

Factors influencing low immunization coverage among children between 12 - 23 months in east pokot, baringo country, kenya

Abstract

Immunization is one of the major public health interventions to avoid childhood illnesses and mortality. Without the same, more than five million children would die each year and many more fall ill. In spite of the fact that approximate global routine measles vaccination coverage was 82% in 2007, about 23.2million children remained unvaccinated of which 15.3million (65%) are from eight countries in Africa. The complete immunization coverage in Kenya in 2003 was 57 % and this rose gradually in 2007 to 77%. However, an estimated 35% of new-borns had not been immunized in 2006, translating to 0.5million unvaccinated children in the country. Notwithstanding, very low immunization coverage remains a challenge in some Counties such as East Pokot Baringo County at about 25% and factors influencing low coverage are unknown. A cross sectional population study was undertaken between January 2014 and March 2015 to determine the factors influencing low immunization coverage. Simple random sampling was used to select respondents. Data was collected using pretested structured questionnaires through house to house visits and analyzed using Epi info version 7 statistical software. Prevalence odds ratio was used to establish association of relevant factors with immunization coverage. Statistical significance was defined at $p < 0.05$. Complete immunization coverage was 23%. Coverage for specific vaccines was; BCG (82%), OPV0 (34%), OPV 1(68%), OPV2 (62%), OPV3 (55%), DPTHeP1 (67%), DPTHeP2 (61%), DPTHeP3 (55%), Measles (46%). Predictors of full immunization possibly included number of children within the family, Knowledge of immunization schedule, Literacy level, place of birth of the child, nomadic lifestyle, economic status and the distance to the nearest health facility. Complete immunization coverage is low. Efforts to improve vaccination coverage must take into account the immunization determinants found in this study. There is need to focus on strengthening of awareness strategies, increasing the number of health facilities with Health workers and strengthening integrated outreach services.

Keywords: immunization, factors, expanded programme on immunization, vaccine preventable diseases

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Abbreviations: BCG, bacillus calmete guerin; CI, confidence interval; DHIS, district health information system; DPTHeP1B, diphtheria, pertussis, tetanus, hepatitis, haemophilus influenza type B; DPTHeP1B1, diphtheria, pertussis, tetanus, hepatitis, haemophilus influenza type B dose no 1; DPTHeP1B2, diphtheria, pertussis, tetanus, hepatitis, haemophilus influenza type B dose no 2; DPTHeP1B3, diphtheria, pertussis, tetanus, hepatitis, haemophilus influenza type B dose no 3; DTP, diphtheria tetanus pertussis; DVI, division of vaccines and immunization; EPI, expanded programme on immunization; FIC, fully immunized child; KEPI, kenya expanded programme on immunization; KM, kilometres; MKU, mount kenya university; NACOSTI, national council of science technology and innovation; OPV, oral polio vaccine; OR, odds ratio; PPS, population proportionate to size; SSI, semi structured interview questionnaires; USD, united states of america dollars; UNICEF, united nations international children education fund; WHO, world health organization

Introduction

Immunization is one of the major public health strategies to avoid childhood illnesses and mortality. Without the same, more than five million children would die each year because of diseases that could have otherwise been prevented through vaccination.¹ Regardless of interventions made to boost immunization services, about 27million

children less than one year were not vaccinated globally against measles or tetanus in 2007.² As a result, 2-3million children are dying annually from easily preventable diseases, and many more fall ill.¹ In spite of the fact that approximate global routine measles vaccination coverage was 82% in 2007, about 23.2million children remained unvaccinated of which 15.3million (65%) are from eight countries in Africa.³ In developed countries, where there is proper management of immunization data and adequate reporting of diseases, most vaccine preventable diseases are low, deaths caused by measles complications dropped by 74 % worldwide and by 89 % in sub-Saharan Africa in the year 2000 to 2007.⁴ Worldwide, diphtheria, tetanus pertussis (DTP) coverage rose to about 82 % by the end of 2008.⁵ Polio is about to be eradicated.⁶ All the same, absolute numbers of children less than one year that were not vaccinated are highest in highly populated developing countries.⁷ The Division of Vaccines and immunization (DVI) Expanded Programme on Immunization's (EPI) policy prescribes that children get vaccinated with Bacillus Calmette-Guerin (BCG) and Oral Polio Vaccine (OPV) at birth; three doses of Pentavalent vaccine and OPV at 6, 10 and 14weeks of age; and measles vaccine at 9months of age.⁴ In Kenyain 2009 fully immunized child (FIC) coverage for children aged 12-23months was 86%. Nevertheless, this coverage varies from 48.3% in North eastern region to 85.8% in central. This regional difference in coverage shows the dissimilarities in the influence of determinants

of full immunization in different regions of the country.⁸ other studies have indicated that the age of the parent, marital status, low level of education and poor knowledge about immunization are significantly associated with non- completion of the immunization schedule by children less than five years.⁹ Other factors include lack of family support, inadequate ante natal care utilization, financial constraints and single motherhood among socio-economically disadvantaged children in the United States.¹⁰ The study was therefore necessary to identify the factors that influence Low immunization coverage among children 12-23months of age in East Pokot and to generate data so as to propose recommendations for interventions in order to improve immunization coverage in East pokot and other areas in Kenya experiencing low immunization coverage.

Materials and method

Study site

East Pokot Sub-County (Figure 1) is situated in Baringo County, Kenya. It covers a total of 4,233Km² of which 905Km² is arable land and the rest arid land. The predominant people inhabiting the sub county are the Pokots who are pastoralists. The population settlement pattern is scattered, away from main roads or trading centers, a condition fostered by a history of raids and conflict with the law enforcement agency. The sub County has an estimated population of 142,951 people and 30,885 households.¹¹



Figure 1 Map of East Pokot.

Immunization coverage has been low over the years in East Pokot, attaining coverage of 24.5% for fully immunized children (FIC) in 2012.¹¹ The choice of East Pokot as a study site has been influenced by the continued low immunization coverage and no study has been conducted in the area to determine the factors contributing to this low coverage. The study, therefore desired to determine the factors that contribute to low immunization coverage among children 12-23months of age in East pokot and to generate data so as to provide recommendations to improve immunization coverage.

Study design

A population-based cross-sectional study was done in which Two hundred and ninety eight (298) mothers/guardians within the targeted areas with children aged between 12 - 23months were picked randomly, visited and interviewed. Households with no suitable person to be interviewed at the time of the visit and without a child of age 12-23months were excluded. The study employed a multi-stage and simple random sampling method. First, four out of five divisions were randomly picked namely; Churo, Tangulbei, Mond and Kolowa.

Then, eight locations from the four divisions were also randomly picked. Finally, a list of all sub-locations (enumeration areas) and their population projection as per census 2009 were compiled. Population Proportionate to size (PPS) procedure was used to select the number of households that were interviewed in each sub location. Structured questionnaire was used to collect data from mothers/guardians.

Information collected included the socio-demographic information, vaccination status of the children and factors influencing low immunization coverage in the area. Child Health cards were examined to assist in the judgement of the vaccination status of the children. In case of unavailability of the child health cards, mothers/ caretakers of the individual children were requested to recall the immunization history of their children.

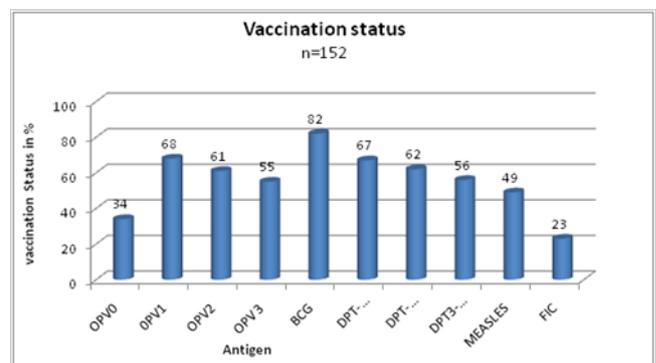


Figure 2 Immunization status among the children.

Ethical approval

Ethical clearance was obtained from Mt Kenya University and Egerton University Division of Research & Extension Research ethics Committee and research permit was obtained from National Council for Science Technology and Innovation (NACOSTI). Informed consent was obtained before informants were interviewed. All questionnaires administered to individual household heads were treated confidential although they were assigned numbers.

Data analysis

Data was coded, entered and analyzed using Epi info version 7 statistical software. Prevalence Odds Ratio (OR) and corresponding 95% Confidence Interval (CI) were used to estimate the strength of association between the predictors of full immunization and immunization coverage. Factors identified that possibly could significantly be associated with “Immunization coverage” at bivariate analysis was evaluated together in a Multivariate analysis (Table 1). This was performed using binomial logistic regression.

Reported p-values were at 95% confidence intervals (CI). Statistical significance differences were defined at p0.05.

Results

Socio demographic information of the study participants

Majority 164 (56.23%) of those interviewed were aged 24 - 33years, overall the age distribution was widespread with a mean of 29.29 and a standard deviation of 7.14 (Table 2). Minimum age was 16years and maximum was 69years. Females formed the majority (95.64%). 57% of the participants interviewed were uneducated, while 35% had attained primary level of education, 5% secondary

level and only 3% had tertiary level of education. On occupation of the respondents; Majority 214 (72%) were housewives, 14% were pastoralists, 6% were employed 5% were students, while only 3% were farmers. 79%(169) of the housewives had their children not vaccinated and 76% (32) of the pastoralists had their children not vaccinated while 50% of those formally employed had their children vaccinated. However, there is no association between employment, religion, age and marital status with fully immunized child. Majority (92%) were married.

Table 1 Multivariate logistic regression analysis for factors influencing low immunization status in East Pokot Baringo County

Factors Associated with Low Immunization Coverage	OR	95% C.I	P-Value
Level of Education	3.55	(1.49 - 8.47)	0.0049
Knowledge of Importance of Immunization	0.89	(0.34 - 2.29)	0.7336
Knowledge on Immunization Schedule	9.04	(1.37 - 7.87)	0
Nomadic Lifestyle	11.06	(4.29-28.54)	0
Family Income	2.71	(0.90 - 8.12)	0.0037
No. of Livestock Owned	1.04	(0.40 - 2.68)	0.0014
No. Of Siblings	1.61	(0.49 - 5.27)	0.0022
Distance to the nearest Health Facility	18.24	(5.56- 59.80)	0
Area of Residence -Rural/ Urban	12.3	(4.77 - 31.73)	0
Place of Birth	4.5	(1.7 - 11.61)	7.2E-07

Majority (55.7%) of the children enrolled in the study were between the ages of 18 - 23months old with the mean of 17.8months and standard deviation of 3.5 Minimum age was 12months while maximum was 23months. Those who were aged between 12-18months were 44.3%, Male children formed the majority (50.68%) (Table 2).

Table 2 Socio-demographic information of the study population

Variables	n=298	%	95% CI Lower	95% CI Upper
Age of Respondent Years				
<23	61	18.50%	14.10%	23.60%
24-33	164	56.20%	50.20%	62.10%
34-43	65	22.40%	17.70%	27.80%
44-53	8	1.80%	0.60%	4.10%
54+	3	1.10%	0.20%	3.10%
Gender of Respondents				
Female	285	95.60%	92.70%	97.70%
Male	13	4.40%	2.30%	7.30%
Age of Child in Months				
12 - 17	132	44.30%	28.20%	65.70%
18 - 23	166	55.70%	37.60%	78.80%
Sex of Child				
Female	145	49.30%	43.47%	55.20%
Male	149	50.60%	44.81%	56.50%
Place of Birth of Child				
Home	243	81.50%	76.66%	85.80%
Hospital	55	18.50%	14.22%	23.30%
Occupation of Respondents				
Farmer	10	3%	2%	6%
Formal Employment	20	6%	3%	6%
Housewife	214	72%	66%	77%

Table Continued...

Variables	n=298	%	95% CI Lower	95% CI Upper
Age of Respondent Years				
Pastoralism	40	14%	7%	15%
Pupil/student	14	5%	3%	8%
Level of Education of Respondents				
College	9	3.00%	1.40%	5.70%
None	171	57.40%	51.60%	63.01%
Primary	104	34.90%	29.50%	40.61%
Secondary	14	4.70%	2.60%	7.80%

Immunization coverage in east pokot

Data on childhood immunization was derived from 152 (51.18%) children between 12 - 23months, whom had vaccination cards. The results (Figure 2) show that 69 (23%) of the children were fully immunized. East Pokot immunization coverage by vaccine (card + History) was as follows: opv0 34%; BCG 82 % (C.I 77.17 - 86.24%); DPTHePHIB1/OPV1 - 67%/68%; DPTHePHIB3 56%; OPV3 55%; measles 49% and FIC 23% (C.I 17.99 - 27.83%). The drop-out rate from DPTHePHIB1-DPTHePHIB3 (card + history) was 16 % and 31% for DPTHePHIB1- measles. Access to and Utilization of immunization services in East Pokot could be low at 67%and 56% respectively. The lowest immunization coverage was recorded for FIC (23%) while BCG was the highest.

Factors influencing low immunization coverage

Factors influencing low immunization coverage in East Pokot were identified in the study as; number of children within the family (p=0.002-2, OR=1.61.), Place where the child was born (p=0.0000 OR=4.55), literacy level (p= 0.0049, OR=3.55), Knowledge on the immunization schedule (p= 0.0000, OR= 9.04), nomadic lifestyle (p= 0.0000 OR = 11.06). Family income (p= 0.0037, OR= 2.71), Distance to the nearest health facility (p=0.000, OR = 18.24), and area of residence urban/rural (p=0.0000, OR = 12. (Table 2).

Discussion

The findings of this study indicated that immunization coverage in East Pokot could be 23%.This coverage is very low compared to the Kenya national coverage for full immunization which is 77%.¹¹ The findings are similar to a coverage of 25.8% immunization coverage of Somaliland¹¹ The high dropout rates could be indicative of poor performance and DPTHePHIB1 vaccination coverage of 67% could also indicate low access to immunization services. The lowest coverage for individual vaccine was that of OPV0 which stood at 34%. Followed by measles which stood at 46.5%. The study shows that slightly higher vaccination rates for vaccines that are given between six weeks and fourteen weeks after birth at between 55% and 82% compared to coverage for measles given at nine months about three months after the first set was poor with only 46% of the children receiving the vaccine. This difference in coverage between these two sets of vaccines has also been documented in other studies in developing countries¹²⁻¹⁴ with exception OPV0 and may be due to the long interval between them andOPV0 is given too early within two weeks from date of birth.

Large proportion of the respondents was aware of the importance of immunization. The high level of awareness may be associated with the Advocacy, communication, social mobilization and health promotion activities that are on-going for polio eradication initiative. However, most respondents lacked knowledge on immunization schedule. This finding of this study is similar with the findings of

another study carried out in Ambo-Woreda, Central Ethiopia.³ The findings of this study also indicate that a child born to a mother who lacks knowledge on immunization schedule was 9 times more likely not to receive full immunization compared to the one born to a mother with knowledge on immunization schedule. Studies done earlier have indicated a significant relationship between immunization coverage and knowledge of immunization schedule.¹¹

Socio-cultural factors may have impacted negatively in immunization coverage. Of significance is Nomadic lifestyle that was mentioned as an obstacle to Immunization. The mothers may be willing to have their children immunized but may not be within reach of any health facility during that particular period of time when they may be on the move and the outreach services are rare. The study reveals that a child born to a family that practices nomadic lifestyle are 11 more times likely not to have their child fully vaccinated. With over 80% of children delivered at home having not received full immunization, the place of birth was found to be one of the factors that influence full immunization. The results indicate that a child delivered in a health facility was 5 times more likely to receive full immunization compared to one delivered at home. Other studies have also found similar relationships between the place of birth of the child and immunization status.⁴

With majority of the respondents having monthly income of less than ksh 5000 (55 USD) per month economic factor could be one of the predictors for full immunization. This study revealed that a child born to a family that earns less than ksh 5000 per month is 3 (three) times more likely not to be fully immunized compared to one born to a family who earns more. Other investigators have also found similar associations between level of income and full immunization.^{12,15}

Distance to health facilities, was associated with non-completion of the recommended vaccination series. The study found out that those in close proximity to the health facility are 18 times more likely to have their children fully vaccinated than those who walk for more than an hour. This finding is consistent with the findings of previous studies that have associated distance to the nearest service delivery point with full immunization.^{4,16}

One other predictor of full immunization could be the number of siblings per household. The study found out that there is significant association between the family size and full immunization. Mothers with more than four children are two times more likely not to have their children fully immunized compared to those with less than 3. Children from large families have been found to have low vaccine uptake by several investigators.¹² This has been interpreted as reflecting the practical difficulty and expense of having other children at home in taking up the immunisation services.

Vaccination status was established using information from immunization cards thereby ensuring the accuracy of information. This eliminates the memory bias that occurs as a result of unavailability of vaccination cards and researchers have to rely on the mother's report.

Conclusion

Immunization status in East Pokot is Low (23%). Low literacy level, Nomadic lifestyle, lack of knowledge on the immunization schedule, Low economic status and long distances to the health facilities are the major factors that hinder immunization. There is a strong association between low level of education (illiteracy) and none immunization of children. Community's awareness on the importance of immunization in prevention of killer diseases is high, but distance, place where the child was born, nomadic lifestyle, economic status, lack of knowledge on immunization schedule and number of children in a household

hinder them from accessing and utilizing immunization services. There is need to increase the number of health facilities with Health workers, strengthening integrated outreach services as a temporary measure, create awareness on the relevance of second and third doses of DPT and polio vaccines and the need of delivering at health facilities as this is associated with higher likelihood of childhood immunization, especially for vaccinations administered at birth.

Authors' contributions

All Authors participated in, design data collection, data analysis and interpretation and writing as well as drafting and approval of manuscript.

Corresponding Author provided finances.

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Conflicts of interest

Author declares there are no conflicts of interest.

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