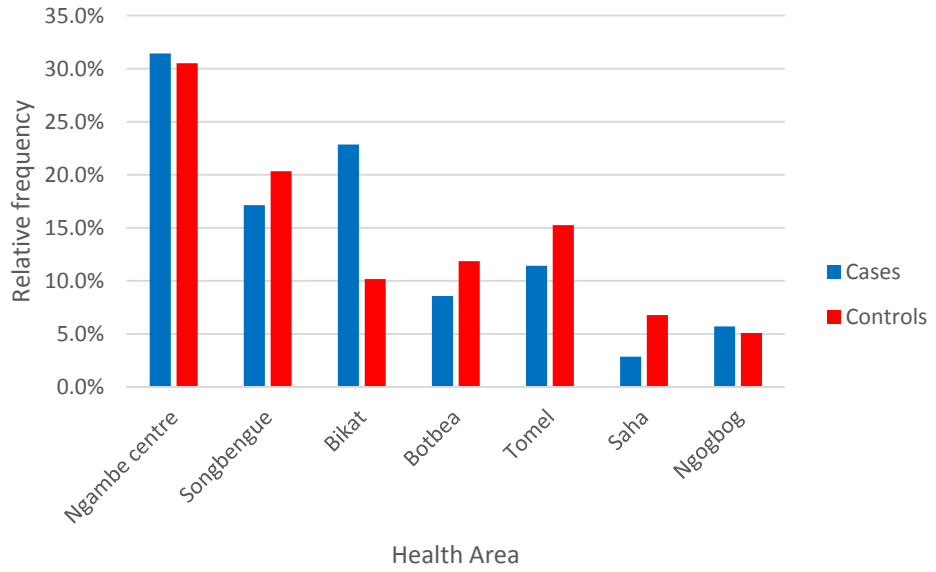

Figure 2: Distribution of study parents according to the health area

On analysis, marital status educational level, age, parity, household size, distance from the health facility and attendance of ANC were highly associated with adherence to vaccination appointments (table 1).

Table 1: Effect on factors on adherence to vaccination appointment (n=94)

Characteristic	Cases n=35	Control n=59	Odds Ratio (95%CI)	χ^2	P-value
Single parenthood					
No	26(41.3%)	37(58.7%)	1.72 (0.86-4.33)	0.86	0.35
Yes	9(26.0%)	22(71.0%)			
Marital status					
Others	22(42.3%)	30(57.7%)	1.62(0.69-3.85)	0.84	0.36
Married	13(31.0%)	29(69.0%)			
Educational level					
Primary and below	12 (63.2%)	7(36.8%)	3.88(1.35-11.11)	6.85	0.01
Secondary and above	23(30.7%)	52(69.3%)			
Age					
36 and above	18(78.3%)	5(21.7%)	11.44(3.69-34.43)	21.93	0.001
16-35	17(23.9%)	54(76.1%)			
Parity					
0-4	15(22.4%)	52(77.6%)	0.10(0.04-0.28)	21.99	0.001
5 and above	20(74.1%)	7(25.9%)			
Child's sex					
Male	17(32.1)	36(67.9)	0.64(0.27-1.49)	0.67	0.41
Female	17(42.5)	23(57.5)			
Means of transport					

Characteristic	Cases n=35	Control n=59	Odds Ratio (95%CI)	χ^2	P-value
Foot	8(61.5)	5(38.5)	3.2(0.96-10.72)	2.70	0.10
Others means of transport	27(33.3)	54(66.7)			
Family size					
2-5	9(16.7%)	45(83.3%)	0.12(0.04-0.28)	22.97	0.001
6 and above	26(65.0%)	14(35.0%)			
Distance from the health facility(km)					
0-5	5(14.7%)	29(85.3%)	0.17(0.06-0.51)	10.11	0.001
6 and above	30(50.0%)	30(50.0%)			
Time to reach the health centre					
0-60 minutes	8(14.5)	47(85.5)	0.08(0.08-0.21)	26.91	<0.001
61 and above	27(69.2)	12(30.8)			
Employment status					
No	30(42.9%)	40(57.1%)	2.85(0.96-8.50)	2.83	0.09
Yes	5(20.8%)	19(79.2%)			
Possession of a functional radio or TV* set					
No	19(45.2%)	23(54.8%)	1.86(0.79-4.33)	1.51	0.22
Yes	16(30.8%)	36(69.2%)			
Child born in the hospital					
No	17(68.0)	8(32.0)	6.02(2.22-16.3)	12.06	0.001
Yes	18(26.1)	51(73.9)			
Attendance of ANC					
No	16(69.6)	7(30.4)	6.26(2.23-17.56)	13.62	0.001
Yes	19(26.8)	52(73.2)			

After controlling for confounders, only age and whether children were born in the hospital or not were found to be statistically significantly associated to adherence to vaccination appointment.

Table 2: Multivariate analysis of the predictors of adherence to vaccination appointments

Covariates	AOR*	95% CI°	P-value
Knowledge of when a child is normally supposed to have completed routine vaccination			
Other responses	Reference		
9 months	2.90	0.14-58.73	0.49
Age	0.76	0.62-0.95	0.01
Attendance of ANC			
No	Reference		
Yes	5.83	0.59-93	0.13
Child born in the hospital			
No	Reference		
Yes	15.82	2.18-213.04	0.04
Distance to health facility			
6km and more	Reference		
5km and less	36323977.5	0.001-1exp12	0.96
Family size			
6 and more	Reference		
5 and less	5.92	0.66-52.80	0.11

Covariates	AOR*	95% CI°	P-value
Level of education			
Primary and below	Reference		
Secondary and above	0.82	0.09-6.77	0.85
Knowledge of some EPI targeted diseases			
Less than 3	Reference		
3 and above	1.15	0.13-10.08	0.89
Parity	2.09	0.77-5.70	0.15
Time taken to reach the health facility			
0-60 minutes	Reference		
More than 60 minutes	0.27	0.04-1.99	0.20
Knowledge of a child is normally supposed to take the first vaccine			
Others responses	Reference		
At birth	0.37	0.02-8.09	0.53

3.2. Discussions

This study examined associations between adherence to vaccination appointments and user-related (socio-demographic) factors. Only 62.8% of children who started vaccination in January 2015 were vaccinated as per the EPI vaccination calendar of Cameroon for infants.

Long distances from the health facilities is a well-known influence on the utility of health services, usually negatively[11, 12]. In this study, parents living closer (less than 5km) to the health facility were less likely not to adhere to their children's vaccination appointment. Therefore, children of the villages hosting a health facility have better chances of being adequately immunized. Monsiur and Saker[13] also demonstrated similar associations between distance and complete childhood vaccination. Age sometimes may serve as a proxy for the parents' accumulated knowledge, which may have a positive influence on adequate utilization and immunization of children[13], this study's results showed that the chances of adhering to a child's vaccination appointment reduces as age increases. This result is in line with Lucius [14]. The inverse relationship between age and respect of vaccination appointment may be due to the increase in responsibility and number of children to cater for that is associated to increase in age. Since age correlates positively with parity, they have similar association to adherence to vaccination appoints. Parents with less than four children were less likely to miss a vaccination appointment. This may be because parents with many children face a higher burden of care and resource constrains associated with increased number of children[15].

Delivery in the hospital goes with health information on various health issues including vaccination, hence account for the association between delivery in a health facility and respect of vaccination appointment. As demonstrated by the results. Also, our results show that parents' level of education was not significantly associated with adherence to vaccination appointment after adjustment. Possibly, health personnel are doing their best to educated the parents in the on the importance of vaccination so much so that the effect of formal education on adherence to vaccination appointment has been neutralized. This is unlike in the study by Bhuwan and collaborators[16], where children with parents who have only primary level of education were more likely to fail to adhere to the vaccination appointments compared to parents with at least secondary level of education.

4. CONCLUSION

Though the Ministry of Public Health is not expected to be perfect in the organization of these activities EPI activities, user related factors also contribute to the non-adherence to vaccination appointments in the Ngambe health District with only about 62.8% of children being vaccinated on time. This is not a good target for a country that is fighting against vaccine preventable diseases. Policies makers at the district, regional and national level needs to direct resources so as to meet the need of persons far from the health facilities and those parents having many children.

CONSENT

Written consern was obtained from every participant who accepted to take part in the study.

ETHICAL APPROVAL

All authors hereby declare that the study have been examined and approved by the appropriate ethics committee and have therefore been performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki. Ethical approval was granted by the University of Buea Faculty of Health Science Ethical Review Board (FSH IRB), and the reference number is **2015/315/UB/FHS/IRB**. Administrative authorization was gotten from the Regional Delegate of Public Health for the Littoral Region and the District Medical Officer of the Ngambe Health District.

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