FACTORS AFFECTING UTILIZATION OF IMMUNIZATION SERVICES AMONG MOTHERS WITH CHILDREN AGED 12-23 MONTHS IN THE RURAL AREAS OF LALITPUR DISTRICT, NEPAL

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ABSTRACT: Immunization is one of the most cost effective public health interventions. In public health, vaccines have a major contribution in eradicating dreadful disease for instance small pox. Currently by targeting children under 5 years, it has been trying to eradicate the poliomyelitis from the worldwide. However, still on account of some issues and factors, there is low immunization coverage in many countries. This cross-sectional descriptive study aimed to describe the factors affecting utilization of immunization services among mothers with children aged 12-23 months in the rural areas of Lalitpur district of Nepal. A total of respondents (n= 300) from five Village Development Committees (VDCs) were selected by using multistage cluster sampling. The results showed that most of respondent's children (92 percent) were fully immunized with all eight vaccines as recommended by the WHO. While about 8% of respondent's children were partially immunized with some vaccines. In addition, mothers with good knowledge on immunization were more likely to use immunization services than those mothers with poor knowledge. While mothers who had high perception towards immunization were more likely to use immunization services as compared to mothers with low perception. The results from multiple logistic regressions showed that maternal age (p=0.011), ANC visits (p=0.003) and maternal perception (p=0.017) were significantly associated with full immunization. One of the principles of primary health care is community participation and an effective primary health care relies on active participation. While this study also revealed that mothers who actively participated in their children's health by keeping the vaccination card were more likely to fully immunize their children than those mothers without card. In order to achieve complete vaccination, focus should be placed on education regarding vaccine preventable diseases and the consequences of incomplete immunization on specific vaccines. Community health education should be provided to motivate mothers for effective use of immunization services.

Keywords: Immunization, Mother and child, Rural, Anderson's Behavior Model of Health Service, Nepal

INTRODUCTION

Vaccination has been a child right and childhood immunization has been one of the most cost effective and important public health interventions to decrease the burden of vaccine preventable diseases (VPDs) and child mortality. National Immunization Program under Child Health Division of Nepal Government has greatly contributed to achieve the Millennium Development Goal-4 (MDG-4) on reducing child mortality rate. Currently, in Nepal there are 8 vaccines against Tuberculosis (BCG), Diptheria-Pertusis-Tetanus-HepatitisB-Haemophilus Influenza Type-B (DPT-Hep B-Hib), Poliomyelitis (OPV) and Measles as a Routine Immunization (RI) for under one year children [1]. The main aim of the Expanded Program on Immunization is to provide immunization services at least about 90% among infants.

Globally, 1.5 million out of 6.9 million of children under 5 years died from vaccine preventable diseases in the year 2011 [2]. Childhood Mortality Rates (CMR) and Infant Mortality Rates (IMR) are the main indicators to measure the health status of country and progress towards MDGs-4 which aims to reduce by two thirds the mortality rate among children under five [3]. According to the data and statistics of WHO/Global Health Observatory, globally infant mortality rate was 37 per 1,000 live births and under five years mortality rate (<5 MR)

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was 51 per 1,000 live births in 2011 [2].

In Nepal, the overall coverage of immunization under 1 year infants for BCG was 97%, DPT-Hep B- Hib3 was 96%, OPV3 was 95% and Measles was 88% [1]. In 2010/2011, national immunization coverage of Nepal had been improved in all antigens under routine immunization compared to last fiscal year (FY) 2009/2010 where the coverage for BCG was 94.5%, DPT-Hep B- Hib3 was 81.6%, OPV3 was 83.3% and Measles was 86.4% [4].However, the total immunization coverage was not consistent all over the country and has not achieved 90 percent target coverage for all the vaccines. Out of 75 districts, only 31 districts have high coverage i.e.>90% for all antigens [1]. Furthermore, low immunization coverage were observed in hard to reach areas of Nepal [1]. Despite of increasing trend in coverage, there were some of the districts and Village Development Committees (VDCs) where the immunization coverage was still low throughout the country [1]. It's due to some constraints in immunization services for instance vacant post of vaccinators, not well trained health workers and volunteers as well as hard to reach areas [1]. While in some of the VDCs, the immunization coverage is less than 90%, but still there is far away to achieve the goal of Millennium Development Goals-4 (MDGs-4). Low coverage and low utilization of immunization services has been considered as one of the major reasons to increase the child mortality and morbidity rate from the Vaccine Preventable Diseases (VPDs) [4].

Lalitpur is one of the major districts with one sub metropolitan city and 41 Village Development Committees (VDCs). Previously some studies have been conducted on factors affecting immunization in Nepal, but this study has particularly focused in rural areas of Lalitpur district, Nepal. The total coverage of Lalitpur district was BCG: 96.7%, DPT3: 71.9%, Polio: 71.9% and Measles: 62.0% [5]. Hence, Lalitpur district was selected due to the low immunization coverage while comparing to the national immunization coverage in all antigens.

The main aims of the study was to reveal factors affecting utilization of immunization which will help to provide information for better utilization of immunization services by mothers and to improve the coverage of immunization in the VDCs of the district.

CONCEPTUAL FRAMEWORK

This study adapted the Anderson's Behavioral Model of Utilization of Health Services to assess the factors that affected mothers to utilize the immunization services for their children by using three dynamics such as predisposing factors, enabling factors and need factors.

METHODOLOGY

A cross sectional study was conducted from December, 2012 to January, 2013. The study sample was collected from 5 different VDCs of Lalitpur district with low coverage. A sample size was calculated by using the formula:

$$n = z^2pq/d^2$$

n = the estimated sample size 300,
z = the standard normal deviation set as 1.96,
p = the estimated proportion of problem which is 0.5,
q = 1-p
d = the precision error (0.06)

A community based household survey among 300 mothers with children aged 12-23 months was done through multistage cluster sampling. After reviewing related literatures, the researcher herself administered a structured questionnaire as the tool for research. The questionnaire was pretested among 30 mothers in another similar setting. The questionnaire was reliable, Kuder-Richardson Formulae21 (KR21) for knowledge was 0.795 and Cronbach's alpha coefficient for perception was 0.746.

The questionnaires consisted of five parts: (i) Socio-demographic characteristics (7 questions); (ii) Accessibility (7 questions); (iii) Mother's Knowledge (10 questions); (iv) Mother's Perception (12 questions) and (v) Utilization of Immunization services.

The knowledge part was answered by yes, no and do not know. "Yes" was scored "1" for correct answer and "No" and "Do not know" were scored "0" for wrong answer in each question. The maximum score for knowledge was 10. The perception was assessed by using 3 Likert scale: agree, not sure and disagree. It contained 8 positive statements and 4 negative statements. For positive statements, an "agree" was scored 3 points, while 2 points for "not sure" and 1 point for disagree". For negative statements, an "agree" was given 1 point, 2 points for "not sure' and 3 points for "disagree". The maximum score for perception was 36. Utilization of Immunization Services comprised of three variables: fully immunized refers to "the child who have received their eight vaccines by the age of one year according to the National Immunization Program schedule", partially immunized refers to "those who have administered at least one vaccine", not immunized refers to "those who have not

Table 1 Frequency distribution of mothers with children aged 12-23 months by studied variables

General Characteristics	n= 300	Percentage
Maternal Age (Years)		
<20	6	2.0
20-29	205	68.3
30-39	85	28.3
40-49	4	1.4
Median=27, Q.D=3, Min-Max (18-48)		
Educational Level		
Illiterate	36	12.0
Can read and write only	12	4.0
Primary Level	57	19.0
Secondary Level	112	37.33
≥ Higher Secondary Level	83	27.67
Occupational Status		
Service	47	15.67
Business	34	11.33
Agriculture	30	10.0
Housewife	117	59.0
Others	12	4.0
Average family income		
< Rs 10,000/ month	124	41.33
Rs 10,000-20,000/ month	162	54.0
>Rs 20,000/ month	14	4.67
Distance to vaccination post from home [(m)]		
< 2 km	276	93.8
2-4 Km	14	4.8
>4 km	4	1.4
Waiting time at vaccination post [(m)]		
< 5 minutes	68	23.1
≥ 5 minutes	226	76.9
Source of Information [(m)]		
Health worker/volunteer	202	68.7
Friends/Relative/Household Member	24	8.2
Mass Media	15	5.1
Self	53	18.0
ANC Visits [(m)]		
1-2times	11	3.7
3 times	27	9.2
≥4 times	255	86.8
Never	1	0.3
Maternal knowledge		
Poor (<7 scores)	127	42.3
Good (≥7 scores)	173	57.7
Median= 7, Q.D=1, Min-Max (6-10)		
Maternal perception		
Low (<33 scores)	112	37.3
High (≥ 33 scores)	188	62.7
Median= 33, Q.D=1, Min-Max (18-36)		
Utilization of immunization services		
Fully Immunized	276	92.0
Not fully immunized	24	8.0

[(m)] Missing data =6

administered with any vaccine by the age of one year" and not fully immunized refers to "those who have either missed at least one vaccine or not administered any vaccine by the age of one year".

Informed written consent for literate and verbal consent for illiterate was taken from mothers with children aged 12-23 months and those mothers who were not able to response due to physical or mental

Table 2 Frequency distribution of Utilization of Immunization Services with card retention

Card Retention	Utilization of Immunization Services			
	Fully Immunized		Not Fully Immunized	
	n= 276	%	n= 24	%
With Card (Yes)	196	99.0	2	1.0
Without Card (No)	80	78.4	22	21.6

instability were excluded from the study.

The study was reviewed and approved by Mahidol University, Social Science Institutional Review Board for compliance with International Guideline of Human Research Protection (COA.No.2013/034-0702). After getting permission from the District Public Health Office (DPHO) of Lalitpur district and in charge of each health centre, study was conducted.

STATISTICAL ANALYSIS

Epi-data was used for entering the data and SPSS 16.0 version for analyzing the data. Descriptive statistics was used to calculate frequency, median, standard deviation and percentage for describing the distribution. Pearson Chi square test and/or Fisher's exact test were used to explore the associations of independent variables with Utilization of immunization services. Multiple logistic regressions were used to find the strength of association, between statistically significant variables with results expressed as adjusted odds ratio (AOR). The level of significance was set at 5% (*p value* <0.05).

RESULTS

General characteristics

Table 1, shows the frequency distribution of mothers with children aged 12-23 months by general characteristics. As the table indicates, more than two-thirds of the respondents (68%) were aged between 20-29 years old. Identifying with educational level, most of the mother were literate (Primary: 19%, Secondary: 37%, Higher Secondary and above: 27%) whereas only 12% were illiterate. Nearly three in five mothers were unemployed (housewife), whose monthly family income was between Rs 10,000-20,000/month. Regarding accessibility, majority of the mothers (94%) lived less than 2 km range from the vaccination post and about 77% of mothers responded that they had to wait ≥5 minutes to receive vaccination at the vaccination post. Over two-thirds of respondents (68.7%) had known about immunization by health volunteer. Mothers who had visited 4 times or more antenatal check up during their entire pregnancy was 87%. More than half of the mother (58%) had good knowledge and 42% had poor knowledge on immunization. The median score for knowledge was 7 with minimum score 6 and maximum of 10. Table 1 show that 63% of mother's had high perception towards immunization. Majority of the children (92%) were fully immunized according to routine immunization.

In Nepal, especially in Lalitpur district, immunization service also provide "card" to mothers when a child was vaccinated first in order to keep track of the full immunization and usually kept in the homes. This is a part of Immunization Program to call upon active participation from mothers and it was surprisingly found that majority of mothers who had fully immunized their children (99.0%) had preserved the card with them as shown in Table 2.

As indicated in Table 3, mother's age ($p<0.001$), educational level ($p<0.001^f$), family monthly income ($p=0.028$), waiting time ($p=0.002^f$), number of ANC visits ($p<0.001^f$), mother's knowledge ($p<0.001$) and perception ($p<0.001$) were significantly associated with maternal utilization of immunization.

Multivariate analysis

After conducting chi-square test among all variables, only 7 were significantly associated with the utilization of immunization services (Table 3). Multiple logistic regressions was carried out among those variables and only 3 remained significant in the final model (Table 4): mother's age (OR=6.05, 95% CI: 1.52- 24.10), ANC visits (OR= 7.18, 95% CI: 1.94-26.47) and perception of mother (OR= 4.59, 95% CI: 1.30-16.16). After adjusting 7 associated variables (Table 3), remaining 4 variables like mother's educational level, average family monthly income, waiting time at vaccination post and mother's knowledge on immunization were not found to be statistically significant with the utilization of immunization service.

DISCUSSION

Immunization is one of the best cost effective ways to protect children against 8 childhood diseases through vaccination. A study was conducted to identify the factors related with the utilization of immunization services. The results of the study indicated that total coverage for fully immunized

Table 3 Association of studied variables with utilization of immunization services

Variables	Fully Immunized n (%)	Not fully immunized n (%)	*p-value*
Mother's Age (Years)			
<27	120 (85.7)	20 (14.3)	
≥ 27	156 (97.5)	4 (2.5)	**<0.001*** **
Educational Level			
No formal education	36 (75)	12 (25)	
Formal Education	240 (95.2)	12 (4.8)	**<0.001**[f]
Occupational Status			
Employed	109 (88.6)	14 (11.4)	
Unemployed	167 (94.4)	10 (5.6)	0.072
Monthly Family Income			
< Rs 10,000/month	109 (88.6)	15 (12.1)	
≥ Rs 10,000/month	167 (94.4)	9 (5.1)	**0.028***
Distance to vaccination post from home [(m)]			
≥ 2 km	16 (88.9)	2 (11.11)	
< 2 km	260 (94.2)	16 (5.8)	0.303[f]
Waiting time at vaccination post [(m)]			
< 5 minutes	58 (85.3	8 (3.5)	
≥ 5 minutes	218 (96.5)	10 (14.7)	**0.002**[f]
Source of Information [(m)]			
Health volunteer	188 (93.1)	14 (6.9)	
Others (relative, mass media)	88 (95.7)	4 (4.3)	0.392
ANC Visits [(m)]			
< 4 times	29(74.4)	10 (25.6)	
≥ 4 times	247 (96.9)	8 (3.1)	**<0.001**[f]
Maternal Knowledge [(m)]			
Poor (<7 scores)	108 (85.0)	19 (15.0)	
Good (≥7 scores)	168 (97.1)	5 (2.9)	**<0.001*** **
Maternal Perception [(m)]			
Low (<33 scores)	94 (83.9)	18 (16.1)	
High (≥33 scores)	182 (96.8)	6 (3.2)	**<0.001*** **

[(m)] Missing data =6, f: - Fisher's exact test

Table 4 Final Model of Multiple Logistic Regression for maternal utilization of immunization services

Factors	Adjusted OR	95% CI		*p-value*
		Upper	Lower	
Mother's age (Years)				
<27	1			
≥27	6.05	1.52	24.10	**0.011***
ANC Visits				
<4 times	1			
≥4 times	7.18	1.94	26.47	**0.003****
Perception				
Low (<33 scores)	1			
High (≥33 scores)	4.59	1.30	16.16	**0.017***

and not fully immunized children was 92% and 8% respectively. While comparing the coverage in Lalitpur district through survey shows higher than the total coverage by national statistics in Lalitpur district (i.e. BCG: 96.7%, DPT3: 71.9%, Polio: 71.9% and Measles: 62.0%). It may be possible due to selection of limited study area through which the outcome couldn't be generalized. In other hand, it is also noticeable that the coverage rates from survey are adjacent with the 2011 NDHS (Nepal Demographic and Household Survey) in which immunization coverage was 87% [3]. This could be possible due to the immunization campaigns and programs organized in Lalitpur district, for instance MR campaign (Measles Rubella campaign) and supplementary immunization activities for polio.

In present study, maternal age was significantly associated with the utilization of immunization

services (p=0.011*) [6]. Conversely, several studies implies that mother's age have no influence on utilizing immunization services [7-10]. Mothers aged ≥27 years were six times more likely to immunized their children (OR=6.05).

Mother who came for antenatal care visits four times or more was significantly associated with the rate of immunization (p=0.003) which is consistent with many previous studies [6, 9, 11, 12]. This could be because most of the mothers replied that they received information regarding importance of immunization and its schedule through health personnel during ANC follow up.

The perception of mother towards immunization was assessed by using four constructs representing the perceived susceptibility and perceived severity of vaccine preventable diseases; benefit of immunization and perceived barrier for immunization. Respondents with high perception were four times more likely to use the immunization services fully as compared to mothers with low perception. In perceived barrier, about half of the mothers feel that they could postpone their child's vaccination during illness [13], but past studies contrary showed that minor illness was not a core reason for not fully immunizing the child [14], mothers could postpone if they were busy [10] and due to fear of side-effects. Some mother perceived that vaccine could be harmful for their child if administered repeatedly which may influence in their vaccination status [15]. The perceived barrier for immunization could influence the mother to miss their child's immunization, which was one of the significant risk factor for childhood immunization [14].

Several studies demonstrated mother's education as a significant predictor for the utilization of immunization services (p<0.001) [11, 16, 17]. Some studies suggests that mother with higher education would have good health concept [17] by immunizing their child according to the schedule [18].

In current study, occupational status, distance to vaccination post from home, source of information were not statistically significant with the vaccination utilization. Maternal knowledge was found to be significantly associated with the utilization of immunization (p<0.001) [10, 19, 20], while mother's education might be the influencing determinants for maternal knowledge [20]. In the study, majority of the respondents responded about the purpose of immunization but only one-third of them knew about the vaccine preventable diseases whereas more than two-third of mothers had knowledge on the schedule of immunization. These findings are consistent with the study conducted in Ethiopia and Nigeria in which more than half of the respondents answered that immunization means to protect child from diseases and more than 60% knew about the correct age for immunization [21, 22]. However, finding of the present study regarding mother's knowledge on vaccine preventable diseases (VPDs) is inconsistent with previous two studies where most of the mothers had good knowledge regarding VPDs [11, 20]. Therefore, it's a worth noting that health personnel in the vaccination site are not providing enough information regarding vaccines which is given against diseases.

Several studies suggests that inaccessibility [8] and insufficient information were the core factors for non-immunization [11, 21, 23]. Therefore, distance; waiting time, and source of immunization were not significantly associated with the utilization of immunization services in the current study. Health volunteers (female community health volunteers) are the leading people who provide door to door information regarding health services. The possible reason could be faith or belief towards health personnel [7].

In overall, health awareness program should be provided targeting the young mothers. Pregnant women should be encouraged to go for regular antenatal check up at least 4 times during their pregnancy period by conducting awareness program in the community. Health personnel should be trained and encouraged to provide relevant information regarding VPDs and its consequences which would improve maternal perception towards immunization and make mothers motivated to immunize their children completely.

CONCLUSION

The important factors that lead mothers to utilize the immunization services fully are age of the mother, number of ANC visits and perception of mothers. Even though the educational level of mothers seems appropriate to understand the information, they should know about the consequences of being not fully immunized on specific antigens through health education. Due to limited time, the study could not cover all the areas of the district. So it is recommended that in future study, the areas (no. of VDCs) should be widened to make it more reliable and generalize the findings for the district.

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