

# Factors Associated with Child Health Card Holding among Mothers of Western Rural Nepal: A Cross Sectional Community Based Study

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**Abstract:** The use of Child Health Card (CHC) has been found effective to assess overall health status of children worldwide. The tool is simple, cost-effective and easy to use yet standard enough to interpret. Nepal recently made contextual modifications in 2006 and has incorporated it into the Health Management Information System. The card is issued to all children during their first visit for immunization. In Nepal, CHC is considered a valid and authentic report for immunization but little has been studied about its holding. The objective of our study was to find its retention rate along with the factors associated. A community-based cross-sectional study was carried out in 10 village development committees of Kapilvastu district between November 15 and December 15, 2010. A total of 190 households were selected using lot quality assurance sampling technique. Higher retention rate (88.9%) of CHC was found while status of complete immunization was significantly associated with its retention [adjusted OR: 41.92, (95%CI; 2.66-658), p=0.008] after adjusting for growth monitoring, ethnicity, place of delivery, antenatal visit, breastfeeding and mother's age. This study can guide the health system and the family members the measures to sustain higher coverage and retention of CHC which can further guide to the best possible health outcomes for the child.

**Keywords:** Child Health Card, Cross-Sectional, Immunization, Lot Quality Assurance Sampling, Nepal, Road-to-health chart.

## INTRODUCTION

Invention of the Road-to-health chart by David Morley has proved to be a milestone in the assessment of several facets of child health [1]. These days Road-to-health chart has been modified as child health card incorporating several developmental and child health service aspects. The Child Health Card (CHC) is being used as a simple, cost-effective and practical tool for monitoring the nutritional and other health interventions of under-five children throughout the world [2, 3].

The chart aids the early detection of deviations in health condition of children with more focus on the nutritional status. Periodic anthropometric measurement and plotting in the CHC serves as a source of more precise information than just weighing the child at a particular point of time and accurate measurements can make the results more valid [4]. This record in child health card can inform the parents and health workers of the child's nutritional status along with the early recognition of other health conditions which helps in decision making for corrective measures [5-7]. The child health card well serves as a mobile

databank and helps to track different aspects of health care delivery including promotion, prevention and cure [3].

Adoption of CHC with contextual modifications (based on countries or regional facts regarding growth i.e. weight-for-age of child and immunization schedule) has been practiced by several nations including Nepal. More recent revision on CHC was carried out by Ministry of Health and Population (MoHP), Nepal in 2006. Incorporation of the chart in the Health Management Information System (HMIS) has made it an integral part of health system of Nepal. Wide availability and appropriate use of CHC is a strategy adopted by MoHP to manage the issues of both acute and chronic malnutrition in Nepal [8]. CHC is provided to a child when s/he is brought to a health facility or an outreach clinic for the first time for immunization. Health workers fill in the details of child's date of birth, name, mother's name and address as identifiers. Details of routine immunization are also filled each time the child is immunized. The card also includes the details of weight for age chart, which is filled each time the child is weighed and assessed. Besides these, information about regular programme like bi-annual Vitamin A supplementation and deworming are also recorded in the card. Furthermore, complications arising after immunization along with other illness can

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be mentioned in details in separate section. All these details make the card an information bank that can give a snap shot of child's identification, immunization status, nutritional as well as developmental status.

Each district in Nepal comprise of several Village Development Committees (VDCs) and few or no municipalities. Municipalities (in urban areas) and VDCs (in rural areas) are the smallest administrative units in Nepal. Each VDC consists either a Sub Health Post (smallest public health unit), Health Post or a Primary Health Care Centre. Kapilvastu has 76 Village Development Committees and one municipality. Altogether 77 governmental health facilities along with district health office are functional to manage the health system of the district. Kapilvastu had a population of 570,612 from heterogeneous ethnic communities in 2011 [9]. During the same year, expected pregnancies were 15,085 while Expanded Program on Immunization (EPI) target (0-11 months) who will be issued CHC was set at 12,942 [10].

Only a third of child aged 12-23 months had retained CHC as per the finding of Nepal Demographic Health Survey 2011 [11]. Though CHC has very useful information that could be used for future and is the valid and authentic report of immunization, only few studies have reported information about child health card holding [11, 12]. Therefore, this study aimed at (i) exploring the practice of retention of child health card and (ii) identifying the determinants of retention of child health card in Kapilvastu district of Western Nepal. The study findings are expected to aid the health planners to address the gaps and formulate strategies to further strengthen the encouraging facts. This will eventually help improve the nutritional and health status of the children.

## **METHODOLOGY**

A cross-sectional study was carried out in Kapilvastu district from 15 November to 15 December 2010. Kapilvastu was selected for the study as it is the district where social mobilization intervention (Community Action Process) has been implemented by district development committee. In this program, community mobilisers take the weight of children in their community until the child reaches the age of three years, and record it in the CHC. Quantitative data was obtained by interviewing mothers of children between 12 and 23 months of age using structured questionnaire. Out of the total 76 VDCs, ten VDCs; Singkhor, Motipur, Mahendrakot, Hardauna, Bhalwari,

Jaynagar, Buddhi, Hathausa, Niglihawa and Maharajunj were selected for this study. Criterion of selecting these VDCs was the program area where the local bodies have implemented community-oriented social mobilization program. Study sites were limited to such venues as this study was part of a social mobilization program called Community Action Process (CAP). Mothers of the children aged between 12 and 23 months were included in the study. In a condition where same house had two eligible mothers, the one with the youngest child was selected. Those sampled mothers who were unavailable at their houses even during the second visit were excluded from the study.

Sampling was conducted as described in Lot Quality Assurance Survey (LQAS) manual and the guidelines developed by World Health Organization (WHO) [13, 14]. Each VDC was considered a stratum and samples for household level were obtained by systematic random sampling. A complete list of households was obtained from the respective VDC offices to prepare sampling frame. A total of 190 households; 19 from each VDC were selected for the study. LQAS enables the district health managers, researchers and the planners to monitor the health progress rapidly. The use of LQAS has been demonstrated in a number of similar studies related to child health [14].

Tools were developed by adopting UNICEF's generic health questionnaire and WHO's LQAS guideline [13, 15-17]. Tools were developed in English, translated to Nepali and back translated to English to ensure that the question is understood in the same way it was intended in English version. Pretesting of the tools was done in the suburbs of Taulihawa municipality of the same district so as to ascertain its usability in the study areas. Village facilitators (staffs of District Development Committee) were mobilised as enumerators after a two-days training. Contents in the training included effective interviewing techniques and data verification using CHC. These enumerators conducted one-to-one interview with the research participants by making home-to-home visits. Verbal informed consent was taken with each interviewee prior to their interview.

Analysis of the data was done considering several variables. The variables used in our study are operationally defined in the next section. Final cross checking was performed prior to data entry in Statistical Package for Social Sciences (version 17). Analysis of the categorical variables was done by applying cross

tabulation and Chi square test. Logistic regression was applied for the variables which were significant in chi square test. Stepwise backward elimination procedure was used to perform multiple logistic regression analysis after controlling for confounders. P value  $\leq 0.05$  was considered statistically significant. The project including the health program implemented in the district were approved by the Ministry of Health and the local health authority and the local government body (district development committee). Name, village and ward number of the person were removed during analysis. Mothers provided consent on behalf of their children.

### Definition of Variables

No hard and fast criteria persist in categorization of ethnicity in development sector and different categories are presented in different literatures [18]. Categorization of ethnicity was done into three groups for analysis purpose; Hill origin ethnicity (Brahmins,

Thakuri and Chhetri), Terai origin ethnicity (Madhesi, Muslim and Tharu), Dalit, *Janajati* and others (including hill and Terai). In our study, Community based organizations (CBOs) include consumers' group, mothers' group, community organizations (COs) of District Development Committee, or other similar groups; either women's group or mixed group.

Immunization card indicates the CHC provided during immunization [19]. Place of delivery is a major indicator for maternal health service utilisation. In this study, the health facility refers to public or private health facilities (sub health post, health post, primary health care centres, public or private hospitals, private polyclinics). Assistance during delivery by health workers refers to assistance provided by doctor, nurse, health assistant, auxiliary nurse midwife, auxiliary health worker or maternal and child health worker [10, 20].

**Table 1: Description of the Study Variables**

Variables	Categories	Frequency	Percent
Age of mothers (n = 188)	Less than 20	7	3.7
	20-32 years	145	77.1
	33 and above	36	19.1
Child health card holding	Yes	169	88.9
	No	21	11.1
Growth monitoring	Yes	88	46.3
	No	102	53.7
Ethnicity	Hilly Origin	48	25.3
	Dalit Janjati	109	57.4
	Terai origin	33	17.4
Sex of child (n=182)	Male	97	53.3
	Female	85	46.7
Place of delivery	Health Facilities	57	30
	Others	133	70
Delivery assistance	Health Workers	75	39.5
	Others	115	60.5
Antenatal visit n=189	One to three visits	111	58.7
	4 or more visits	64	33.9
	No visit at all	14	7.5
Involvement in CBO (n=186)	Yes	64	34.4
	No	122	65.6
Education level	No school education	91	47.9
	Some school up to high school	76	40
	Higher secondary school	23	12.1
Initiation of breastfeeding after birth	Within one hour	86	45.3
	Not within one hour	104	54.7

# the number of respondents for each response may differ from the total 190 due to missing information.

## RESULTS

### Background of the Study Variables

A total of 190 mothers were sampled and interviewed during the study. Missing information has resulted in the variation of the number of responses for few variables. (Table 1) Mean age of the mothers was 27.2 years (SD=5.758) with the highest concentration in age group 20 to 32 years (77.1%). Almost half (47.9%) of the mothers were illiterate while only 12.1% of them had some higher secondary or above level of studies and all were married (not shown in table). Male babies were the youngest child of more than half (53.3%) of the mothers (Table 1).

*Dalit* and *Janajati* groups had the highest share in population count (57.4%) followed by the people of Hill origin (25.3%). Though women's participation in community based organizations (CBOs) has been promoted in several programs including health, only one third (34.4%) of the mothers from the study site were involved in those organizations.

Only one third (33.9%) of the mothers had attended four or more ante-natal care (ANC) visits during their last pregnancy. Almost 40% of mothers were assisted by health workers during their last delivery. Delivery conducted in health institution was even less (30%).

**Table 2: Factors Associated with Child Health Card Holding**

Independent Variable	Categories	Outcome variable: Hold the CHC		Chi Square: P value
		Yes	No	
Growth monitoring	Yes	85	3	0.002*
	No	84	18	
Ethnicity	Hilly Origin	48	0	0.001*
	Dalit Janjati	32	1	
	Terai origin	89	20	
Sex of child (n=182)	Male	84	13	0.266
	Female	78	7	
Place of delivery	Health Facilities	56	1	0.007*
	Others	113	20	
Delivery assistance	Health Workers	70	5	0.119
	Others	99	16	
Antenatal visit (n=189)	One to three visits	97	14	0.027*
	4 or more visits	61	3	
	No visit at all	10	4	
Involvement in CBOs (n=186)	Yes	57	7	0.912
	No	106	14	
Education level	No schooleducation	77	14	0.088
	Some school up to high school	69	7	
	Higher secondary school	23	0	
Initiation of breastfeeding after birth	Within one hour	88	16	0.036*
	Not within one hour	81	5	
Measles immunization	Yes	167	19	0.012*
	No	2	2	
Age of mothers (n=188)	Less than 20	7	0	0.001*
	20-32 years	135	10	
	33 and above	25	11	

## Child Health Card Retention and Associated Factors

Eighty nine percent of the mothers retained CHC and could present it during the interview period. Fewer than half of the babies (46.3%) were monitored by the health workers for their growth (as noted in the record from CHC).

Association of independent variables growth monitoring status, ethnicity of mothers, sex of child, place of delivery, delivery assistance, attending antenatal visits, involvement in CBOs, education status of mothers, initiation of breastfeeding after birth, measles immunization and mother's age with retention of CHC was analyzed using Chi-square test. It was found that growth monitoring, ethnicity, place of delivery, attending antenatal visits, initiation of breastfeeding, measles immunization, and age of mothers were (statistically) significantly associated (Table 2).

We further examined the association of these significant variables by using logistic regression. In unadjusted logistic regression growth monitoring, place of delivery, antenatal visit, time of initiation of breastfeeding after birth, measles immunization and age of mother were analysed separately.

Growth monitoring, antenatal visits, place of delivery, time of initiation of breastfeeding, measles immunization and age of mother were significantly associated with CHC holding. Further analysis was performed using multiple logistic regression by entering all the significant variables into the model. Measles immunization status was the only significant predictor of child health card holding after controlling for growth monitoring, place of delivery, ethnicity, age of mothers, time of initiation of breastfeeding after birth, and antenatal visit. From the final model, it was found that the mothers of the children who were completely immunized for measles (all the immunization before measles) were more likely [adjusted OR: 41.92, (95%CI; 2.66-658), p=0.008] to retain the child health

**Table 3: Predictors of Child Health Card Holding**

	Categories	Yes	No	Unadjusted Odd ratio			Adjusted Odd ratio		
				OR	95 %CI	P value	OR	95 %CI	P value
Growth monitoring	Yes	85	3	Ref					
	No	84	18	0.16	0.047-0.580	0.005 <sup>†</sup>	0.231	0.48-1.16	0.068
Ethnicity	Hilly Origin	48	0	0.000 <sup>£</sup>	000 <sup>£</sup>		000 <sup>£</sup>	000 <sup>£</sup>	-
	DalitJanjati	32	1	Ref					
	Terai origin	89	20	7.191	0.927-55.781	0.059	4.69	0.546-40.367	0.159
Place of delivery	Health Facilities	56	1	Ref			Ref		
	Others	113	20	0.101	0.013-0.771	0.027 <sup>†</sup>	0.205	0.017-2.429	0.209
Antenatal visit n=189	One to three visits	97	14	0.123	0.624-0.634	0.012 <sup>†</sup>	0.29	0.059-1.450	0.132
	4 or more visits	61	3	0.361	0.1-1.308	.121	0.753	0.107-5.299	0.776
	No visit at all	10	4	Ref		Ref			
Initiation of breastfeeding after birth	Within one hour	88	16	2.945	1.031-8.405	0.043 <sup>†</sup>	3.803	0.891-16.230	0.071
	Not within one hour	81	5	ref		ref			
Measles immunization	Yes	167	19	8.789	1.170-66.032	0.035 <sup>†</sup>	41.92	2.669-658.67	0.008 <sup>†</sup>
	No	2	2	ref		ref			
Age of Mothers (n=188)	Less than 20	7	0	00 <sup>£</sup>	00	00	00	00	-
	20-32 years	135	10	0.168	0.65-0.438	<0.001	0.292	0.096-0.890	0.03
	33 and above	25	11	ref			ref		

-2loglikelihood ratio: 89.969, df: 8

Factors included in the initial model: growth monitoring, ethnicity, place of delivery, antenatal visit, time of initiation of breastfeeding, measles immunization and mother's age

£: Ethnicity and age of mother: analysis in logistic regression was not feasible in some categories due to zero observations.

card than their counterparts. However, because of the OR having a larger class interval, the findings should be interpreted with caution (Table 3).

## DISCUSSION

Since its first design and use in 1960s, road-to-health chart has been widely accepted, redesigned and used by several countries to improve their information system on child health [21]. Many studies have been carried out throughout the world to update it, ascertain its usefulness and to identify the factors associated with its use and retention [6, 22].

Retention of CHC is directly linked with its extent of use for the desired purpose. Our study revealed that the majority (88.9%) of the mothers had retained the card and could present it at the time of study. The finding is much greater than other similar studies conducted in different parts/districts of Nepal. Nepal Demographic and Health Survey (NDHS), 2011 found that only 34% children presented the immunization card during the study [11]. In a study carried out at a VDC of Nawalparasi, only about 40% of the mothers could present the card [12]. Studies carried out in other parts of the world show varying results for the retention; 78.3% and 94.4% mothers possessed the card as revealed by the studies conducted in Tanzania and Zimbabwe respectively [23, 24]. A study carried out in Bangladesh revealed 49% clients had retained the Family Health Card (FHC) issued to them [25]. Despite poor maternal health indicators – poor ANC coverage alongside low institutional and health workers assisted deliveries, there was a high retention of CHC which may be the result of the social mobilization intervention (Community Action Process) implemented by district development committee in the district. This program is also called Decentralized Action For Children and Women (DACAW) [26]. In this program, community mobilisers take the weight of children in their community until the child is of three years, and record it in the CHC. Based on weight for age curve, plotted in CHC, they educate mothers on nutrition, immunization and hygiene issues. Since community mobilisers are local women available in nearby settlements, mothers are more likely to visit them at their available time and are more likely to take their children for growth monitoring whereas primary health care outreach clinics conducted by health facilities have different context. These clinics are conducted once in a month only in 2-5 venues of the VDC providing less contact time for mothers [10]. Therefore, due to higher chances of contact with community mobiliser-run growth

monitoring programs, mothers may perceive CHC-holding to be necessary for next visit and this could have contributed to the retention of the card. The high retention rate of CHC can be indicative of opportunity for its effective use to assess the health status of the child and monitor utilization of child health interventions [23].

Studies have reported several factors that determine retention of CHC. Though growth monitoring, ethnicity, place of delivery, ANC check-ups, initiation of breastfeeding, measles vaccination and age of the mothers were marginally associated with retention of CHC, only completeness of measles vaccine was significant predictor after controlling for confounders. This association with complete immunization might be because the mothers are asked to present the card during every visit for their child's immunization and are well informed about its importance. Similar finding of retention of CHC associated with the enforcement of health workers was found in the study carried out in Bangladesh [25]. It is also reported from Uganda that children with CHC are more likely to receive all vaccines by 10 times than their counterparts [2]. In some studies where mother had understood the importance of CHC and retained it achieved better status of their child regarding immunization and weight gain [27, 28]. One noteworthy, though from limited sample, finding is that sex of the child was not significant for retention of CHC. This finding is similar to the finding of other studies in Nepal and Uganda [2, 12]. This finding might indicate a decreasing sex based discrimination between male and female child in terms of child health service utilization. In Nepalese context, a great proportion of children are in mar of severe forms of under-nutrition. More than 4 in 10 children under five years of age are stunted, 11% are wasted and 29% are underweight [11]. Though proportion of fully immunized children has doubled in a period of 15 years from a level of 43% in 1996 to recent 87% in 2011, still 13% children are not secured of their basic right for immunization [11]. A greater focus on retaining CHC could close the gap of immunization coverage. On the other hand, early detection of under nutrition is only possible when the use and retention of the CHC is done as expected.

Ministry of Health and Population (MOHP) of Nepal made the revision of CHC in 2006 and included areas to note vitamin supplementation as well as de-worming medication data on the card. Since fiscal year 2008/09 the coverage of the card has been increased to the children up to the age of 5 years [10]. All these factors

have been targeted to manage nutritional as well as overall health status of the children. This multi-purpose CHC has been perceived as a crucial tool of child health programme in Nepal and retention of CHC should be emphasized.

Though this study has provided an explorative perspective on reporting a neglected, yet important issue within child health, this is not free from limitations. As the study is cross-sectional, targeting limited area with relatively small sample size, the findings may not be generalizable. The second limitation of this study may be less number of socio-economic variables included in the study. Had more socio-economic variables been included in the study, better findings might have been reported. Nevertheless, the study opens up avenues for future studies, specifically about the outcomes of higher retention of CHC.

## CONCLUSIONS

The objective of our study was to find the retention rate of the CHC as well as the factors associated with it. Retention of CHC was found high (88.9%) in the study area. Complete immunization as per the schedule was the factor significantly associated with retention of CHC. The high retention rate of CHC in Kapilvastu is to be maintained through effective strategies designed to meet the local context. Role of the health workers will be crucial in defining the importance and necessity of retention of the CHC to mothers of all groups and status.

Higher coverage of the card along with its higher retention rates can guide the health system and the family members to the best possible health outcomes of the child. However, there is still a need to link CHC with future uses such as means of verification of immunization during school admission, national level surveys and international travel. Currently, this point has not been taken into consideration. As considerable amount of investment in CHC design, fill up and monitoring has been done; further use might in turn give adequate return of such endeavour of health system.

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## DECLARATIONS

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None.

### Conflicts of Interest

The authors report no conflicts of interest in this work.

### Ethical Approval

District Health Office and Ministry of Health and Population.

## AUTHORS' CONTRIBUTION

RB: manuscript writing, revision. MA: contributed in revision, and editing of the manuscript. VK: study concept design, data collection and statistical analysis. All authors revised and agreed on final version of manuscript.

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