Science Journal of Public Health
2014; 2(6): 617-623
Published online November 27, 2014 (http://www.sciencepublishinggroup.com/j/sjph)
doi: 10.11648/j.sjph.20140206.29
ISSN: 2328-7942 (Print); ISSN: 2328-7950 (Online)

Utilization of essential immunization services among children under five years old in Kacheliba Division, Pokot County, Kenya

Koskei Alfred[1], Simiyu Tabu,[1] Paul Kisia Malalu[1], Irene Marete[2], Robert Too[1], Koskei K. Peter[1], Constance Tenge[2]

[1]School of Public Health, Moi University, Eldoret, Kenya
[2]School of Medicine, Moi University, Eldoret, Kenya

Email address:

alfredkoskey@gmail.com (K. Alfred), pkmalalu@gmail.com (P. Malalu), cntenge@yahoo.co.uk (C. Tenge), idemken.tabuo4@gmail.com (S. Tabu), tookip_2000@yahoo.com (R. Too), mareteirene07@yahoo.com (I. Marete)

To cite this article:

Koskei Alfred, Simiyu Tabu, Paul Kisia Malalu, Irene Marete, Robert Too, Koskei K. Peter, Constance Tenge. Utilization of Essential Immunization Services among Children under Five Years Old in Kacheliba Division, Pokot County, Kenya. *Science Journal of Public Health.* Vol. 2, No. 6, 2014, pp. 617-623. doi: 10.11648/j.sjph.20140206.29

Abstract: *Background:* Immunization contributes significantly to the achievement of millennium development goal number 4 and is one of the eight elements of primary health care. Effective utilization of immunization services is associated with improved child health outcomes. WHO targets immunization coverage of 90% for urban areas and 80% for rural areas. Most rural areas in remote counties of Kenya fall short of this target precipitating high mortality rates from immunisable diseases. *Objectives:* The main objective is to determine the utilization of immunization services by children under five in Kacheliba Division. The specific objectives were to determine the level of utilization of immunization services and economic and socio-cultural factors influencing utilization of immunization services. *Methods:* This was descriptive cross-sectional study involving use of quantitative techniques carried out in Kacheliba division, Pokot North District, Kenya. Kacheliba division, which has 4 locations, was selected through purposive sampling. In every location, a household that met inclusion criteria was selected by systematic sampling (every K^{th} household). The guardian or mother was interviewed and household's demographic, socioeconomic and immunization status of children recorded in a structured questionnaire. Children' immunization cards or booklets and BCG scar mark were scrutinized as well as the mother's or guardian's verbal verification. All the 8 health facilities in Kacheliba division were visited and their cold chain facilities assessed. Quantitative data was analyzed using stata version 12 special edition. *Results:* The study covered 381 children in 164 household. There were 178 boys and 203 girls with a mean age of 28.3 months. 41.7% of children were fully immunized with 59.8% measles vaccine uptake. Except for the level of education and age, respondents' socioeconomic and cultural factors were not significantly associated with vaccine uptake. *Conclusion:* The proportion of fully immunized children was far below the WHO's target of 80%. Demographic and socioeconomic factors were not significant predictors of immunization services uptake except age and education level. Therefore, it is recommended that educational and flexible frequent outreach programs on immunization services should be carried out among the Kacheliba residents to improve utilization of immunization services.

Keywords: Immunization, Utilization, Essential Vaccines, Socio-Cultural Factors

1. Introduction

Immunization is a lifesaving and cost-effective medical intervention which reduces childhood morbidity and mortality from diseases (1). Globally, there are 30 million children who are not routinely immunized every year and 1.5 million children under five years of age die each year from vaccine preventable diseases namely measles, whooping cough (pertusis), Hemophilus influenza type B (HIB) and tetanus (2). The commentator found that the global mortality rate for the under-five had declined by 22.6% from 93 under five deaths in 1000 live births in 1990 to 72 in 2006. The mortality rates for under-fives has significantly remained high in African countries with rates above 180 deaths per 1000 live births compared to global average of 72 (2). Kenya's national under five mortality

rate stands at 74 per 1000 (3). Sub-Saharan Africa accounts for two thirds of global deaths and the progress has been slowed due by lack of preventive care and treatment, weak health systems and socio-economic stagnation due to political instability, conflicts and HIV/AIDS.

To reduce morbidity, mortality and disability due to vaccine preventable diseases, the WHO, via the Government of Kenya, recommends eight different vaccine antigens in 4 vaccine formulation free of charge to the vaccinee through the Division of Vaccine and Immunization (DVI). The targeted vaccines preventable diseases and there WHO adapted immunization schedules are: Tuberculosis vaccine (administered at birth), Poliomyelitis (at birth, 6 week, 10 week, and 14 week), Diphtheria, Pertusis, Tetanus, Hepatitis B and Haemophilus type b (at 6 week, 10 week and 14 week) and Measles at 9 month.

In Kenya one out of 9 children die annually from vaccine preventable diseases before the 5th birthday (2).It has been noted that by expanding routine immunization and increasing coverage, most of these lives could be saved. The WHO global target of 90% immunization coverage by 2010 was not achieved and a collaborative effort should be maintained (4).

In Kenya, the immunization coverage is still below the GAVI's 90% target by 2010 (5). The national immunization coverage stood at 71% (3). Significant progress in immunization coverage from 1999 to 2003 has been made in Kenya which actually appeared to attain the 2002 GAVI target of 80% DPT3 immunization coverage by the year 2007 but recorded stagnation and coverage was below 90% global target by 2010 (5). Furthermore, disparities in immunization coverage exist in various districts and regions in Kenya. Kenya has a population of 38.8 million with children less than five years of age approximately 6.5 million (KNBS 2009). The mortality rate of children under five years of age is 128/1000 live births (5) and 74/1000 live births (3). The total number of under five deaths in Kenya in 2010 was 188,928 (5).

Immunization services is not accessible to all children and equity gaps have been demonstrated, between and within countries with mobile populations, displaced populations and those living in informal settlements (6). The re-emerging vaccine preventable diseases like measles and polio calls for the need for new approach, if the country is to achieve Millennium Development Goals (MDGs) for universal access to health care and reduction in child mortality. According to AMREF (7), low immunization coverage exposes large proportion of children to infectious diseases. Several other studies have shown that disease outbreaks mainly come from pockets of low immunization areas such as remote places or islands, urban slums, or in certain population groups such as ethnic and racial minorities (8),nomadic people (9), persons with religious or philosophical objections to immunization and refugees (10). Victoria et al., (11) suggested that the best way of increasing immunization coverage is mass campaigns and through integrating routine immunization with Maternal and Child Health (MCH) clinics but the success of this depends on the percentage of the susceptible populations that attend those clinics. All these strategies have been hampered by cultural factors which were not considered at the beginning. According to Kabir, et al (12) the campaign to eradicate polio in Nigeria was hampered by religious and cultural beliefs which prevent mothers from taking their children for immunization in Muslim states of Northern Nigeria. Immunization programme launched by the United Nations in the northern city of Kano in Nigeria to wipe out the diseases faced opposition from some Islamic clerics and preachers who said they had strong reservations after the failure of a drug trial by Pfizer which they claimed killed a dozen children and left 200 others brain damaged six years later in that region (12). According to the WHO (13), Nigeria accounts for more than 50% of new polio cases globally largely associated with socio-cultural factors which limit utilization of immunization services (13).

The Expanded Program of Immunization (EPI) which changed to DVI has been operational in Kenya since 1980s, and largely follows WHO guidelines for vaccinating children. DVI targets children below five years of age. WHO guidelines stipulates that for a child to be considered fully vaccinated, he/she should receive the following vaccinations: One dose of BCG, three doses each of DPT/Hepatitis/Influenza and four doses of Polio, and one dose of measles (14). However, the national coverage was 59% for urban children and even lower coverage in rural areas in 2003 (14). This is far from WHO standards of 90% immunization coverage for urban areas and 80% for rural areas (13). According to WHO (13) report, complete immunization coverage in Kenya currently stands at 71%.

The main aim of this study was to determine the level of utilization of immunization services and assess socio-economic and cultural factors associated with utilization of immunization services by children under five year in Kacheliba Division, Pokot County.

2. Materials and Methods

Study setting: The study was carried out in Kacheliba division, an administrative area of Pokot North district. It covers a total area of about 9,064km^2 with an estimated population of 308,086 (Kenya census, 2009) with Kacheliba's population of 48,644. Kacheliba division has four locations namely Kodich, Kopulio, Lokichar and Suam. According to District records, the entire Pokot County has 53 health faciities both MOH and private clinics with Kacheliba having eight health facilities. There is one District hospital in Kacheliba Division- Kacheliba District Hospital. It is within ASAL belt with periodic flooding, drought and rough mountainous terrains but and dry vast plains. It borders Uganda to the east and is mainly inhabited by nomadic Pokot community.

Study population: The target population for this study was children aged between 9 months and 59 months that met the inclusion criteria. The Kenya National Bureau of Statistics estimated the population of under five in the population at 15.83% of the total population with 6.4 members per household (KNBS, 2009) and Kacheliba Division had a total population of 48,664 (Kenya Population Census, 2009), hence the under-five population is estimated to be 7,700 (15.83% of

48,664). A sample of under five year old children (381) were systematically sampled in 164 households. The maximum households in the division were estimated to be 7,700 households (48,664/6.4). The cold chain management factors that could influence immunization uptake were assessed at health facility level within Kacheliba division.

Study design: This was a descriptive cross sectional study. It was conducted in July 2011 with the aim of determining the immunization coverage, the influence of socioeconomic and cultural factors on the utilization of immunization services and the status of cold chain management.

Key variables included respondents' age, level of education, religion, distance to nearest health facility and waiting time that affected utilization of immunization services. Other variables were related to cultural factors and cold chain management.

Sample size determination: The sample size was determined using Fisher Exact formula. According to District records, the Pokot North district immunization coverage was 54%. The target population in the division was 7,700 (15.83% of 48,664) under-fives. The sample size was determined using the formula recommended by fisher et al. (1998).

$$n = \frac{Z^2 pq}{d^2}\ x\ e$$

Z = 1.96 (Z score corresponding to 95% confidence interval).

P= 0.54 (Prevalence value of immunization coverage in the Pokot North district)

q =0.46 (1-p)

d= 0.05 (Sampling error /the margin of error (5%) that can be accepted in this study).

N= 7700 (Target population)

e=0.4 ((Cluster Effect, given to account for differences in households). Therefore,

$$n = \frac{1.96^2 \times 0.54 \times 0.46}{0.05^2}\ \text{x}\ 0.4 = 153$$

Sampling techniques: The study focused on HHs in the division were selected by systematic sampling (every 10^{th} household) in each location until the sample size was reached. All the four locations were selected purposively, namely Kodich, Kopulio, Lokichar and Suam. The sample size was proportionately allocated to the four locations.

The population in 3 locations in the division was homogenous, almost equal in population size except Kapulio being most populous.

Kacheliba Division has a total of 48,664 people. With an estimated 6.4 persons per HH by the KNBS (15), the total households were approximately 7,600. A total of 164 HHs were sampled, proportionately distributed across four locations in Kacheliba Division. Thereafter in each location, HHs were selected through systematic sampling. The K interval was calculated as follow: Number of HH in the location /minimum sample size allocated to the location. Thereafter, very K^{th} HH that had children under five was assessed. If the HH did not have any such child, the next K^{th} HH was picked. This was repeated until the entire target HHs were reached. In total, 381 children under five were assessed.

Data collection procedures: A pilot study was carried out in Kapenguria District to pre-test the questionnaire. This was done to enable the researcher to fine-tune the tools where necessary. The subjects were interviewed through an interviewer administered questionnaire. There were two research assistants each covering two location and its health facilities. There was one supervisor who monitored the data collection and supervised the research assistants. Training of research assistant was done to help them understand the questionnaire, sharpen their interview skills and clarify the ethical issues in research.

A Household questionnaire was administered to the respondents and household demographic, socioeconomic and cultural factors obtained and entered. These included information on status of immunization and other factors influencing utilization of immunization services.

Data collection and management: The questionnaire consisted of both close-ended and some open-ended questions. The questionnaire was interviewer-administered. Filled questionnaire were checked for completeness and coded by the researcher. Data was then entered in computerized MS access data base software and was later exported to Stata version 10 for analysis.

Limitations of the study

Arid and semi-arid conditions hampered greater area of coverage of the County

3. Results

3.1. Demographic Characteristics of Households

The mean age of the respondents was 30.5 years with a standard deviation of 7.1. The median age was 29 years with a range of 15 years. Majority of the respondents (98.8%) were females. On education level, 43.3% (71) of the respondents reported that they did attend school or completed primary school while 32.9% only completed primary school level. In addition, 86.6% (142) of the respondents reported profess Christian faith. Table 1 summarizes the socio economics and demographics characteristics of the respondents.

All the respondents had heard about immunization with 72.0% of respondents hearing it through community health workers (CHWs) and loud speakers (24.4%). That 35.4 % (58) of the respondents reported that they always attend clinic whenever they have medical appointment with 50% (82) attending often. Kacheliba District Hospital is the main facility attended by the respondents (76.8%) with Kosia health centre least frequently used (1%). Again, 29.3% (48) of the respondents live within less than 2 kilometers from the nearest health facility but 10.9% and 8.5% of the respondents live within 6-10 kilometers and over 10 kilometers respectively. The waiting time was within acceptable standards with 29% (48) and 37.8% (62) of the respondent taking less than 20 minutes and between 20-40 minutes respectively.

The study showed that 39.6% of the respondents failed to be immunized at least once because of various reasons including 33.3% (22) and 29.2% (19) of them reporting lack of vaccines and absence of health personnel at health facilities respectively. When respondents were asked on whether they had any traditional beliefs or practices that affect uptake of vaccines negatively, 80.5% (124) said their practices/beliefs do not affect while 18.5% (30) of the respondents admitted their traditional beliefs and practices affects vaccine uptake of their children. Vernacular Pokot and Kiswahili was the most commonly used languages as means of communication between clients and medical providers with 70% (115) and 27.1% (46) respectively.

Table 1. *Socio-demographic characteristics of the respondents (n= 164)*

Variable	N / (%)
Respondents sex	
Male	2 (1.2)
Female	162 (98.8)
Education level	
None	71 (43.3)
Primary	54 (32.9)
Post primary	39 (23.8)
Religion	
Christian	142 (86.6)
Muslim	22 (13.4)
Occupation	
Farmers	59 (35.98)
Formal employment	21 (12.8)
House wife	43 (26.2)
Pastoralist	23 (14.0)
Other	18 (10.98)
Marital status	
Married	137 (83.5)
Single	19 (11.6)
Divorced/separated/Widowed	8 (4.9)
No. of Children per household	
Mean (std)	2.32 (1.93)
Median (range)	2.0 (1.8)

Table 2. *Uptake of immunization services by under fives*

Vaccine	Number and percentage coverage		
	Children aged 9 ≤ 12 months (N=81)	Children aged >12-59 months (N=300)	Total number of under five children (N=381)
BCG	78 (96.3)	271 (90.3)	349 (91.6)
OPV 1	71 (87.7)	235 (78.3)	306 (80.3)
OPV2	65 (80.2)	227 (75.7)	292 (76.6)
OPV3	40 (49.4)	145 (48.3)	185 (48.6)
Pentavalent 1	60 (74.1	218 (72.7)	278 (72.9)
Pentavalent 2	64 (79.0)	217 (72.3)	281 (73.8)
Pentavalent 3	40 (49.4)	134 (44.7)	174 (45.7)
Measles	50 (61.7)	178 (59.3)	228 (59.8)
Fully Immunized	38 (46.9)	121 (40.3)	159 (41.7)

Table 3. *Views on influence of socio-cultural factors on use of FP methods*

Variable	Immunized		p-value
	Yes (N=48)	No (N=333)	
Education			
None	12 (25)	162 (48.65)	
Primary	20 (41.67)	104 (31.23)	0.047
Post primary	16 (33.33)	67 (20.12)	
Income			
<5000	31 (64.58)	237 (71.17)	
5000- 10000	4 (8.33)	31 (9.31)	0.486
>10000	13 (27.08)	65 (19.52)	
Religion			
Christian	36(75.00	295 (88.59)	0.19
Muslim	12 (25.0)	38 (11.41)	
Mode of transport			
Bicycle	1 (2.08)	15 (4.50)	
Foot	34 (70.83)	277 (83.18)	0.30
Vehicle	13 (27.08)	41 (12.32)	
Language			
English	0	1 (0.30)	
Kiswahili	14 (29.17)	87 (26.13)	
Through translation	1(2.08)	7 (2.10)	0.905
Vernacular	33 (68.75)	238 (71.47)	
Respondent age			
15-24 years	4 (8.33)	42 (12.69)	
24- 49 years	43 (89.58)	285 (86.10)	0.042
>49 years	1 (2.08)	4 (1.21)	
How long it takes to get to clinic			
Less than 30 mins	16 (33.33)	72 (21.62)	
30 min to 1 hour	18 (37.50)	169 (50.75)	
1 to 2 hours	9 (18.75)	61 (18.32)	0.766
Over 2 hours	5 (10.42)	31 (9.31)	
Wait time			
Less than 20 mins	16 (33.33)	91 (27.33)	
20 to 40 min	18 (37.50)	102 (30.63)	
40 to 60 min	6 (12.50)	77 (23.12)	0.314
Over 1 hour	9 (18.75)	63 (18.92)	

3.2. Immunization Level

When categorized by age, children aged less than 12 months had a higher proportion of fully immunized (46.6%) than children above 12 months (40.3%). The measles vaccine uptake was found to be 59.8%. The dropout rates between BCG to OPV3 were 48.7% and 46.5% among children aged less than 12 months and more than 12 months respectively. In overall, BCG to OPV3 had 47% dropout rate. From BCG to measles, the dropout rate among children aged less than 12 months and more than 12 months were 35.9% and 34.3% respectively with overal dropout rate of 34.7%. This is summarized in table 2.

3.3. Associations between Immunization and other Demographic Factors

The study assessed the relationship between utilization of immunization services and demographic, socioeconomic and cultural factors. As shown in table 4, education and mother's age were significant predictors of utilization of immunization services with p-values of 0.047 and 0.042 respectively. Furthermore, the level of income, religion, mode of transport and communication, rating of facility and waiting time were not statistically significant predictors of utilization of immunization services. The p-values were greater than 0.05 hence insignificant.

To assess the level of association for each of the covariate accounting for the fact that household had more than one child, the multi-level logistics regression was used to adjust for clustering the unadjusted and adjusted results. Based on odds ratio, heads of household that had primary education and those with post primary education were 2.4 and 2.66 times more likely to have children fewer than five fully immunized respectively compared to those with no education. Similarly, house hold heads aged 24-49 and those > 49 years were 1.36 and 8.74 times more likely to have children who are fully immunized compared to those aged 15-24 years.

4. Discussion

The study revealed that the level of utilization of immunization services is low and varies among various specific vaccine antigens. The proportion of fully immunized children was only 41.7%, which is below the WHO recommended 80% for a rural set up. While the level of utilization of BCG vaccine was found to be high (>95%), other vaccines such as OPV3 and Pentavalent 3 were significantly low. This finding is similar to Kenya demographic Health Survey (KDHS) (3) which found high uptake of BCG and low uptake of measles vaccines. When the ages of the children were categorized, there were no significant differences in utilization of specific antigens among children aged 9-12 months and >12-59 months. The study found that there was a high dropout rate between BCG and OPV3 of 47% while the dropout rate between BCG and Pentavalent 3 was 50.1%. The trend is similar between BCG and Measles vaccine with 34.67% dropout. The official Pokot North district data showed that that proportion of fully immunized children was 54% in 2009 and our study results are similar to WHO, 2008 findings which showed that immunization coverage in Kenya was still below 80% rural target and high dropout rates between BCG and Measles uptake of more than 10%. Our findings is also consistent with findings by Juliandi, Masahau et al., and Dubey et al. (18, 19, 23), which revealed that more than 20 % drop out from BCG to OPV3, OPV1 to OPV3 and DPT1 to DPT3. According to WHO Kenya's immunization profile report, September 2010, there is a high dropout rates greater than 10% in Kenya. The key informant interviews revealed that despite high level of awareness by the respondents, low uptake and high dropout rates may be partly due to long distances to health facilities, Shortage of personnel, drugs and vaccines. Also it may be contributed by constant movements among the respondents, poor health seeking behavior and constant change of health facilities attended by the respondents or guardians. Documentation problems such as the loss and replacement of immunization cards could have contributed to this phenomenon. However, the DVI 2007 report stated that a dropout rate greater than 10% and less than 90% coverage was unacceptable and was an indication of the problem in demand for vaccination, clients dissatisfaction with services and the inability of the program to provide these services (16).

The study findings indicated that the measles coverage is not an accurate predictor of immunization coverage. Whereas measles coverage was 59.84 %, the proportion of fully immunized children was 41.73%. The Ministry of Health estimated 54% immunization coverage in Pokot North District for the year 2009 (3) based mainly on measles coverage. A study commissioned by USAID/KENYA through Alphia 2 project in 2009 found 38% fully immunized children between age 12-23 months in western Kenya region of Teso, Samia, Bunyala and Busia (17).

The association of Socioeconomic and cultural factors and utilization of immunization services

The associations between utilization of immunization services with demographic, socioeconomic and cultural factors were also analyzed. The study found out that respondents' level of education (p-value=0.047) was significantly associated with utilization of immunization services. Mothers or guardians with at least secondary education were more likely to have fully immunized children compared to mothers with primary or with no evidence of any schooling. This finding is similar to those of Bhuiya el al (24) which found that more educated mothers tend to have fully vaccinated children than less educated counterparts. Education was significantly associated with vaccine uptake because having knowledge on the importance of vaccination was partly dependent with level of education. However, it contrasts with Ahluwalia et al (21) and Streatfield et al., (22) findings which showed no association between education status of the mother and immunization status of their children. In our study, the respondent' age (p-value=0.042), income (p-value =0.486), religion (p-value=0.19), waiting time (p-value=0.766) and mode of transport (p-value= 0.242) were not significantly associated with utilization of immunization services. Although Children from higher income households (greater than kshs. 10, 000 per month) have higher utilization of immunization services than lower income households, there was no statistical significant differences since immunization services was given free of charge in government and non-governmental health centers. This is similar to Rahman & Obaida (20) and Juliandi Harahap (23) findings and contrasts with Koeing et al. (26), Quinley et al. (25), Majumder et al. (27), and Bhuiya et al. (24) which found these factors significantly associated with uptake of immunization services. We hypothesize that religious beliefs were not significantly associated with immunization uptake because it is not known

to advocate against immunization programs in Kenya, except the catholic church stand against tetanus vaccine for reproductive age women. This contradicts Kabir *et* al, (12) findings that found religious beliefs to be significantly associated with uptake of vaccines in Nigeria.

The mode of transport and distances to health facilities were found to vary among respondents but was not significantly associated with utilization of immunization services. The focus group discussion attributed it to immunization outreach activities done by NGOs and district surveillance team from office of DMOH and DPHN. However outreach activities were not being carried out regularly in remote areas of Kacheliba division but mainly during peak seasonal disease outbreaks and dry seasons. Although 80 (48%) households live within the WHO's recommended less than 6 kilometers to their nearest health centers, they don't necessarily attend those clinics consistently, often preferring Kacheliba District hospital, which was more than 6 kilometers away. Therefore, this study was not able to show statistically significant differences in utilization of immunization services by categorizing distances because of outreach activities in the area.

Although the study showed that all respondents had heard about the importance of immunization, they were found to have poor health seeking behavior. In addition, 35.76% reported that they always attended medical appointment for her/himself and for the child while 49.70% of the respondents admitted failing to attend clinic appointment. However it is a statistically insignificant predictor of utilization of immunization services (p-value >0.1). Language was also not statistically significant predictor and this is because there were no language barriers between providers and their clients. Most of them understood pokot language (mother tongue) and Kiswahili. It was also found that most respondents' source of information on immunization was through community health workers and loud speakers but there were no significant differences in utilization (P-value > 0.1) from those who learnt from other sources such as radio and Billboards. Kacheliba was the main clinic attended by respondents for immunization services. Focus group discussion revealed that missed opportunities were partly propagated by clinicians turning away clients so as to come in groups. This was meant to reduce vaccine wastage but the deputy public health nurse (DPHN); a key informant interview contributor argued that the policy had been reviewed and reversed. It was not immediately clear whether the respondents were aware about the new policy.

5. Conclusion

The utilization of essential immunization services among under five year old children in Kacheliba Division was low as proportion of fully immunized children was 41.7%, with measles uptake of 59.8%, suggesting high dropout rates. It is below the 80% WHO targets for rural areas. The respondents age and level of education determines the utilization of immunization services by under-fives. Poor cold chain management contributed to low utilization of immunization services.

Recommendations

- Health education and promotion campaigns should be carried out by local authorities and non-governmental organizations to increase community awareness about importance of immunization services.
- Ensure that health facilities are adequately stocked with vaccines and cold chain equipment be well maintained with standby biomedical technician.
- Outreach (mobile) immunization service should be more flexible to change locations and times of services provision in conformity with migratory patterns of the residents.

References

[1] World Health Organization (2005) Global Immunization Vision and Strategy 2006-2015, WHO Geneva.

[2] United Nations Children's Education Funds (2005): The state of Worlds Children; "Childhood under threat". UNICEF New York

[3] Kenya Demographic and Health Survey (2008/2009): Maternal and Child Health, pg.136-140

[4] WHO/UNICEF Coverage estimates 1980-2006, August, 2007.

[5] United Nations Children's Education Fund. State of world's Children, 2010. Available at: http://www.unicef: Accessed on January 30th, 2011

[6] Wagstaff A. (2002) Poverty and Health Sector Inequalities. World Health Organization Vol. 80 No.2

[7] AMREF (2001): Community health. Vaughan J.P, C.H. Wood, H. de Vlanville 2nd edition. Regal Press Limited

[8] Hersh B.S., L.E. Markowitz, E.F Maes (1992): The geographical distribution of measles in United States, 1980-1989. 267:1936-1941

[9] Loutan L., S. Paillard (1992). The epidemiology of Measles in Nomadic community. Bull WHO, 70:741-744

[10] Novorty T., C. C., Jennings, M. Doran (1988). Measles outbreak in religious groups, excepts from immunization laws. Public health Rep, 103: 49-54.

[11] Victoria C.G., J. Vaughnan, F. Barros, A. Silva, E. Tomasi (2003): Explaining trends in inequalities, evidence from Brazilian child health studies.

[12] Kabir M., B. Ahmadu (2006): Knowledge, Perception and beliefs about Childhood immunization and attitude towards uptake of Poliomyelitis immunization in Nigeria.

[13] World Health Organization and United Nations Children's Education Funds (2008): Review of National Immunization coverage 1980-2007. WHO/UNICEF Geneva.

[14] Kenya Demographic and Health Survey (2003): Maternal and Child Health

[15] Kenya National Bureau of Statistics report, 2009

[16] Ministry of Health. C=Division of Vaccines and Immunization Report. 2007

[17] USAID/KENYA Report, 2009 ALPHIA 2 Project

[18] Dubey D.K., Singn S., and Kushwah S.S..Utilization of immunization services by slum dwellers of Municipal corporation area of Rewa city in Madhya Pradesh. Indian journal of community health, (2013), volume 25, No.2

[19] Masahau Maekawaka, Somthana Douangmala, Kayako Sakisaka Kericoh Takahashi, Outavong Phlathammavong, Anonh Xeuatrongsa, Chushi Kuroiwa. Factors affecting routine immunization coverage among children aged 12-59 months in Lao PDR after regional polio eradication in western Pacific region (2007). Bioscience trends: 1(1):43-51.

[20] Rahman M. and Obaida-Nasrin S., Factors affecting acceptance of complete immunization coverage of children under five years in Rural Bangladesh (2010). Salud Publica Mex.52;134-140

[21] Ahluwalia I.B., Helgerson, S.D. and Bia F.J. Immunization coverage of children in a semi urban village Panchayat in Nepal (1985). Social science and medicine, 26(2); 265-268

[22] Streatfield K. and Singarimbun,M. Social factors Affecting use of immunization in Indonesia.(1988). Social science and medicine 27(11):1237-45

[23] Juliandi Harahap. Factors affecting childhood immunization in North Sumatra province, Indonesia.Thesis ISBN 974 664 603-6

[24] Bhuiya A., I. Bhuiya and M. Chomdhury. Factors affecting of immunization among children in Rural Bangladesh (1995). Health Policy and Planning. 10:3, 304-311

[25] Quinely J.Y. Burhannudin, A.Syaifuddin, M.Udin and A. Iskandar (1991). Maternal tetanus immunization in Acech Province, Sumatra. The cost effectiveness of the alternative strategies. Social Science and Medicine. 33:2, 185-192

[26] Koeing M.A., M.A. Khan, B. Wojtynaiak, J.D. Clemens, J. Chakroborty, V. Fauvea J.F. Phillip, J.Akbar and V.S Barua. Impact of measles vaccination on childhood mortality in rural Bangladesh. Buletin of World Health Organization. 68;4 441-447

[27] Majunder A.K., S.. Aziz and J.C. Paul. Impact of socio-economic factors on immunization among children and Mothers in an urban area of Bangladesh. The journal of Family Welfare. 40;4 , 51-57