

**CARETAKERS' AND HEALTH WORKERS'
CHARACTERISTICS INFLUENCING CHILDHOOD
FULL IMMUNIZATION IN EMBAKASI AND
KIBERA SLUM SETTLEMENTS OF NAIROBI.**

**A Dissertation in partial fulfillment for the award of the degree of
Master of Medicine (Pediatrics) in the Department of Pediatrics and
Child Health, College of Health Sciences, University of Nairobi.**

Dr. Janet Munyasa Isigi.

October, 2010.

Declaration

This dissertation is my original work and has not been presented for the award of a degree in any other university.

Signed..... Date

Dr Janet Munyasa Isigi

MBChB. University of Nairobi.

This dissertation has been presented with our full approval as the supervisors.

SignedDate

Prof. Wasunna A.O.

MBChB; M.Med (Paed); Neonatal Fell (UK)

Ass. Professor, Department of Pediatrics and Child Health, University of Nairobi.

SignedDate

Dr. Daniel Njai

MD; Diploma in pediatrics (Italy)

Lecturer, department of Pediatrics and Child Health, University of Nairobi.

Dedication

To all the children of our beautiful country Kenya and the World at large.

and

To my dear husband and two daughters (Peshy and Gloria) who prayed and supported me throughout the period of the study.

Acknowledgements

1. To the World Health Organization (WHO) Kenya country office for extending financial support to facilitate the study.
2. To my supervisors Prof. Wasunna .A. and Dr. Njai Daniel for taking the time they took to provide the much needed advice and guidance throughout the study and for their patience.
3. To the final year medical students who voluntarily agreed to take part in the study to collect the data.
4. To the Provincial Medical Officer of Health, Nairobi for granting permission for the study to be carried out in the two areas.
5. The Division of Vaccines and Immunization for providing information on current state of immunization in the country.
6. To the mothers, caretakers and health workers in Embakasi and Kibera who provided information to make this study a success.
7. To Kenneth Mutai who assisted with the statistical analysis of the data.
8. To my husband Livingstone and daughters Peshy and Gloria for their perseverance and support through the long and tiring working schedule and for the conducive home environment during the study period.

Contents

Declaration.....	ii
Dedication.....	iii
Acknowledgements.....	iv
List of figures.....	vi
List of Tables.....	vi
Abbreviations.....	vii
Definitions.....	viii
Abstract.....	ix
1.0 Introduction.....	1
1.1 Literature Review.....	2
1.2 Study justification.....	6
1.3 Objectives.....	7
1.3.1 Broad Objective	7
1.3.2 Specific Objectives	7
2.0 Methodology.....	8
2.1 Study Design.....	8
2.2 Study area.....	8
2.3 Sample Size Calculation.....	8
2.4 Study Population.....	9
2.5 Inclusion and exclusion criteria.....	9
2.6 Sampling Technique.....	9
2.7 Survey Instruments and Data Collection.....	10
2.9 Quality Control during Data Collection.....	13
2.10 Study period.....	13
2.11 Ethical Considerations.....	13
3.1 Qualitative arm (Focus group discussion's).....	15
3.2 Quantitative Arm (immunization cluster survey).....	15
4.2 Results of the Qualitative Research.....	28
5.0 Discussion.....	30
5.1 Study Limitations.....	33
6.0 Conclusion.....	33
7.0 Recommendations.....	34
APPENDIXES.....	35
Appendix I: Information for the interviewer.....	35
Appendix II: CONSENT FORM.....	36
Appendix III: Household survey questionnaire.....	38
Appendix IV: HEALTH WORKER SURVEY QUESTIONNAIRE.....	42
References.....	45

List of figures

Figure 1: Percentage of Death from Vaccine-Preventable Diseases (VPDs) among children aged < 5 years.	2
Figure 2: Health facility type	25
Figure 3: Health worker /Staff cadre	26

List of Tables

Table 1: Immunization coverage in Nairobi province for the years 2006/2007.	5
Table 2: General description of the study population.....	17
Table 3: Socio-demographic characteristics of the caretakers and distribution by site	18
Table 4: Full Immunization coverage by site	21
Table 5: Factors associated with full immunization in Embakasi	22
Table 6: Factors associated with full immunization in Kibera	23
Table 8: Multivariate analysis – Embakasi	24
Table 9: Multivariate analysis – Kibera.....	24
Table 7: Health facility and health worker related factors.....	27

Abbreviations

AEFI	Adverse Events Following Immunization
BCG	Bacille Calmette Guerin
DVI	Division of Vaccines and Immunization
EPI	Expanded Program on Immunization
FGDs	Focus Group Discussions
GAVI	Global Alliance for Vaccines and Immunization
GIVS	Global Immunization Vision and Strategy
KDHS	Kenya Demographic and Health Survey
KNH	Kenyatta National Hospital
PDA	Personal Digital Assistant
RED	Reach Every District
SES	Socioeconomic Status
UNICEF	United Nations Children’s Fund
VPDs	Vaccine Preventable Diseases
WHO	World Health Organization
OPV	Oral Polio vaccine
GoK	Government of Kenya
NGO	Non Governmental Organization
BSN	Bachelor of science in Nursing
ECN	Enrolled Community Nurse
RCN	Registered Community Nurse
RCO	Registered Clinical Officer

Definitions

Household - A group of people who live and eat together and are thus likely to be similarly influenced in the way they take care of their children.

Primary caretaker – The person who is responsible for the child including physically taking the child to the health facilities for immunization.

Immunization coverage – proportion of the individuals in the target population who are fully immunized.

Missed opportunity – a missed chance of immunizing children who have come into contact with a healthcare worker at a time when they were due for a particular vaccine.

Immunization– administration of a vaccine or antigen to a non immune individual to stimulate an immune response that's protective.

Abstract

Background: The city of Nairobi exemplifies rapid urbanization amidst deteriorating economic and health conditions which is also characteristic of most cities in the developing world. While a lot of studies have been done around the world and in Kenya to determine factors affecting immunization coverage in different slum settlements in urban areas, very little information is available on why some slum settlements have high immunization coverage while others have low coverage rates. Embakasi division of Nairobi has recorded good immunization coverage (>97%) in the years 2006 and 2007. Kibera division on the other hand has had dismal performance with reported coverage of 58% and 56% in 2006 and 2007 respectively. Most of the population in the two divisions resides in slum settlements and the factors contributing to the difference in immunization coverage are not known. The main purpose of this survey was to try and find out some of the factors that have contributed to the difference in the uptake of immunization in the two divisions.

Objective: The main objective of this study was to describe the factors contributing to the large difference in immunization coverage between Embakasi and Kibera divisions of Nairobi.

Methodology: The study was a cross sectional descriptive survey that utilized both the qualitative (Focus group discussions) and quantitative methods of data collection. For the quantitative part, a structured questionnaire was used to obtain data about caretakers socio-demographic characteristics and childs' immunization status as verified by card.

Data analysis: The data collected was analyzed using SPSS version 17.0 software. A chi-square test was utilized to test for associations. A p-value of less than 0.05 was considered statistically significant. A summary of the Focus Group Discussion (FDG) results was done.

Results: A total of 1205 caregivers were enrolled in the study and majority of them(95.2%) were mothers. The level of education was higher in Embakasi compared to

Kibera OR (Odds Ratio) 26, p-value <0.001. Higher education and employment were associated with higher immunization. Unemployment was lower in Embakasi as opposed to Kibera OR 0.2, P value<0.001. Full immunization coverage was 92.4% in Embakasi and 70% in Kibera. Children in Embakasi were 3.2 times more likely to be immunized than Kibera OR 3.2 p-value of 0.003.

Conclusion and Recommendation: There is a slight improvement in immunization coverage in Kibera although it has not yet reached the desired coverage of 90% nationally. Strategies to improve the uptake of immunization services in Kibera should target improving the literacy levels and employment in area. A further study to correlate the finding of improved immunization coverage in Kibera may be required in the near future.

1.0 Introduction

Immunization remains a key public health intervention and a cost effective Strategy in preventing or reducing many childhood illnesses and hence reducing morbidity and mortality associated with these illnesses. It is through vaccination that some diseases like small pox have been eradicated from the globe and some like polio have either been prevented or eliminated in some regions. Despite this, vaccine preventable diseases (VPDs) still contribute significantly to childhood morbidity and mortality with an estimated 2.5 million deaths per year among children aged less than five years.¹

The uptake of vaccination services is dependent not only on provision of these services but also on the knowledge, attitude and practice of mothers or caretakers, healthcare workers and accessibility to vaccination clinics.

In Kenya, the Division of Vaccines and Immunization (DVI) has been at the forefront in promoting and improving provision of immunization services to all eligible children.

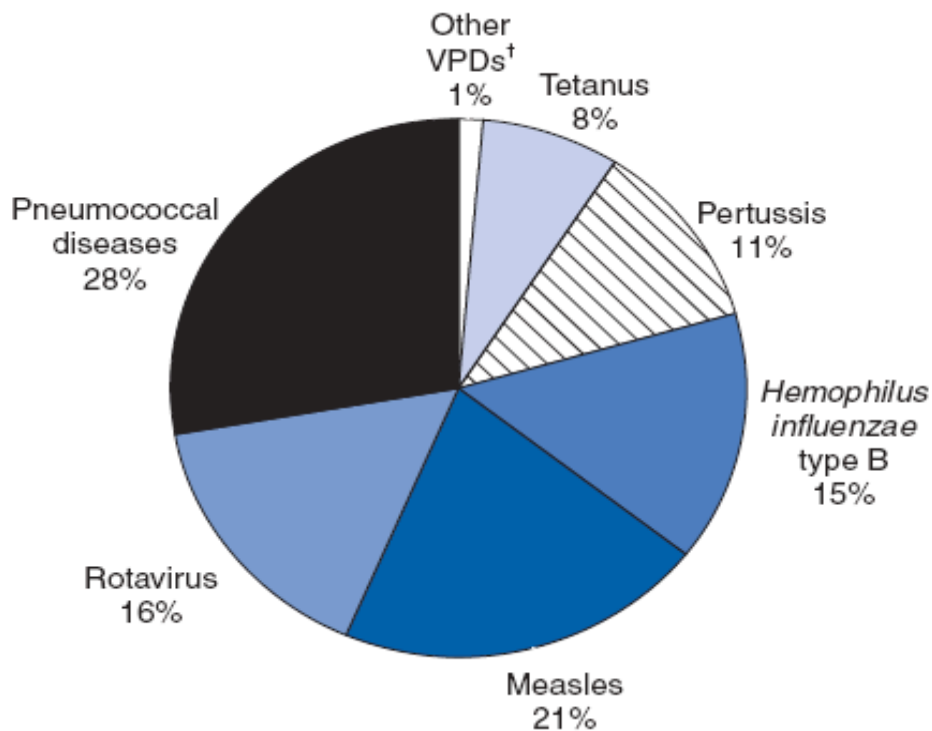
Immunization is also key to achieving the 4th United Nations Millenium Development Goal (MDG) which aims at reducing child mortality rate by 2/3 from the 1990 rate of 12.7 million deaths per year, by the year 2015.²

Despite immunization being free to all children in government owned health facilities in Kenya, not all children are fully immunized.

1.1 Literature Review

Since the advent of vaccination in the 19th century, tremendous progress has been made towards improving the coverage rates among populations globally. The EPI program was established in 1974, and has made remarkable achievements. In the pre-EPI era, less than 5% of all children in the developing countries were reached with essential vaccines; however by the year 2004, over 70% of children in the world were reached with essential vaccines by the age of one year.³ Despite this, there still remains a significant number of deserving children who do not receive the required vaccines. This is best illustrated by the vaccine preventable disease specific deaths pie chart as in figure 1 below.¹

Figure 1: Percentage of Death from Vaccine-Preventable Diseases (VPDs) among children aged < 5 years.



The above chart clearly illustrates that by just giving four of the vaccines namely, Pneumococcal, Haemophilus influenza, measles and Rota vaccines, 80% of the deaths would have been averted.

Currently, the WHO recommends at least five visits to immunization clinics and to be fully immunized a child must receive the following vaccines: BCG, 4 doses of oral polio vaccine (OPV₀, OPV₁, OPV₂ and OPV₃), 3 doses of Pentavalent vaccine containing five antigens (pertussis, diphtheria, tetanus, hepatitis B and Haemophilus influenza type b) and the measles vaccine by the age of nine months.⁴

In the year 2006, UNICEF laid emphasis and focus on excluded and invisible children who include children from poor countries, those discriminated against due to ethnicity and HIV status; and those from areas of conflict.⁵ They too need to be reached and vaccinated. Since 1960's, Nairobi's population has increased tenfold from 350,000 in 1962 to over 3 million today. Over half of the population lives in slum communities which occupy only 5% of the residential land area of the city. Majority of them live on less than one dollar a day and are faced with a myriad of problems like health, social and economic problems, unemployment, housing, water shortage and sewage disposal. These make them more vulnerable to many ailments including vaccine preventable diseases.⁶ Reaching these children with the required vaccines still remains a challenge for health care workers.

In the year 2005, in order to address the challenges facing the immunization system and as part of the long term commitment to vaccination service provision, the World Health Assembly adopted the Global Immunization Vision Strategy (GIVS) framework for 2006-2015.² The primary aims of the GIVS strategy include: to immunize more people against more diseases, to introduce a range of newly available vaccines and technology and to provide critical health interventions (such as micronutrient supplementation, iron supplementation and insecticide treated nets to fight malaria) along with immunization.

The World Health Organization (WHO) together with other global bodies in partnership with member states have set out strategies to help increase the number of deserving children who get immunized. The Global Alliance for Vaccines and Immunization (GAVI) in the year 2003 set out targets of reaching at least 90% routine immunization coverage nationally and 80% coverage in every district (90/80 GOAL) by the year 2015.

To achieve this, the “Reaching Every District” (RED) strategy was adapted. The RED strategy is aimed at improving the organization of immunization services so as to guarantee sustainable and equitable immunization for every child. The RED strategy has five components that include establishment of regular outreach vaccination for underserved communities, supportive supervision and onsite training of healthcare workers, establishing links between the community and service through regular meetings, monitoring for action and better planning and management of human and financial resources. Through the implementation of the RED strategy, achieving the 90/80 GOAL and the fourth MDG could be a reality.^{2, 7, 8}

In Kenya, the immunization coverage has dropped since 1993. According to data by the Kenya Demographic and Health Surveys (KDHS) of 1993, 1998 and 2003, there has been a steady drop in immunization coverage from 78.6% to 65% and to 58% respectively.⁷ The main factors that have been cited as being associated with the low coverage include low socio-economic status, low maternal education, higher birth order and province of residence.^{9,10}

Health provider factors have also been cited including long waiting times, missed or irregular vaccination sessions, false contraindications and cost of accessing immunization services.^{11,12,13}

Bad experience with the immunization system, previous adverse events following immunization (AEFI) and negative attitude of health workers involved in immunization services have also been shown to contribute to low coverage.¹⁴

In 2007, Mrozek Budzyn, in a study in Malopolskie (Poland) on factors contributing to high immunization coverage found out that high level of knowledge among mothers and good health worker and parents’ attitude towards immunization were important and contributed to the high coverage.¹⁵

In a study done in Guinea Bissau in 2000 by Ines Kristensen, immunization was shown to reduce child mortality significantly in the immunized group with mortality remaining high in the non-immunized group.

In 1988/89, a study in an urban area in the same country done by Gutts et al showed a significant correlation between maternal or caretaker knowledge, attitude, education level and practice with starting or completion of immunization schedule.¹⁶

Dr. Owino Okongo, in 2007 in a study done in Mathare valley found out that maternal and caretaker factors like lack of information, lack of motivation, advanced maternal age and missed opportunity contributed significantly to non immunization. Other factors cited included a higher birth order, ethnicity and health worker related reasons like long waiting time.¹⁷

The Division of Vaccines and Immunization (DVI) in conjunction with the Ministry of Health (MoH) collected data on immunization in Nairobi for two years (2006 - 2007). This data was analyzed and the 8 divisions categorized based on immunization coverage and dropout rates as shown in table 1 below:-¹⁸

Table 1: Immunization coverage in Nairobi province for the years 2006/2007.

DIVISION	2006 coverage	2006 category	2007 coverage	2007 category
Embakasi	97%	1	182%	1
Kasarani	99%	2	113%	1
Dagoretti	88%	2	88%	1
Central	64%	3	56%	4
Kibera	58%	2	56%	4
Makadara	72%	4	68%	4
Pumwani	82%	1	70%	2
Westlands	88%	2	75%	2

category 1 - $\geq 80\%$ coverage, drop out of $<10\%$

category 2 - $\geq 80\%$ coverage, drop out of $\geq 10\%$

category 3 - $<80\%$ coverage, drop out of $<10\%$

category 4 - $<80\%$ coverage, drop out of $\geq 10\%$

The above categorization was based on first Pentavalent vaccine and measles uptake versus drop out rates.¹²

Kibera and Embakasi are sprawling slums in Nairobi's western and Eastern districts respectively. Immunization coverage in these areas like in all the other slum areas is likely to be hampered by low SES and low maternal and caretaker knowledge among other factors. From the above data, Embakasi, despite being a slum area continues to record good immunization coverage compared to Kibera whose coverage has been persistently low yet it has the highest number of health facilities including the National teaching and referral hospital.

1.2 Study justification

Immunization services are offered free of charge in government owned health facilities in Kenya. Despite this, immunization coverage reports indicate varied utilization with some slum areas of Nairobi having poor coverage while others report good coverage. Both Embakasi and Kibera are two slum settlements in Nairobi.

The factors contributing to the large difference in immunization coverage between the two slum areas are not well understood. Knowledge of these factors will be useful for improvement of immunization in low coverage areas.

The information will also inform policy makers and guide them in planning for the improvement of immunization coverage.

1.3. Objectives

1.3.1 Broad Objective

To describe the factors associated with the large difference in immunization coverage between Embakasi and Kibera divisions of Nairobi.

1.3.2 Specific Objectives

1. To describe and compare the socio-demographic characteristics of mothers and caretakers in Embakasi and Kibera divisions.
2. To evaluate the influence of the socio-demographic characteristics of mothers and caretakers on full immunization in the two divisions.
3. To determine health worker knowledge and practice regarding immunization in Embakasi and Kibera divisions.

2.0 Methodology

2.1 Study Design

This was a cross sectional descriptive study that utilized the quantitative method of data collection using structured questionnaires and qualitative method through conduction of focus group discussion.

2.2 Study area

The study area consisted of two divisions randomly selected from the high and low immunization coverage areas (Embakasi and Kibera).

Embakasi division is in Nairobi East district. It has an under 5years children population estimated at 21,482. Majority of its population are in slum areas namely Mukuru kwa Njenga, Dandora, Kayole, Soweto, Quarry, Korogocho. It has a total of 12 public health facilities (health centers / dispensaries) plus private clinics & dispensaries.

Kibera on the other hand is located in Nairobi West district and has an under five years children population of 14,166. Majority of its population also reside in the slums. It's served by over 50 public and private health facilities including Mbagathi district hospital and Kenyatta National Teaching and Referral Hospital.

2.3 Sample Size Calculation

The sample size was calculated using the WHO immunization cluster survey formula as below:-¹⁹

$$\begin{aligned} N &= DEFF \times Z\alpha^2 P(1- P) \div d^2 \\ &= 2 \times 1.96^2 \times 0.69(1-0.69) \div 0.05^2 \\ &= 657 \end{aligned}$$

N = minimum sample size, d = precision taken as 5%

DEFF = design effect of 2 because of cluster sampling

Z α = normal standard deviation corresponding to 95% CI.

P= 0.69 (A previous study done by Dr Owino Okongo in Mathare valley found immunization coverage to be 69%).¹⁷

2.4 Study Population

The study population consisted of mothers and caretakers of children aged 12-23 months that had been resident in Embakasi and Kibera for not less than 3 months before period of study and at least one health worker in each health facility visited.

2.5 Inclusion and exclusion criteria

All mothers and caretakers of children aged 12-23 months who gave consent to participate in the study.

Health workers in the health facilities visited who consented to take part in the study.

The following were, however, excluded:

- a. All mothers and caretakers of children aged 12-23months who declined to give consent to participate in the study.
- b. Mothers or caretakers of children aged 12-23months who had resided in the area of study for less than 3 months.
- c. All healthcare workers who declined to give consent to participate in the study.

2.6 Sampling Technique

Multi- stage sampling was employed where the clusters were sampled first followed by the households in the various clusters.

Cluster selection- The random cluster sampling was done as recommended in the WHO immunization cluster survey manual.¹⁸ The area was subdivided into clusters using roads, railways, rivers and other natural landmarks. All the clusters were numbered and a random selection of those to be studied done using the random table of numbers.

House hold selection – Houses were numbered in each cluster and a table of random numbers used to determine the first household visited. The next household to be visited was the house next to the first as determined by time taken on foot to reach it. A total of 30 households in each cluster were surveyed.

Health worker selection- The first health worker to come in contact with the interviewer was the one selected for the interview.

Focus Group Discussion participants selection- Participants in the focus group discussions included mothers or caretakers of children aged between 12-23 months resident in the area for not less than three months and opinion leaders. Local guides helped in identifying eligible mothers or caretakers from the various clusters and at least 30 of them were randomly selected to participate in the FGD.

2.7 Survey Instruments and Data Collection

The study mainly utilized both the quantitative and qualitative methods of data collection.

Quantitative arm of the study

For the quantitative part of the study, an interviewer administered standard questionnaire was used to obtain data from every consenting mother or care giver and health worker. The principal investigator and Study assistants who had undergone a two day training workshop on data collection and use of the PDA collected the data in pairs. Local guides were utilized to take the principal investigator and study assistants around the various households during the household survey. The data was collected using a pre-tested questionnaire from mothers and caretakers of children aged 12-23 months who had been resident in the area for not less than three months. The questionnaire sought information on socio- demographic characteristics (age, sex, education level, marital status, number of children, birth order of eligible child and ethnicity child's relationship with caretaker), knowledge on vaccine schedules and immunization, knowledge about vaccine preventable diseases, history of vaccines received and reasons for non-immunization. In

addition, information about a child's vaccination status was obtained from the child welfare card.

The data obtained was also entered into a PDA utilizing the Epi-surveyor software program and the two were at the end of the day collaborated to ensure accuracy before being entered into a pre-programmed computer.

Information was also obtained from the health worker using a structured questionnaire.

Conducting the household interviews

In each household visited, the principal investigator and study assistants introduced themselves, found out if the household had a child aged 12-23 months, asked to speak to the mother or care taker, explained the purpose of the study, sought a written consent and proceeded to administer the questionnaire to those who consented. The process continued until the desired sample size was attained. For households that had nobody at time of the visit, a message was left and an attempt done later to do the interview.

In households with more than one child aged 12-23 months only the youngest was included in the study.

Qualitative study

For the qualitative study, Focus Group Discussions were conducted using a prepared set of questions as a guide. The chief investigator and two trained assistants conducted the discussion which was carried out in our national language (Kiswahili) that also doubles up as the main language spoken in the areas. Assistants noted down the salient points arising from the discussion, which were also audio-taped.

Consent to audio-tape the proceedings was sought from the participants before commencing the sessions.

FGD participants

Participants in the focus group discussions included mothers and caretakers of children aged between 12-23 months resident in the area for not less than three months and opinion leaders. Local guides helped in identifying eligible mothers or caretakers from the various clusters and at least 30 of them were randomly selected to participate in the

FGD. They were then divided into three groups of ten each. Each group had a different venue where their sessions were held. The participants were reminded a day before the set date for the FGD and their participation confirmed.

Conducting the FGD

The discussion was done in stages starting with introductions, obtaining of consent to audiotape the session, main discussion which followed a prepared topic guide consisting of questions that were asked. These covered different areas including maternal and caretaker knowledge, attitude and practice regarding immunization.

All issues raised were considered pertinent and noted down.

Health worker interview

At least one health worker was interviewed in each immunizing health facility by the principal investigator. Information was sought on type of immunizing facility, cadre of the health worker being interviewed, whether they had guidelines on immunization and mobile outreach services. I also sought to find out whether they had all the vaccines, if they charged a fee for the vaccines and assessed their attitude towards caregivers via incognito observation. Information on their knowledge of the various vaccines and adverse events following immunization was also obtained.

2.8 Study Personnel

- 1. Field supervisors:** Four field supervisors (including the principal investigator), were each in charge of two interview teams. They ensured the administrative officials in the area of study were informed prior to commencement of the study. They also provided the necessary materials for the study and ensured accuracy and completeness in questionnaire filling.
- 2. Study assistants:** Data was collected with the help of sixteen study assistants (interviewers) who consisted of final year medical students from the University of Nairobi. They received a two day training on data collection and how to enter data into a PDA, the standard operating procedures for the study and how to conduct themselves during the study.

- 3. Local guides:** Were recruited from area of study. Each team had a local guide who was either a village elder or an influential person in the area. Their role was to take the various teams around the area and introduce the interviewers to the locals and households. They were not involved in interviewing or deciding the household to be visited.

2.9 Quality Control during Data Collection

The interviewers worked in pairs and were able to counter check with each other to make sure the information collected was as accurate and complete as relayed to them by the individuals being interviewed. Field supervisors did impromptu checks in the course of data collection to ensure information was being filled accurately. Information obtained on the questionnaires was also concurrently entered into the PDA and the two were compared at the end of the day to see if they were in agreement.

2.10 Study period

After approval of the study, the data was collected over a period of two month – September to October 2009.

2.11 Ethical Considerations

Approval for the study to be conducted was sought from the Ministry of Health (provincial medical officer), the Division of Vaccines and Immunization (DVI), the District Public Health Nurse (DPHN) and the Kenyatta National Hospital (KNH) Ethics Review committee.

Informed consent was also sought from the mothers and caretakers before being included in the study.

Participants were neither charged nor asked to pay for participating in the study. They benefited by having their questions and concerns on immunization addressed by the study team.

Confidentiality of the participants was maintained throughout the study period.

2.12 Control of biases

The control of biases was achieved through random selection of households.

At the end of each day, data collected on the questionnaires was cross checked with the information entered into the PDA to ensure accuracy before being entered into a pre-programmed computer.

3.0 Data analysis and management

3.1 Qualitative arm (Focus group discussion's)

Notes written in the field were cross-checked with audio tape-recorded discussions in the evening after the discussions. Data analysis was an ongoing process starting during the discussions and was done manually. The analysis involved summing up the different issues arising from the group members and key informants into emerging themes. Conclusions and recommendations were then made on the specific themes of the discussions.

3.2 Quantitative Arm (immunization cluster survey)

All data collected from quantitative study using PDA's was compared with information on the structured questionnaires for completeness and accuracy. The information was then entered into a pre-programmed computer on a daily basis. Processing and analysis of the data was done using the SPSS 17.0 soft ware. Analysis was done using immunization status at 23 months as the outcome variable (dependent variable), with complete immunization being based on whether the child had received all immunizations in the EPI schedule (BCG vaccine at birth, Polio and Pentavalent vaccines at 6 ,10 and 14 weeks respectively and measles at 9 months)

Further analysis included 95% confidence intervals for socio-demographic factors associated with immunization status at 23 months.

Associations were evaluated using the chi square test and presented as Odds Ratios (OR) and P – values.

Logistic regression analysis was done to determine the factors that significantly influenced full immunization at 23 months.

The results of the analysis is presented using tables, pie-charts and bar charts

4.0 Results

4.1 Results of the quantitative survey

Caregiver socio-demographic characteristics

The Demographic part of household questionnaire yielded information about caregivers demographic profile namely: age ,gender, marital status, occupation, education level, child's relationship with caretaker, religion and employment status and the summary and distribution is as follows:-

General description of study population

The summary and description of the study population is shown in table 2 on page 17.

Children enrolled in this study were mainly taken care of by close family members. A total of 1147 (95.2%) children were taken care of by mothers, 16 (1.3%) by fathers, 7 (0.6%) by siblings and 35(2.9%) by other relatives. There was a wide age distribution of the caretakers with 164 (13.6%) aged <20years, 857 (71.1%) between 21-30years, 169 (14%) between 31-45years and 15(1.2%) above 45years.

Most caretakers were in a married monogamous relationship (975 or 80.9%). The rest were either single (127 or 10.5%), married polygamous (72 or 6%), divorced or separated (25 or 2.1%) or widowed (6 or 0.5%). Regarding education status, majority of caretakers had some education with 675 (56%) having primary level education, 465 (38.6%) having secondary school level of education and 45 (3.7%) being of college level and above.

Forty three caretakers (3.6%) were in formal employment while 290 (24.1%) were self employed. The rest were either casual labourers (8.5%) or unemployed (63.8%). Christianity was the predominant religion amongst the caretakers with 1106 (91.8%) being Christians and 96 (8%) being Muslims.

Table 2: General description of the study population

Characteristic	N=1205	Percentage (%)
Child's relationship with caretaker		
Mother	1147	95.2
Father	16	1.3
Sibling	7	0.6
Other*	35	2.9
Age of caretaker		
<20ears	164	13.6
21-30years	857	71.1
31-45years	169	14
>45years	15	1.2
Marital status		
Single	127	10.5
Marriedmonogamous	975	80.9
Married polygamous	72	6
Widowed	6	0.5
Divorced/separated	25	2.1
Education		
None	20	1.7
Primary	675	56
Secondary	465	38.6
College and above	45	3.7
Employment		
Formal employment	43	3.6
Self employment	290	24.1
Casual employment	103	8.5
Unemployed	769	63.8
Religion		
Christian	1106	91.8
Muslim	96	8.0
Other**	3	0.2

*...includes aunt, uncle, grandmother, grandfather, cousin, non-relative.

**...includes African indigenous religion.

Distribution of Care taker socio-demographic characteristics

Information from the quantitative cluster survey revealed a wide distribution of the different caretaker socio-demographic characteristics between the two sites as shown in table 3 below:-

Table 3: Socio-demographic characteristics of the caretakers and distribution by site

	Embakasi (n=569)	Kibera (n=636)	OR (95% CI)	P value
Caretaker				
Mother	557 (97.9%)	590 (92.8%)	1.0	
Father	1 (0.2%)	15 (2.4%)	0.1 (0.0 - 0.5)	0.010
Sibling	0 (0.0%)	7 (1.1%)	0.0 (0.0)	0.999
Other relative	8 (1.4%)	22 (3.5%)	0.4 (0.2-0.9)	0.022
Other	3 (0.5%)	2 (0.3%)	1.6 (0.3-9.5)	0.613
Age group				
<20 years	51 (9.0%)	113 (17.8%)	1.0	
21-30 years	430 (75.6%)	427 (67.1%)	2.2 (1.6-3.2)	<0.001
31-45 years	86 (15.1%)	83 (13.1%)	2.3 (1.5-3.6)	<0.001
>45 years	2 (0.4%)	13 (2.0%)	0.3 (0.1-1.7)	0.167
Marital status				
Single	59 (10.4%)	68 (10.7%)	1.0	
Divorced/ Separated	14 (2.5%)	11 (1.7%)	1.5 (0.6-3.5)	0.384
Married Monogamous	483 (84.9%)	492 (77.4%)	1.1 (0.8-1.6)	0.514
Married Polygamous	11 (1.9%)	61 (9.6%)	0.2 (0.1-0.4)	<0.001
Widowed	2 (0.4%)	4 (0.6%)	0.6 (0.1-3.3)	0.533
Education				
None	4 (0.7%)	16 (2.5%)	1.0	
Primary	224 (39.4%)	451 (70.9%)	2.0 (0.7-6.0)	0.224
Secondary	302 (53.1%)	163 (25.6%)	7.4 (2.4-22.5)	<0.001
College and above	39 (6.9%)	6 (0.9%)	26.0 (6.5-104.7)	<0.001
Employment				
Employed	31 (5.4%)	12 (1.9%)	1.0	
Unemployed	298 (52.4%)	468 (73.6%)	0.2 (0.1-0.5)	<0.001
Self employed	197 (34.6%)	93 (14.6%)	0.8 (0.4-1.7)	0.584
Casual labourer	41 (7.2%)	62 (9.7%)	0.3 (0.1-0.6)	0.001
Other	2 (0.4%)	1 (0.2%)	0.8 (0.1-9.3)	0.840
Religion				
Christian	557 (97.9%)	549 (86.3%)	1.0	
Muslim	10 (1.8%)	86 (13.5%)	0.1 (0.1-0.2)	<0.001
Other	2 (0.4%)	1 (0.2%)	2.0 (0.2-21.8)	0.580

From the bi-variate analysis in table 3, the following can be said about caretaker socio-demographic characteristics in Embakasi and Kibera;

Caretaker relationship with child

Majority of caretakers in Embakasi were mothers (97.9%) compared to Kibera where 590 (92.8%) of the caretakers were mothers. There was a high likelihood of having a caretaker who was a father in Kibera than Embakasi OR= 0.1 (95% CI 0.0-0.5) P= 0.01 The chances of having a relative other than parent as caretaker were also high in Kibera OR=0.4 (95% CI 0.2-0.9). P= 0.022

Age of caretaker

There were 430(75.6%) caretakers in Embakasi aged between 21-30years while 427 (67.1%) were in the same age bracket in Kibera. The age distribution of the rest of the caretakers in Embakasi was 51 (9%) aged less than 20years, 86 (15.1%) between 31-45 years and 2 (0.4%) aged above 45years. Kibera on the other hand had 113 (17.8%) caretakers aged less than 20years, 83 (13.1%) between 31-45years and 13 (2%) over 45 years.

There was a high likelihood of getting a caretaker aged between 21-30years in Embakasi compared to Kibera OR=2.2 (95% CI 1.6-3.2) P value <0.001. The odds of having a caretaker aged between 31-45years were high in Embakasi as opposed to Kibera OR=2.3 (95%CI 1.5-3.6) P value < 0.001.

Marital status of caretaker

483 caretakers (84.9%) in Embakasi were in a married monogamous relationship while 492 (77.4%) were in the same relationship in Kibera. In Kibera, 68 (10.7%) caretakers were single, 61(9.6%) were married polygamous, 11(1.7%) were either divorced or separated and 4(0.6%) were widowed . In Embakasi, 59 (10.4%) were single, 11 (1.9%) were married polygamous, 14(2.5%) were either divorced or separated and 2 (0.4%) were widowed. There was a less likelihood of having a married polygamous caretaker in Embakasi compared to Kibera OR=0.2(95% CI 0.1-0.4) P value<0.001. The chance of having a divorced or separated caretaker was 1.5 times higher in Embakasi OR= 1.5

(95% CI 0.6-3.5) but the difference between the two sites was not significant P value 0.384.

Education level

341 (60%) of caretakers in Embakasi had secondary school education and above while only 169 (26.5%) in Kibera had the same. 451 (70.9%) caretakers in Kibera had primary education while 16 (2.5%) had no formal education at all compared to Embakasi where only 224 (39.4%) had primary and 4 (0.7%) had no formal education respectively. The chances of caretakers having secondary or college education were higher in Embakasi compared to Kibera OR=7.4 (95% CI 2.4-22.5) P value <0.001 and OR=26 (95% CI 6.5-104.7) P value <0.001 respectively.

Employment status

There was a high number of unemployed caretakers in both sites (63.6%). Kibera had the highest number of unemployed caretakers at a total of 468 (73.6%) while only 298 (52.4%) of the caretakers in Embakasi were unemployed. Whereas 269 (47.2%) of care in Embakasi were in some form of employment, only 26.2% were in the same in Kibera. The likelihood of a caretaker being unemployed was higher in Kibera OR=0.2 (95%CI 0.1-0.5) P value <0.001. There was also a high chance of a caretaker being a casual labourer in Kibera compared to Embakasi OR=0.3 (95%CI 0.1-0.6) P value <0.001

Religion

Generally, 91.8% of the caretakers were Christians. 97.9% and 86.3% of caretakers were Christians in Embakasi and Kibera respectively. The chance of having a caretaker who was a Muslim was higher in Kibera than Embakasi OR=0.1(95% CI 0.1-0.2) P value <0.001.

Thus, Embakasi had more caretakers who were mothers, falling between the age brackets 21-30years. There were also more educated and employed caretakers in Embakasi compared to Kibera. Kibera on the other hand had more married polygamous and muslim caregivers.

Influence of the caretaker socio-demographic characteristics on immunization.

The outcome variable of interest here was a child's full immunization. By recall, 552 (97%) of caretakers reported having fully immunized their children in Embakasi while 620(97.5%) reported the same in Kibera. 92.4% and 70% of the children in Embakasi and Kibera respectively were found to be fully immunized as confirmed by card. There was a significant difference in immunization status in the two sites with children from Embakasi being 3.2 times more likely to be immunized than those from Kibera OR=3.2 (95% CI 1.8-4.3) P value <0.003.

Table 4: Full Immunization coverage by site

Immunization	Overall N=1203	Embakasi n =567	Kibera n =636	OR (95% CI)	P value
Fully immunized by recall	1172(97%)	552 (97.0%)	620(97.5%)	0.8 (0.4-1.7)	0.616
Fully immunized on review of MCH card	947(79%)	502(92.4%)	445(70%)	3.2(1.8-4.3)	0.003

A Univariate analysis was then done to identify possible predictors of a child's full immunization (dependent variable) in each of the two sites. The independent variables whose association with immunization status was assessed were caretaker relationship with child, age of caretaker, marital status, education level, employment status and religion. The results of this analysis are shown in tables 5 and 6 on page 22 and 23 respectively.

Table 5: Factors associated with full immunization in Embakasi

Variable	Fully immunized (n=502)	Not fully immunized (n=41)	OR (95% CI)	P value
Caretaker				
Parent	494 (98.4%)	39 (95.1%)	3.2 (0.7-15.4)	0.170
Other	8 (1.6%)	2 (4.9%)		
Marital status				
Married	441 (87.8%)	30 (73.2%)	2.7 (1.3-5.6)	0.008
Other	61 (12.2%)	11 (26.8%)		
Education				
<=Primary	192 (38.2%)	19 (46.3%)	0.7 (0.4-0.9)	0.007
≥Secondary	310 (61.8%)	22 (53.7%)		
Age group				
<20 years	45 (9.0%)	5 (12.2%)	1.0	0.345
21-30 years	1 (0.2%)	1 (2.4%)	1.6 (0.6-4.4)	
31-45 years	380 (75.7%)	26 (63.4%)	0.9 (0.3-3.0)	
>45 years	76 (15.1%)	9 (22.0%)	0.1 (0.0-2.1)	
Employment				
Unemployed	260 (51.8%)	27 (65.9%)	1.0	0.001
Self employed	176 (35.1%)	11 (26.8%)	1.7 (1.4-3.4)	
Employed	28 (5.6%)	2 (4.9%)	1.5 (1.2-6.4)	
Casual labourer	36 (7.2%)	1 (2.4%)	3.7 (0.5-28.4)	
Other	2 (0.4%)	0 (0.0%)	-	
Religion				
Christian	495 (98.6%)	40 (97.6%)	1.0	0.598
Muslim	7 (1.4%)	1 (2.4%)	0.6 (0.1-4.7)	

Full immunization at Embakasi was significantly associated with marital status, education level and employment status of the caretakers. Married caretakers were more likely to have their children immunized compared to non married ones OR=2.7 (95% CI 1.3-5.6) P value 0.008. Caretakers with higher education were likely to immunize their children compared to those who were less educated. P value 0.007

Employment status was significantly associated with immunization. Children of employed caretakers (self or formal employment) were more likely to be immunized compared to those of unemployed caretakers. OR= 1.7(95% CI 1.4-3.4) P value 0.001 for self employed and OR=1.5(95% CI 1.2-6.4) P value 0.022 for those in formal employment respectively.

Table 6: Factors associated with full immunization in Kibera

Variable	Fully immunized (n=514)	Not fully immunized (n=77)	OR (95% CI)	P value
Caretaker				
Parent	494 (96.1%)	73 (94.8%)	1.4 (0.5-4.1)	0.538
Other	20 (3.9%)	4 (5.2%)		
Marital status				
Married	452 (87.9%)	66 (85.7%)	1.2 (0.6-2.4)	0.580
Unmarried	62 (12.1%)	11 (14.3%)		
Education				
>=Secondary	146 (28.4%)	13 (16.9%)	1.9 (1.04-3.7)	0.033
<=Primary	368 (71.6%)	64 (83.1%)		
Age group				
<20 years	94 (18.3%)	13 (16.9%)	1.0	
21-30 years	349 (67.9%)	53 (68.8%)	0.9 (0.5-1.7)	0.777
31-45 years	61 (11.9%)	11 (14.3%)	0.8 (0.3-1.8)	0.548
>45 years	10 (1.9%)	0 (0.0%)	-	-
Employment				
Unemployed	384 (74.7%)	57 (74.0%)	1.0	
Employed	78 (15.1%)	14 (18.2%)	1.7 (1.4-2.5)	0.016
Casual labourer	52 (10.1%)	5 (6.5%)	1.5 (0.6-4.0)	0.375
Other	0 (0.0%)	1 (1.3%)	-	-
Religion				
Christian	449 (87.4%)	72 (93.5%)	1.0	
Muslim	64 (12.5%)	5 (6.5%)	2.1 (0.8-5.3)	0.135
Other	1 (0.2%)	0 (0.0%)	-	

Full immunization at Kibera was significantly associated with education level of the caretaker. The caretakers who fully immunized their children were found to be more likely to have secondary level of education or above as compared to those who missed immunization OR 1.9 (1.04-3.7), P=0.033. Therefore, the children of caretakers with secondary education or above had 1.9 times chances of being fully immunized compared to those of caretakers with less education.

Employment status was also found to influence immunization in Kibera with children of employed caretakers being 1.7 times more likely to be immunized compared with those of unemployed caretakers. OR=1.7 (95% CI 1.4-2.5) P=0.016.

However, all the other factors such as child’s relationship with the caretaker, marital status, age, and religion of the caretaker did not significantly influence immunization in Kibera.

A multivariate analysis revealed that education was the independent variable influencing immunization in both sites (P value 0.019 for Embakasi and 0.020 for Kibera) as shown in table 8 and 9 below;

Table 7: Multivariate analysis – Embakasi

Variable	OR (95% CI)	P value
Married	0.8 (0.2-3.4)	0.707
<=primary education	0.3 (0.1-0.8)	0.019*
Employment		
Unemployed	1.0	
Casual labour	0.0	0.998
Self-employed	0.0	0.998
Formal employment	0.0	0.935

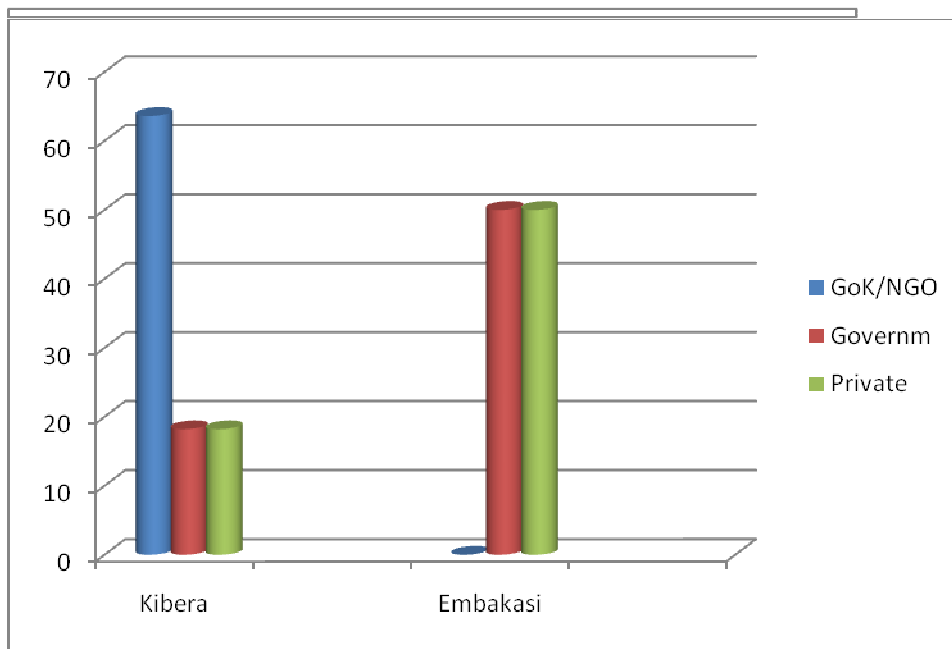
Table 8: Multivariate analysis – Kibera

Variable	OR (95% CI)	P value
<=primary education	0.7 (0.3-0.9)	0.020*
Employment		
Unemployed	1.0	
Casual labourer	0.8 (0.1-7.5)	0.867
Self-employed	1.1 (0.1-8.9)	0.927
Formal employment	0.8 (0.1-7.0)	0.842

Health worker and health facility related factors

A total of 21 health workers belonging to different cadres were interviewed in 21 immunizing facilities in the two sites. Overall, there were 7 government owned health facilities, 7 private facilities and 7 GoK/NGO facilities that were visited. Of the 21 health workers interviewed, 3 had a Bachelor of nursing degree, 6 were enrolled community nurses, 5 were registered community nurses and 3 were clinical officers. The rest included nurse aids and a medical officer.

Figure 2: Health facility type

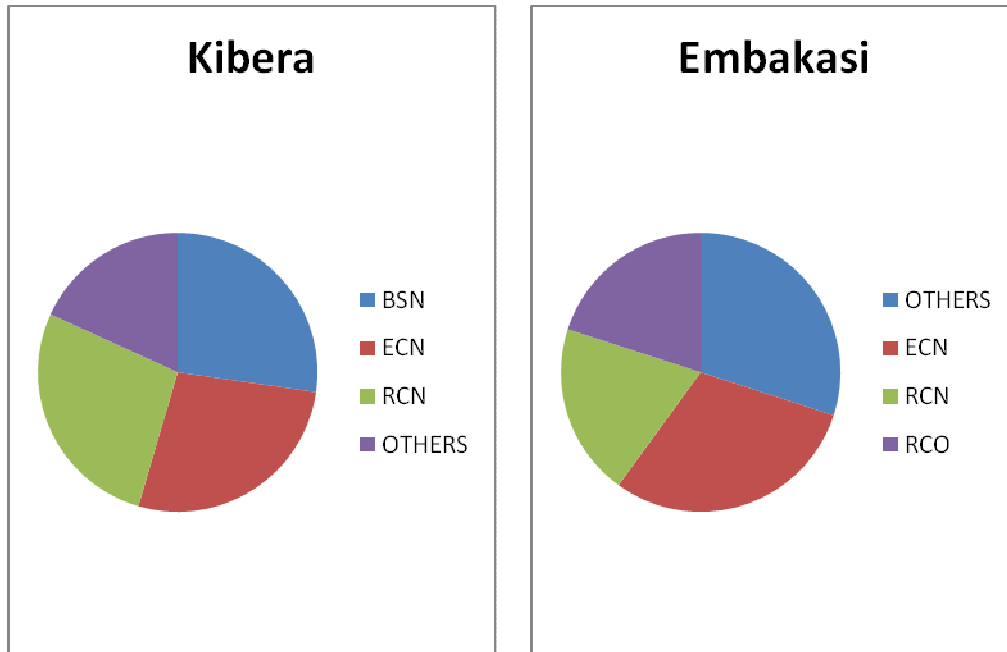


GoK/NGO...Government of Kenya/ Non-governmental organization

GovernmentGovernment

Most facilities visited in Kibera (63.6%) were those partly owned by the government and non-governmental organizations while the rest were either fully government owned (18.2%) or fully private (18.2%). Majority of those visited in Embakasi (50%) were government owned facilities while the rest were private (50%).

Figure 3: Health worker /Staff cadre



BSN...Bachelor of science in Nursing. RCN...Registered community nurse
ECN...Enrolled community nurse Others..Doctors, nurse aids.

The staff cadres and distribution was similar in the two divisions as reflected in the above pie charts.

Table 9: Health facility and health worker related factors.

	Embakasi (n=10)	Kibera (n=11)	P value (Fisher's exact test)
Have mobile/outreach services	9 (90.0%)	10(91%)	1.000
Have immunization guidelines	10(100.0%)	11(100.0%)	-
Have all vaccines	5 (50.0%)	8 (72.7%)	0.387
Have immunization plan	10(100.0%)	9(81.8%)	0.476
Attitude towards caretakers	9 (90.0%)	7(63.6%)	0.311
Charge for immunization services	3 (30.0%)	4 (36.4%)	1.000
Mothers welcomed	9 (90%)	8 (73%)	0.211
Caretakers charged for vaccination	2 (22.2%)	3 (30.0%)	1.000
Caretakers informed of next visit	10(100%)	9 (90%)	1.000
Check the welfare of the child	9 (90.0)	9 (81.8%)	1.000

Most of the factors looked at were comparable in both sites with no statistically significant difference as shown in table 7 above.

Most facilities reported having mobile outreach services, immunization guidelines and immunization plans. However the health workers in Embakasi were more welcoming to the mothers and caretakers (90%) compared to 73% in Kibera although this was not statistically significant (P value 0.211).

4.2 Results of the Qualitative Research

Summary of the FGD

Most participants interviewed in the two sites generally knew the vaccines children required to receive during infancy. They also reported that vaccines were beneficial to their children and knew they were to be started during the first two weeks of life.

Knowledge of immunization facilities

All the participants interviewed knew where they could go to have their children immunized in both sites.

Reasons for failure to immunize

a, Lack of knowledge

Focus group participants stated that some mothers did not realize the importance of immunization especially for those babies who were well.

b, Religious/cultural beliefs

They also said that some religious and cultural beliefs discouraged some mothers from taking their babies for immunization for example a religious sect operating in Kibera (Miracle Provide) prohibits exposure of newborns to the outside until the age of eight days. Thus, children born to members of the sect are likely to start immunization for their children late and thus at a greater risk of not completing the immunization schedule.

c, Fear of adverse events following immunization

Some of the participants stated that some mothers did not trust the safety of the vaccines on their children. Some of the mothers feared that their children could become sick after immunization. Part of the fear was even based on rumours as stated by one of the mothers in Kibera that some vaccines had substances that were meant to reduce the fertility of the African children. Such unfounded fear might be contributory to non-immunization of some of the children.

d, Health worker related factors

Some FGD participants in both Kibera and Embakasi reported use of abusive language by some healthcare workers when they take their children for immunization. This was said to be one of the reasons for drop-out of some of the mothers who feared to go back to the facilities as they may be humiliated. Some of the reasons given for the abuses included coming late to the immunizing facility and failure to bring along the child welfare card.

FGD participants in Kibera cited instances where some mothers had been sent away from immunizing facilities without their children being immunized.

Problems encountered while accessing immunization

The main problems mentioned in both sites included included:

1. Fee charged for immunization.
2. Long queues at immunizing facilities.
3. Negative attitude of health staff –mentioned in Kibera
4. Long walking distance before reaching health facilities.
5. Lateness by health workers resulting in long delays before starting to immunize.

Negative aspects of immunization.

The attitude of most respondents as regards immunization was positive in both sites.

In Kibera, some respondents believed some of the vaccines made their children sick. One of the mothers, infact said that her child developed a thigh abscess after the first pentavalent vaccine and she declined to take her baby back for the subsequent pentavalent vaccines.

5.0 Discussion

The Expanded Program on Immunization (EPI) was set up in Kenya in the year 1980 with the mandate of providing childhood immunization to all children in accordance with the WHO/EPI guidelines. In line with the Global Immunization Vision and Strategy (2006-2015), EPI has adopted the 90/80 goal which aims at ensuring an immunization coverage level of 90% countrywide with a minimum of 80% coverage in all districts with all vaccines is attained by the year 2015 or earlier.

The full immunization coverage in Kibera was found to be 70% (by child welfare card), and 97.5% (by caregiver recall). The immunization coverage by child welfare card shows a great improvement from previous reports by the Division of Vaccines and Immunization (DVI) which showed a dismal performance of 58% and 56% in the year 2006 and 2007 respectively.¹⁸ This has however not reached the desired 90% coverage as per the GIVS strategy. The immunization coverage in Embakasi on the other hand still stands at a high of 97% by recall and 92.4% by child welfare card. This correlates well with the previous surveys by the KDHS that have shown excellent coverage rates in Embakasi (>95%).¹⁸

All caretakers in both divisions knew where to access immunization services. The main problem seemed to be utilization of these services. The main socio-demographic characteristics found to positively influence immunization in this study were education level of caregiver, marital status and employment.

The negative influence of ignorance of caretakers on immunization cannot be underestimated as has also been shown in studies done by other authors. In this study, caretakers who had more formal education were likely to immunize their children compared with those who had less education. The education level in Embakasi was good with 60% of caretakers having secondary education and above while a paltry 26.6% had the same level of education in Kibera. Caretakers with secondary education and above were >1.7 times more likely to immunize their children as opposed to those with lower

education in both divisions (OR 1.7, P value 0.016). These may help explain why Embakasi records good immunization coverage rates compared to Kibera. . In one study done in Nairobi, maternal level of education as well as knowledge of immunization schedules had a positive relationship with immunization coverage.^{17,20}

Employment status was also found to influence immunization significantly in both Kibera and Embakasi. Children of employed caretakers were 1.7 times more likely to be immunized in Kibera and Embakasi compared with those of unemployed caretakers. Embakasi on the other hand had a lower level of unemployed caregivers compared with Kibera OR 0.2, P Value <0.001. Caregivers in employment are likely to have formal education, be knowledgeable as regards to benefits of immunization and therefore more likely to immunize their children. They may also be in a position to have the money to pay for the immunization services in areas where a fee is charged for them. The low levels of unemployment in Kibera may thus explain why the division has trailed behind other divisions in immunization coverage rates.²⁰

Married caretakers were found to be likely to immunize their children in Embakasi. There were more married caregivers in Embakasi (86.8%) compared with Kibera (77.4%). The higher numbers of married caregivers in Embakasi may thus be a positive contributor to the higher levels of immunization coverage in the area.

Kibera had a higher percentage (17.8%) of teenage caretakers (aged <20years) compared with Embakasi (9%). In this study, age of caregiver was not found to have any influence on immunization although other studies have shown teenage mothers to be unlikely to fully immunize their children.¹⁷ This may be because younger individuals are likely to be inexperienced and to be school dropouts and therefore of low education.

The relative improvement in immunization coverage in Kibera may be as a result of the National Immunization campaigns that have enabled some unreached children receive the desired vaccines. The fact that they have more health facilities may also play a positive

role in taking immunization services closer to the people. There is however more that needs to be done to improve the education standards and employment in the area.

Information arising from the FGD reveals that some wrong religious beliefs that prohibit caretakers from taking their newborn children out early until a particular age may hamper completion of the vaccination schedule. Such groups included the “Miracle Provide group” operating in Kibera that does not allow its members to take newborns out until after 8 days. This may contribute to delay or failure of some children born at home from receiving certain vaccines hence non-completion. In Kibera, Some rumours among some of the caretakers to the effect that vaccines had some added substances to reduce fertility of the Africans may also contribute to non-immunization. Thus, there is still a need for the correct information regarding immunization to be reinforced in the division.

Health system factors and vaccination status.

Health system factors also contributed a lot to the non immunization of some of the children. The issues cited were, charging a fee for immunization, negative attitude of healthcare workers and long waiting time. Similar issues have also been found to hamper immunization in other studies.¹⁷ Poor interpersonal skills and rudeness by health workers towards caretakers were some of the factors contributing to drop outs and poor utilization of immunization services in the two areas. In Kibera, mothers were often abused before their children and some of the reasons for the abuse cited were lateness, failure to come for scheduled vaccinations and having many children. This discourages some of the caretakers from coming for subsequent vaccinations.

The quality of interaction between health workers and caregivers has been shown to be decisive in ensuring completion of the vaccination schedule. Non completion of immunization and caretakers’ negative attitude towards immunization are often due to poor or inadequate information sharing by health providers. Specific behaviors of the immunizers like rudeness and insensitivity deter caretakers who feel disparaged and

therefore less motivated to return to health facilities to complete the vaccination schedule.¹⁴

Health facility managements also need to adhere to their operating times to avoid cases where caretakers have to wait for lengthy periods before being vaccinated.

5.1 Study Limitations

Access to the slums was quite difficult due to poor road network.

Some mothers and caretakers enrolled in the study did not have their child welfare cards and information on their Childs' vaccination status was from recall thus reducing the reliability of the information collected in such a manner.

6.0 Conclusion

1. There were significant differences in the socio-demographic characteristics of caretakers between the two sites namely; relationship of caretaker, age, marital status, education level employment and religious status.
2. The level of education and employment was higher in Embakasi as opposed to Kibera.
3. Higher education and employment were associated with higher immunization.
4. Full Immunization coverage for children aged 12-23 months was 92.4% in Embakasi and 70% in Kibera.
5. Children from Embakasi were 3.2 times more likely to be immunized compared with those from Kibera.

6. Ignorance, wrong beliefs regarding immunization and negative attitude of healthcare staff are still an issue in Kibera hence health education still needs to be reinforced to counter this.

7.0 Recommendations

1. Another study in Kibera to correlate the finding of remarkably improved immunization coverage as this does not corroborate with the KDHS survey reports.
2. More health education in Kibera is still required to curb ignorance and wrong beliefs regarding immunization.
3. The literacy level in Kibera still requires improvement so as to cope with the changing times.

APPENDIXES

Appendix I: Information for the interviewer

i, Date of interview ---/---/---

ii, Interviewer -----

iii, Introduce yourself and explain that you are there on behalf of doctors from Nairobi University and are conducting a study on immunisation in the entire Kibera and Embakasi areas

iv, Confirm if there are 12-23 month old children in the household.

vs, If yes, proceed to seek written consent for time and permission to interview mother or caretaker of the child.

vi, If mother or caretaker is not present at first visit, leave a message behind about intended visit and make further attempts to do the interview at a later time preferably in the same day if possible.

vii, Answer any questions or concerns the mother or caretaker may have regarding the study or pertaining to immunization as a whole in simple terms for them to understand. Refer any children found to be non-immunized or due for any vaccine antigen to the nearest immunizing facility.

Appendix II: CONSENT FORM

Dear parent/ guardian,

I am Dr Janet Munyasa a student from the University of Nairobi, department of pediatrics and child health. As part of the requirement for completing my studies I intend to carry out a survey on immunization in this area.

Immunization as you may be aware is a very important strategy in promoting and improving child survival. Despite this, we have realized that there are still a substantial number of children who do not access this service. The purpose of these study therefore is to try and find out some of the factors that may be leading to non- immunization of some children.

Your child is one of those who have been selected to take part in the study which involves asking a few questions concerning your child's immunization status. There will be no risk to your child as the study does not involve any invasive procedures and you will not be charged for participating. If you do not wish to participate, you are free to do so and you may opt out at any stage if you feel uncomfortable. Your questions and concerns will be addressed at any stage of this interview.

Information gathered from this study will be used to improve immunization services in this area. Children who during the course of the study will be found to be non-immunized will be referred appropriately to the nearest centers where these services are offered.

I have explained the above to the participant and answered any issues of concern raised satisfactorily. Signature

Ihave understood the study requirements and agree / disagree to take part in this study as explained above.

Signature

Chief investigator

Dr Janet Munyasa Isigi,
Dept of pediatrics and child health,
Box 30197,
NAIROBI.
Tel 0722817704

Permission for study granted by;

The Kenyatta National Hospital/ U.o.N Ethics and Research Committee,
P.O. BOX 20723,
NAIROBI.

Appendix III: Household survey questionnaire

District-----

1. Date of interview --/--/-- house number ---

Socio-demographic information

2. Relationship of caregiver to child-- mother / father / aunt / uncle /

Grandparent / sibling / other (specify)

3. Age of parent / primary caregiver -- <20yrs, 21-30yrs, 31-45yrs, >45yrs

4. Marital status of caregiver –Married monogamous, married polygamous, single, divorced or separated, widowed.

5. Education status of caregiver --- none / primary incomplete / primary complete / secondary incomplete / secondary complete / higher education.

6. Employment status of caregiver ---Housewife, unemployed, self employed, casual labourer, formal employment, farmer/pastoralist.

Information about index child

7. where was the child delivered? – home unassisted, home assisted by TBA/ trained midwife, health facility, other (specify)

Date of birth of the child --/--/-- sex of child M [] F []

8. Religion ----- a, Christian b, muslim c, other (specify)

9. Ethnicity/ tribe ---

10. Are there any under 2 year old children in the household? Yes / no

Age of youngest child ----- <6mo, 6-<12mo, 12-23mo, don't know.

11. Has child been vaccinated? Indicate whether by recall or card

Vaccine	Received Y/N	Date given(card)	Date given(recall)
BCG			
OPV ₀			
OPV ₁			
Pentavalent 1			
OPV ₂			
Pentavalent 2			
OPV ₃			
Pentavalent 3			
Measles			

Review from card above and determine if the child has missed any vaccines due ---- missed / not missed/ place or time of immunisation unknown.

If missed indicate the specific vaccine missed.—BCG/ OPV₀/ OPV₁/ OPV₂/OPV₃/ penta 1/penta2 /penta 3/ measles.

Reasons for missed vaccination opportunity

a, Lack of information

- unaware of need to immunize
- unaware of need to return for 2nd /3rd dose
- place or time of vaccination unknown
- fear of side effects
- wrong ideas about contraindications
- other (specify)

C, lack of motivation

- postponed until another time
- no faith in immunisation
- rumours
- other (specify)

b, obstacles/ barriers

- place of immunisation too far
- time of immunisation inconvenient
- vaccinator absent
- mother too busy
- user charge / fee
- child ill
- long waiting time
- other (specify)

12. Where was the child vaccinated? –government/ private/ mission/ national outreach/ other (specify)

13. Where did you hear about vaccination? -- health worker, community health worker, media, friend/relative, campaigns/outreach, other (specify)

14. What other challenges or problems would make you not come for immunisation services.

15. If mother of child is present for interview

-have you ever received TT injection before your last pregnancy ---Yes/ No

-How many times did you receive TT in your last pregnancy? (corroborate from card if available).

-State the immunisation status of the child at birth ---protected against tetanus/ not protected against tetanus

16. For questions below assess response to statements on a scale of 1-3

i, The distance from health facility is too far- 1, agree 2, neutral 3, disagree

ii, The time taken to travel to health facility is too long --- 1, agree 2, neutral 3, disagree

iii, The cost of traveling to the health facility from your home is high

1, agree 2, neutral 3, disagree

iv, Immunisation times acceptable to you--- 1, agree 2, neutral 3, disagree

17. Do you know the immunisation days and times in your nearest health facility? Yes /

No. If yes specify

18. What times are preferable to you for immunisation services?

a, daily /weekdays b, daily but to include afternoon hours c, two times d, other (specify)

19. Are you charged for immunisation services – Yes /No. if yes specify amount.

.If yes, what is your opinion on the cost-- cheap /affordable /expensive/ other (specify)

20. Were you satisfied with the vaccination services provided? --Yes/ No. If yes what did you like about the services, if no what did you dislike? (list)

21. What do you think are the benefits of vaccination- list

-What do you think are the negative effects of vaccination to your child- list

-Do you believe that vaccination prevents childhood diseases? Agree/ neutral / disagree

22. In your household who decides when and if the child should go for vaccination? – mother/ father/ mother in law / other.

23 Which diseases can be prevented by vaccines? List

Note down in table below if the interviewer was able to identify any of the EPI diseases

Disease	Local name	Known by respondent
Measles		Yes/no
Polio		Yes/no
Whooping cough		Yes/no
Tetanus		Yes/no
Diphtheria		Yes/no
Tuberculosis		Yes/no
Hepatitis		Yes/no
Other		Yes/no

24. If you missed a vaccination day, what would you do? a, come another day b, don't bother c, other (specify)

Appendix IV: HEALTH WORKER SURVEY QUESTIONNAIRE

1. Health facility name..... Date of interview..././....
District name..... Name of interviewer.....

2. Type of facility...a, Government b, Mission c, Private

3. Cadre of staff being interviewed
-ECN -RCN -BSN -RCO -Medical Doctor
-PHT -PHO -OTHER- specify

4. Do you give Outreach/ Mobile vaccination services? Yes/ No
5. Do you have guidelines on immunization? Yes /No. [Look for evidence if there is]

6. What is the practice in your facility? Do you advocate for daily vaccination for all antigens?
a, Only weekdays c, others - specify
b, Week days and weekends
7. Do you have all the vaccines? Yes/ No. if yes specify
8. Do you have a plan for immunization services?
9. Are there any limitations that would prevent you from vaccinating a child? Yes/ No if yes specify.

10. How would you identify a child who has missed an opportunity to be vaccinated? -
Compare age and date of vaccination
-Don't know

11. Describe the National vaccination schedule/ vaccines and diseases they prevent

Vaccine	No. of doses	Age given	Disease/s it prevents
BCG			
Oral polio			
Pentavalent			
Measles			
Yellow fever			

12. What is an adverse event following immunization?

13. What do you do in the event you get one?

14. What contraindications would make you not give a vaccine to a child

a, b, c, d,

15 Are there illnesses that would prevent you from vaccinating a child who is due for vaccination? Yes / No. if yes, which ones?

-high fever

-immune compromised

-symptomatic HIV

16. How do you identify missed opportunities?

-screening policy

-defaulter tracing

-other- specify

17. How do you forecast your vaccine and other supplies needs?

-monthly calculation/requests

-not regular, only when stock runs out

-not done.

18. Do you charge for immunization services? Yes / No. if yes how much?

19. If a mother brought a child for immunization without a card, would the child be vaccinated? Yes/ No . Would you give a new card?

Observations.

1. Observe the temperature chart of the refrigerator, is monitoring up to date?
2. Is correct vaccine for age given? Yes/No [observe for at least one child]

Checklist

- observe how mothers are welcomed.
- check if all vaccines are available
- any expired vaccines in storage? Yes/No
- how mothers with partially vaccinated for age or unvaccinated children are treated.
- are care takers charged for vaccination? Yes/No
- is AEFI explained to care takers? Yes/No
- is information given to care takers on about next visit? Yes/No
- Do they have catchment area map in the facility? Yes /No
- Are they using single use needle for each child?

References

1. Communicable Disease Control (CDC), Vaccine preventable deaths and the Global Immunization Vision and Strategy 2006-2015. 2006; 55(18): 511-515
2. World Health Organization (WHO), Department of immunisation, vaccines and biologicals, 2005. Global Immunization Vision Strategy framework 2006-2015.
3. United Nations Children's Fund (UNICEF) publication, 2004. Progress of children: A report card on immunization No.3.
4. World Health Organization (WHO), Department of immunization, vaccines and biologicals. Operational Research. 2006
5. United Nations Children's Fund (UNICEF), The state of the world's children 2006. December 2005
6. African Population and Health Research Center (APHRC), Population and health dynamics in Nairobi's informal settlements. A report of the Nairobi cross sectional slums survey (NCSS), 2000
7. World Health Organization (WHO) Regional office for Africa. The implementation of the strategy "Reaching Every District" and improvement of vaccination coverage in the African region. Vaccine preventable diseases bulletin, WHO/AFRO No. 056.
8. World Health Organization (WHO) Regional office for Africa – AFRO. Implementing "RED" approach, A guide for District Health Management Teams. November 2006
9. Central Bureau of Statistics (CBS), Ministry of Planning and National Development, Kenya Demographic Health Survey (KDHS), 2003.

10. Bjerregaard P, Mutie D.M. Immunization Coverage in Kenya in 1987. *EAMJ*, 1988; 65(12): 811-819.
11. Ardythe L.M., Rosenthal J., Hassan D.L et al. Population based study of access to immunization among Virginia children served by public, private and military health care system. *Pediatrics*. 1998; 101 (2): 1-10 (Downloaded from www.pediatrics.org/102/2/e5).
12. Amina P., Hamisou M. Maternal determinants of preventive care utilization among blacks and whites. *Journal of National Medical Association*. 2005; 97: 792-797.
13. Kenyon T.A., Matuck M.A., Stroh G. Persistent low immunization coverage among inner city pre-school children despite access to free vaccines. *Pediatrics*. 1998; 101 (4): 612-16.
14. Waisbord S., Larson H. Why invest in communication for immunization: evidence and lessons learned. A joint publication of the health communication partnership of John Hopkins School of public health and UNICEF. 2005.
15. Mrozek Budzyn, Factors influencing vaccination coverage improvement in Malopolskie Voivodeship. *Przegl Epidemiology* 2007; 61(1): 143-151.
16. Ines Kristensen, Routine immunization and child survival, a follow up study in Guinea Bissau, west Africa. *BMJ* 2000; 321: 1435-1439.
17. Dr Owino Okongo 2007, factors that influence immunization coverage in Mathare valley. (a post graduate thesis).
18. Ministry of Health, Division of Vaccines and Immunization. Kenya Demographic and Health Survey (KDHS). 2006/2007

19. World Health Organization 2005, Department of immunization, Vaccines and Biologicals. Immunization coverage cluster survey reference manual.

20. Kamau N, Esamai F.O. Determinants of immunization coverage in Mathare Valley. EAMJ 2001; 178(2): 590-594.

