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ORIGINAL ARTICLE

Assessment of Knowledge and Factors Associated with Uptake of Vaccines among Caregivers of Children Less Than 2 Years Old in Kosofe Local Government Area Lagos State

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ABSTRACT

Background: Vaccine-preventable diseases are a major cause of death in children less than 5 years old especially in low/middle-income countries like Nigeria. Immunization has played a crucial role in decreasing mortality and morbidity in this vulnerable population. This study assessed the knowledge of routine and optional vaccines and factors associated with the uptake of these vaccines among caregivers of children aged less than 2 years in Kosofe Local Government Area, Lagos State.

Methods: A cross-sectional study was carried out among 319 caregivers of children less than 2 years old selected by multistage sampling. Data were obtained using interviewer-administered questionnaires and analyzed using Epi Info software version 3.5. Descriptive analysis was presented as frequencies, proportions, and graphs to summarize the data. Bivariate analysis was done using Chi-square/ Fischer exact tests to identify the association between independent and dependent variables. The level of significance was set at $p < 0.05$.

Results: Majority of the respondents had good knowledge of routine (86.8%) and optional (60.2%) vaccines. Factors significantly associated with the uptake of routine vaccines were the place of birth ($\chi^2=46.154, p<0.01$), caregiver's education ($\chi^2=15.991, p=0.003$), and knowledge of the routine vaccines ($\chi^2= p<0.01$). Factors significantly associated with the uptake of optional vaccines were the age of respondents ($\chi^2=10.916, p=0.027$), place of birth ($\chi^2=49.696$, $p<0.01$), caregiver's education ($\chi^2=45.038, p<0.01$), caregiver's occupation ($\chi^2=49.102 p<0.01$), average monthly income ($\chi^2=72.662$, $p<0.01$)), and knowledge of optional vaccines ($\chi^2= p<0.01$).

Conclusion: Though majority of the respondents had good knowledge of the vaccines, targeted interventions should be implemented to further improve knowledge and enhance uptake of both the routine and optional vaccines.

Keywords: Caregivers, Knowledge, Vaccination Uptake, Children less than 2 years

INTRODUCTION

Vaccines play a critical role in preventing and controlling communicable diseases, contributing to global health security.[1] Public health interventions such as immunization have proven to be effective and successful.[2] Immunization has significantly reduced deaths caused by infectious diseases and prevented disabilities, ensuring optimal growth and cognitive development in children while combating antimicrobial resistance.[1] Additionally, vaccines offer cost-saving benefits by reducing disease incidence and minimizing hospital visits.[3] Launched in 1974, the Expanded Programme on Immunization (EPI) ensured global access to life-saving vaccines for all children. Today, every country has its national immunization program, considering vaccines as safe, cost-effective, and successful in preventing deaths and improving lives.[4] In Nigeria, routine immunization programs are vital in protecting newborns and children from life-threatening diseases.[5]

According to the vaccination schedule, fully immunized status is achieved when children aged 12–23 months have completed all their immunizations.[3] Globally, millions of children fail to receive the complete set of basic vaccines every year, with over thirteen million children receiving no vaccines at all in the routine national immunization.[1]

Many low- and middle-income countries (LMIC) fall short of WHO's global target of 90% coverage for three doses of diphtheria-tetanus-pertussis vaccines (DTP3). It includes the 'zero-dose' children who have not received the first dose of the DPT and the 'missed dose' children have not received the full schedule.[6]In Nigeria, the prevalence of incomplete vaccination statuses among children has shown a consistent decrease from 2003 to 2018.[7] However, in 2021, at least 64% of children between the ages of 12-23 months in Nigeria did not receive all recommended vaccines.[5]

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The low uptake of routine immunization in Nigeria is influenced by several factors. Analysis of the National Demographic Health Survey (DHS) data spanning 2003 to 2018 reveals that incomplete immunization among children is influenced by individual, community, and state-level factors.[8] Widespread misinformation regarding the preventive benefits of immunization contributes to the problem.[9] Mothers often lack knowledge about non-routine immunization, leading to low vaccine uptake among their children.[10] Caregiver's knowledge of immunization, delivery at health facility, household wealth level, and caregiver's educational status were found to be factors associated with full child immunization.[11,12,13] It is surprising that in the South-West zone of Nigeria, an increase in the prevalence of children with zero vaccinations was noted according to the national demographic trend analysis.[7] Conducting regular studies on vaccination rates is of paramount importance as it enables us to comprehensively assess the resilience of our population, evaluate the extent of program coverage, and ensure the effectiveness of our strategies in preventing vaccine-preventable diseases.[14] Thus, this study aimed to assess caregiver's knowledge and factors influencing the uptake of routine and optional vaccines among children under 2 years in Kosofe Local Government Area of Lagos State.

MATERIALS AND METHODS

STUDY AREA

The study was conducted in Kosofe Local Government Area (LGA), one of the 20 local government areas in Lagos State. Its headquarters or secretariat is in Ogudu Road, Ojota. Kosofe LGA is made up of 7 wards and 2 Local Council Development Areas (LCDA). It has an area of 81km^2 (31 sqm) and a population of 904,705 as at 2011. There are four government hospitals in Kosofe LGA; three Primary health centers and one General Hospital.There are about forty-two registered private hospitals in the LGA.

STUDY DESIGN AND POPULATION

This was a community-based cross-sectional study carried out among caregivers of children aged less than 2 years in Kosofe L.G.A who met the inclusion criteria.

SAMPLE SIZE

A sample size of 319 was determined using a single proportion population Cochran's formula and adjusting for 10% non-response. With the assumption of a 5% margin of error (d), 95% confidence level (Z), and the proportion of children who got an optional vaccine (22.9%).[15]

SAMPLING TECHNIQUE

Three hundred and nineteen participants were selected by multistage sampling. In stage 1, a simple random sampling (balloting) was used to select 3 out of 7 wards in Kosofe LGA. Based on the number of streets in each selected ward, 12 streets were selected in the ratio of 1:1:2 by simple random sampling, three streets each from wards 1 and 2, and six streets from ward 3. Finally, the number of houses in each selected street was determined and systematic sampling was used to select the households. The households that did not meet the inclusion criteria were skipped.

DATA COLLECTION

Data were collected by the researchers and trained assistants using a pre-tested, interviewer-administered questionnaire adapted from a previous studies on caregivers knowledge and vaccine uptake among children. in Lagos. The questionnaire was divided into 4 sections. Section A: Socio-demographic characteristics of the respondents (caregivers of children below age 2 years) and characteristics of the index child. Section B: Knowledge level of participants about routine and optional vaccines Knowledge of routine vaccines was scored as 'good' if 6 or more options are correct out of eleven options.

For knowledge of optional vaccines, there were seven options; and 'good' knowledge was when 4 or more options are correct. Section C: Reasons for uptake and non-uptake of routine and optional vaccines

ETHICAL CONSIDERATIONS

Ethical approval for the study was obtained from the Health Research and Ethical Committee of University Teaching Hospital Lagos (Health Research Committee reference number: ADM/DCST/HREC/APP/1972). Informed consent was obtained from the respondents prior to interviewing them. Respondents' privacy was protected through private face-to-face interview with no third party and there were no identifiers in the questionnaires. Respondents were assured of their rights to withdraw from the study at any time, with or without reason and with no violation of their rights.

DATA ANALYSIS

Data were cleaned and several consistency checks carried out to ensure accuracy and completeness The data obtained were analyzed using EpiInfo software version 3.5. Descriptive analysis was presented in frequencies, proportions, and graphs to summarize the data. Bivariate analysis using chi-square test was done to identify the association between socio-demographic variables and uptake of routine and optional vaccines. A P-value <0.05 was considered for statistical significance.

RESULTS

Socio-demographic/economic characteristics of respondents

A total of 319 questionnaires were administered, completed, and analyzed given a response rate of 100%.

The mean age of the respondents was 30.6 + 6.0 years. Most of the respondents were the mothers of the children (95.6%), married 293 (91.8%), and had education up to post-secondary school level 167 (52.4%) Majority of the respondents' spouses 175 (59.7%) had post-secondary school level education. Most of the respondents 252 (79.0%) had a source of income that placed them in the higher socio-economic strata. (Table 1).

Characteristics of the index child

The index children were almost evenly distributed males 164 (51.4%) and females 155 (48.6%), with an age range of 1 to 23 months and a mean age of 10.7+6.6 months; more than half of the children were delivered in a government hospital 170 (53.3%) and very few of the deliveries 5 (1.6%) were taken by traditional birth attendants. In 208 (65.2%) of respondents, the index child was the only child under 5 years in the household. Only 6 (1.9%) index children had not received routine vaccines commensurate with age. (Table 2).

Overall knowledge of routine and optional vaccines

Most (86.8%) of the respondents had good knowledge of the routine vaccines to be given to children with regards to which vaccines were on the NPI, and when they were to be administered. With regards to the optional vaccines, more than half of the respondents (60.2%) had good knowledge of the optional vaccines. (Figure 1).

Uptake of routine and optional vaccines

Three hundred and thirteen index children under two years had received routine vaccines of which almost all of them got the BCG vaccine (98.1%).

The measles and yellow fever vaccines were the least received of the routine vaccines, 54.5% and 53.3% respectively. In addition to the routine vaccines, 56 (17.6%) index children also received some optional vaccines. The optional vaccines most received were PCV1-3 (16.0%, 14.4% and 13.5% respectively), Rota 1 and 2 (16.6% and 15.4% respectively), Chicken pox (9.4%) and MMR (4.4%)). (Figure 2).

Association between socio-demographic characteristics and vaccination uptake

For the routine vaccine, there was a significant association between child's place of delivery (χ^2=46.158, P=0.0000) and uptake of routine vaccines. Children delivered in government and private hospitals got routine vaccines more than those delivered in TBAs and other places. There was also a significant association between caregiver's education (χ^2=15.991,p=0.003), and knowledge of the routine vaccines (χ^2= p<0.01) and uptake of routine vaccines. Factors significantly associated with the uptake of optional vaccines were the age of respondents (χ^2=10.916,p=0.027), place of birth (χ^2=49.696,p<0.01), caregiver's education (χ^2=45.038,p<0.01), caregiver's occupation ((χ^2=49.102p<0.01), average monthly income (χ^2=72.662, p<0.01)), and knowledge of optional vaccines(χ^2= p<0.01). Children of mothers who were between ages 31 and 40 years and being delivered in private hospital were associated positively with receiving optional vaccines. Children of parents with higher levels of education, professionals and higher average monthly income received the optional vaccines more than their counterparts. (Table 3)

DISCUSSION

The results of this study indicate that child and caregiver-level characteristics are important in explaining the differences in vaccination status regarding routine and optional vaccines. Most of the respondents had good knowledge of both the routine and optional vaccine. This contrasts with the findings of a study done in Nigeria where 66.5%[16] and 79.1%[10] of the respondents had poor knowledge of routine and non-routine immunization respectively.[16] However, a higher level knowledge of optional vaccine (55.1%) was reported among Romanian parents.[17] The poor level of knowledge in the Nigerian studies was attributed to the fact that educational messages delivered by the clinic's health workers may not provide the caregivers with the necessary depth of knowledge regarding various diseases and vaccines.[16] Majority of the index children at the time of this study had received the full vaccination according to age, similar to a report from South-South Nigeria where 80.7% were fully vaccinated for age.[18]

In this study, few of the children had received the optional vaccines and this is comparable to findings from a study done in Oyo State, South West Nigeria[10] but this differs from a report in Romania where 76.0% of the children had received at least one optional vaccine. The low uptake of optional vaccines observed in this study may lead to immunity gaps, potentially causing the emergence, resurgence, and widespread outbreaks of vaccine-preventable diseases due to an increased number of unvaccinated children.[2] Various studies in Nigeria[10,18,19,20] and other countries,[14,17,19,21]found that higher immunization uptake was associated with maternal and paternal education, and higher wealth index.

The association between maternal education and uptake of vaccines could be due to the success of Nigeria's strategy and actions for female empowerment and quality education.[10] This finding is also supported by a result of an analysis done in Nigeria which showed that increase in the chances of incomplete immunization was due to limited financial resources and thus, poor health-seeking behavior.[8]

Additionally, other factors noted in this study to be significantly associated with uptake of vaccines include the caregiver's age (31-50 years), and good knowledge of the vaccines.A study in Ethiopia also noted that mothers who were 40 years and above were more likely than other age groups to complete their child's immunuzation.[22] This may be attributed to the fact that older women often have more experience and are more likely to have frequented health facilities compared to younger caregivers. Consequently, they may have had greater exposure to information regarding the significance of childhood immunization. The finding of knowledge of vaccines being a factor that influence childhood vaccine uptake is consistent with other studies done in Northern Nigeria[23] and other African countries.[22 ,24,25]The reason for this finding may be that caregivers will be better able to make informed or positive decisions about their children's health if they are knowledgeable about childhood immunization.

In this study, birth in a hospital (both private and government hospitals) were significantly associated with uptake of optional and routine vaccines. This corroborates withfindings from similar studies that reported that birth in a health facility was associated with uptake childhood vaccine uptake.[18, 19,26]

This could be linked to the presence of healthcare workers at the health facilities who are trained to offer health promotion services such as raising awareness on childhood immunization through health education. Also, this might be explained by the presence of skilled birth attendant (SBA) at the health facilities.[27,28] Through these SBAs, mothers are able to understand the importance of ensuring their children are fully immunized, as well as motivate them to take action in order to achieve this goal. [18,28] Additionally, when women give birth in a health facility, they are afforded the opportunity to have their newborns vaccinated right away and receive essential information about upcoming immunization schedules.[8]

CONCLUSION

Majority of the respondents had good knowledge of routine and optional vaccine. Some socio-demographic factors found to be associated with uptake of both routine and optional vaccines were knowledge, education of caregivers and place of delivery. These findings underscore the importance of educational campaigns to improve knowledge about vaccines, especially among caregivers with lower education levels. The finding emphasizes the importance of promoting hospital deliveries and discouraging home births or traditional birth attendants. Additionally, efforts to make vaccines, both routine and optional, more accessible and affordable to all socioeconomic groups should be a priority.

LIMITATION

This study was conducted exclusively in one Local Government Area (LGA) within Lagos state, potentially limiting its representativeness for caregivers in the broader context of the state and the entire country. Consequently, the generalizability of the results may be limited.

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TABLES AND FIGURES

Table 1: Socio-demographic characteristics of the respondents

Variables	Frequency	Percentage (%)
Age of respondents (years)		
≤20	8	2.5
21-30	167	52.4
31-40	126	39.5
41-50	14	4.4
51-60	4	1.3
Marital Status		
Single	11	3.4
Married	293	91.8
Separated, Divorced & Widowed	15	4.7
Education		
None	8	2.5
Primary	28	8.8
Secondary	104	32.6
Post-secondary	167	52.4
Vocational	12	3.8
Spouses' education(N=293)		
None	2	0.7
Primary	15	5.1
Secondary	66	22.5
Post-secondary	175	59.7
Vocational	35	11.9
Average monthly income		
≤N20,000 (<$1.90/day)	67	21.0
N20,001-50,000 ($1.90-$3.80/day)	95	29.8
>N50,000 (>$3.80/day)	157	49.3
Occupation		
Professionals	70	21.9
Skilled	19	6.0
Semi- skilled	79	24.8
Unskilled	76	23.8
Unemployed	75	23.5
Spouses' Occupation (N= 293)		
Professionals	118	40.3
Skilled	25	8.5
Semi- skilled	76	25.9
Unskilled	71	24.2
Unemployed	3	1.0

Table 1: Characteristics of the index child

Variables	Frequency	Percentage (%)
Age of child (months)		
≤ 6	103	32.3
7-12	99	31.0
13-18	68	21.3
19-24	49	15.4
Sex of child		
Male	164	51.4
Female	155	48.6
Place child was delivered		
Government Hospital	170	53.3
Home	4	1.3
TBA	5	1.6
Private Hospital	132	41.4
Others	8	2.5
Number of children < 5 years		
1	208	65.2
2	96	30.1
3	15	4.7

Table 2: Association between socio- demographic characteristics and the uptake of routine and optional vaccines

	Routine vaccines				Optional vaccines			
Variable	**Not received Freq (%)**	**Received Freq (%)**	X^2	**P**	**Not received Freq (%)**	**Received Freq (%)**	X^2	**P**
Age of respondent								
≤20	0(0.0)	8(100.0)	2.063	0.724*	8(100.0)	0(0.0)	10.916	0.027*
21- 30	2(1.2)	165(98.8)			146(87.4)	21(12.6)		
31- 40	4(3.2)	122(96.8)			94(74.6)	32(25.4)		
41- 50	0(0.0)	14(100.0)			11(78.6)	3(21.4)		
51-60	0(0.0)	4(100)			4(100.0)	0(0.0)		
Relationship with the child								
Other caregivers	0(0.0)	14(100.0)	0.633	0.762*	12(85.7)	2(14.3)	0.976	0.541*
Mother	6(2.0)	299(98.0)			251(82.3)	54(17.7)		
Marital status								
Single	0(0.0)	11(100)	0.542	0.762*	9(81.8)	2(18.2)	0.195	0.907*
Married	6(2.0)	287(98.0)			241(82.3)	52(17.7)		
Separated/divorced/widowed	0(0.0)	15(100.0)			13(86.7)	2(13.3)		
Place child was delivered								
Government hospital	2(1.2)	168(98.8)	46.158	0.000*	164(96.5)	6(3.5)	49.696	0.000
Private hospital	0(0.0)	132(100.0)			87(65.9)	45(34.1)		
TBA/home/others	4(23.5)	13(76.5)			12(70.6)	5(29.4)		
Education								
None	0(0.0)	8(100)	15.991	0.003*	8(100)	0(0.0)	45.038	0.000*
Primary	3(10.7)	25(89.3)			27(96.4)	1(3.6)		
Secondary	3(2.9)	101(97.1)			102(98.1)	2(1.9)		
Post-secondary	0(0.0)	167(100)			115(68.9)	52(31.1)		
Vocational	0(0.0)	12(100)			11(91.7)	1(8.3)		
Spouse's education(N=293)								
None	0(0.0)	2(100)	6.655	0.152*	2(100)	0(0.0)	19.201	0.000*
Primary	0(0.0)	15(100)			14(93.3)	1(6.7)		
Secondary	3(4.5)	63(95.5)			63(95.5)	3(4.5)		
Post-secondary	1(0.6)	175(99.4)			130(74.3)	45(25.7)		
Vocational	2(5.7)	33(94.3)			32(91.4)	3(8.6)		
Occupation								

Professional	0(0.0)	70(100)	3.767	0.438*	39(55.7)	31(44.3)	49.102	0.000*
Skilled	0(0.0)	19(100)			15(78.9)	4(21.1)		
Semi-skilled	2(2.5)	77(97.5)			67(84.8)	12(15.2)		
Unskilled	4(3.9)	73(96.1)			72(94.7)	4(5.3)		
Unemployed	1(1.3)	74(98.7)			70(93.3)	5(6.7)		
Spouse's occupation								
Professional	0(0.0)	118(100)	7.178	0.122*	80(67.8)	38(32.2)	38.641	0.000*
Skilled	0(0.0)	25(100)			21(84.0)	4(16.0)		
Semi-skilled	4(5.3)	71(94.7)			69(90.8)	7(9.2)		
Unskilled	2(2.8)	69(97.2)			70(98.6)	1(1.4)		
Unemployed	0(0.0)	3(100)			1(33.3)	2(66.7)		
Average monthly income								
≤20000	2(3.0)	65(97.0)	2.939	0.401*	64(95.5)	3(4.5)	72.662	0.000*
20001- 50000	3(3.2)	92(96.8)			91(95.8)	4(4.2)		
50001- 100000	1(1.3)	78(98.7)			68(86.1)	11(13.9)		
>100000	0(0.0)	78(100)			40(51.3)	38(48.7)		
Knowledge								
Poor	6(14.3)	36(85.7)	34.158	0.000*	120(94.5)	7(5.5)	19.784	0.000
Good	0(0.0)	277(100)			143(74.5)	49(25.5)		

**Fisher's exact P* Other caregivers-father, grandparent, nanny

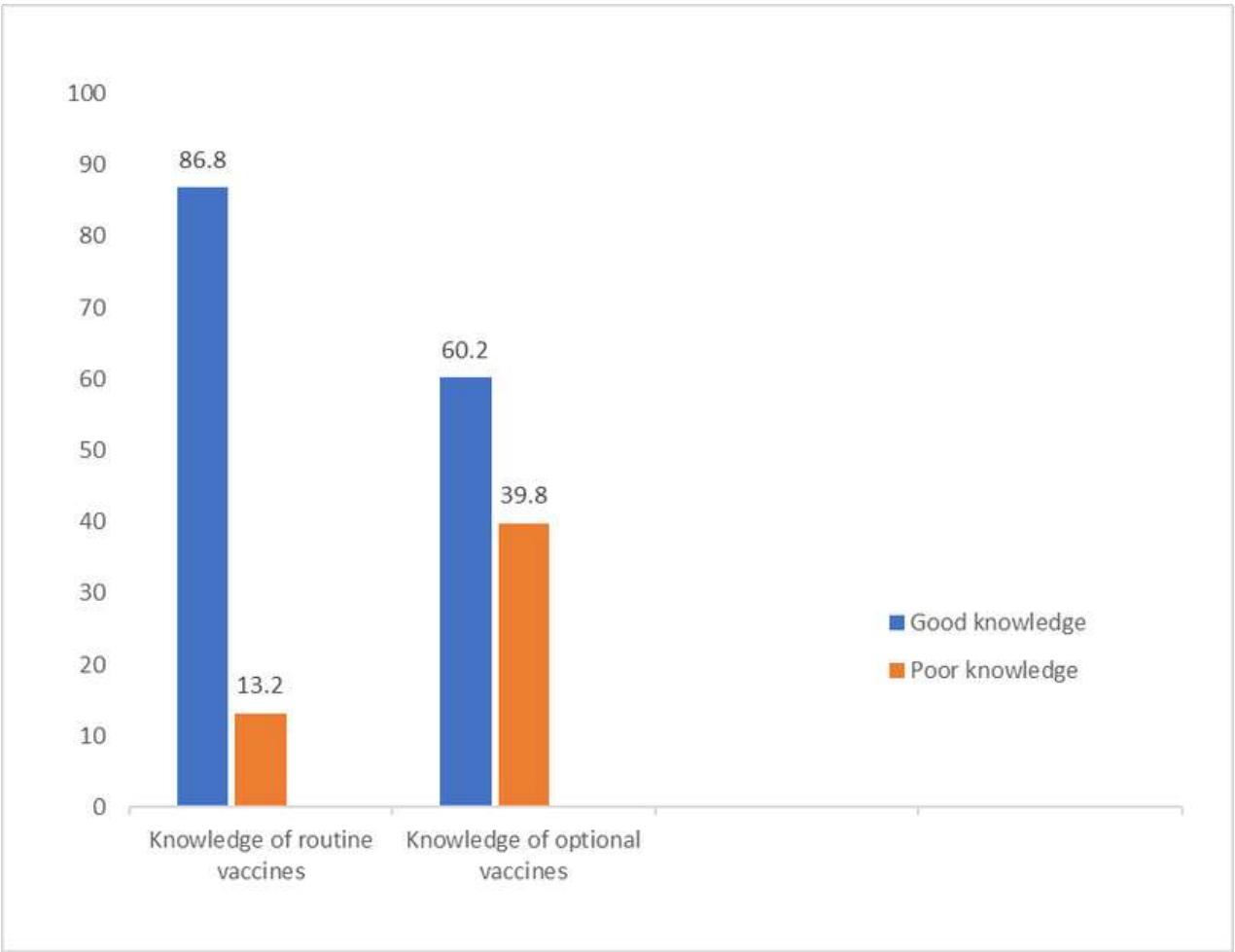

Figure 1: Knowledofte of routine and optional vaccine

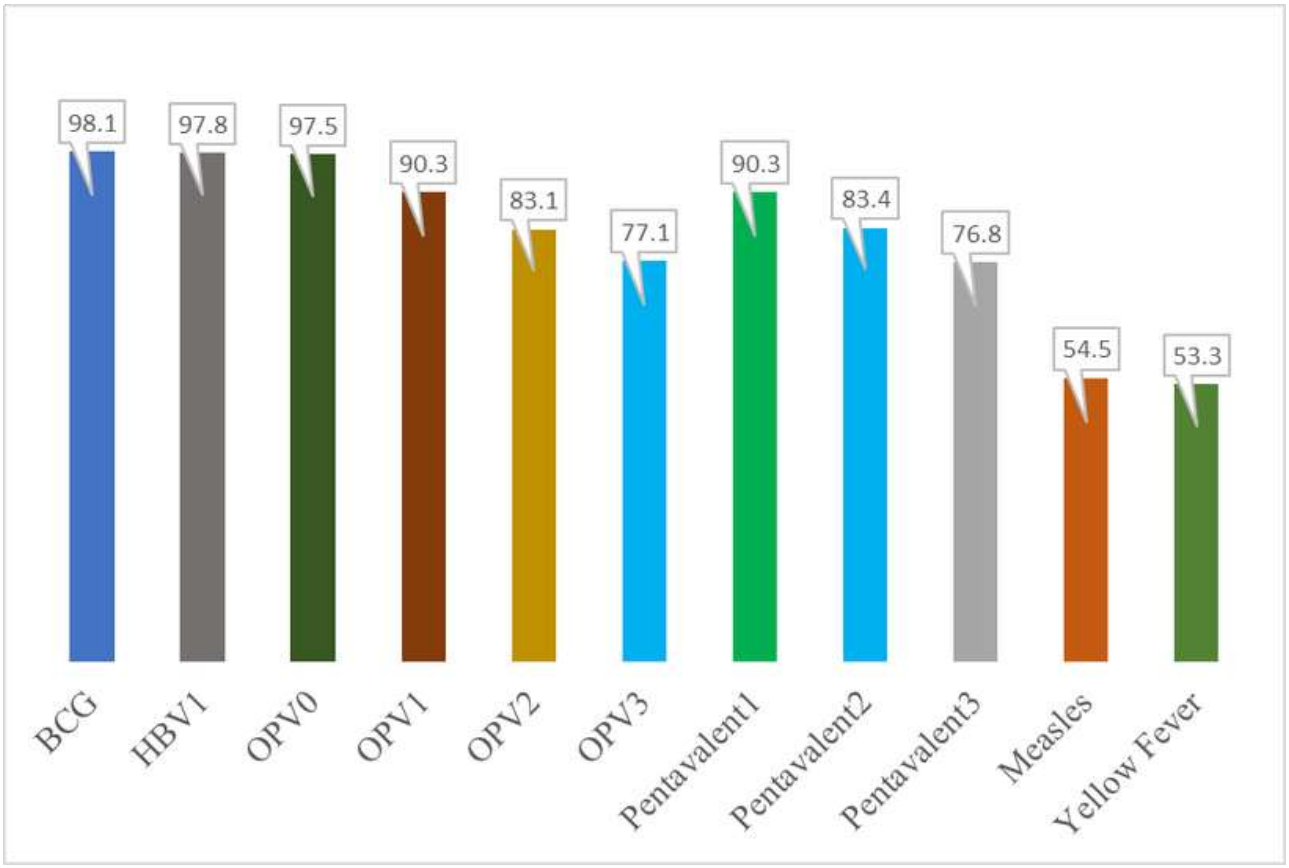

Figure 2: Proportion of index children who received routine vaccines*E*

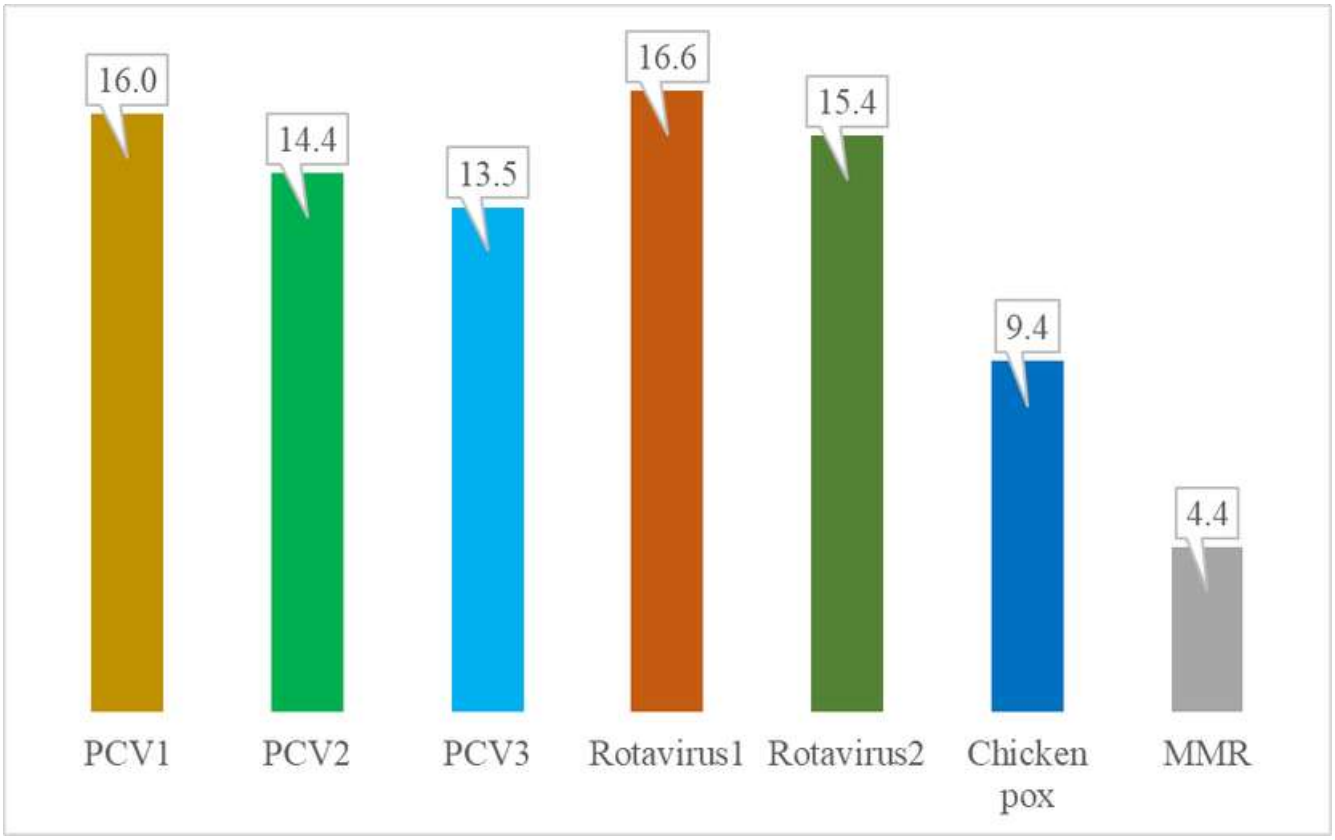

Figure 3: Proportion of index children who received optional vaccines