Oman Medical Journal (2014) Vol. 29, No. 3:190-193
DOI 10.5001/omj.2014.47

Predictors of Vaccination Card Retention in Children 12-59 months old in Karachi, Pakistan

Sana Sadiq Sheikh and Syed Asad Ali

Received: 28 Jan 2014 / Accepted: 30 Mar 2014

Abstract

Objective: To determine the factors associated with retaining the vaccination card among care takers of 12-59 months old children in Karachi, Pakistan.

Methods: This was an analytical cross-sectional study in Karachi. Households were randomly selected throughout a multistage cluster sampling technique. Data was collected for 504 children of 12- 59 months of age. Questionnaire was administered to caretakers to gather information regarding the children's vaccination status, socio-demographic characteristics and reviewing their vaccination cards. Statistical analysis was done by SPSS 19 using logistic regression.

Results: Among 462 vaccinated children, caretakers of 33% provided vaccination cards. Odds of card retention decrease if the caretaker has a large household i.e., >5 people sharing one room (AOR 0.277, 95% CI: 0.096, 0.797) and if the child is of four to five years of age (AOR 0.544, 95% CI: 0.305, 0.970). Gender of the child, and the caretaker's education and access to electronic media were not significant predictors of vaccination card retention in our study.

Conclusion: Our study showed that vaccination card retention for children 12-59 months of age was low (33%) in Karachi. There is a need to educate caretakers of young children regarding the importance of keeping vaccination card and to disseminate this information through healthcare providers. Improving vaccination card retention is one of the key measures which will help towards accurately estimating coverage and to inform health policy decisions.

Keywords: Predictors; Vaccination Card; Retention; Under Five; Pakistan.

Introduction

Expanded Program of Immunization (EPI) was launched in 1974 by World Health Organization (WHO) to reduce under five year child morbidity and mortality due to vaccine preventable diseases.[1] Until 1985 in United States, vaccine coverage estimates were based on parental recall only; thereafter, concerns were raised regarding its accuracy and this led to the recommendation of card review for improved coverage surveys.[2]

EPI issues vaccination cards to children at their first vaccination regardless of their age at the time. This EPI vaccination card records the child's name, father's name, child's age, vaccinations received and due date of next vaccine. The caretaker is asked to keep the card secure and provide it to the vaccinator on every routine visit. Frequently though, the cards are lost by the caretakers. Low card retention and utilization has been shown by different studies determining immunization coverage in developing countries.[3]

In routine EPI schedule in Pakistan, BCG and OPV-0 are given at birth. DPT, HepB, Hib and OPV are given at 6th, 10th and 14th week of birth and measles vaccine is given at age of 9 months and again in second year of life.[4] After four decades of free EPI vaccination services in Pakistan, coverage is still less than optimal in children under five and card retention has been reported to range from 11% to 49%.[5,6] Another study correlating reported vaccination history with serology in Pakistan, revealed that only 54% of the children whose parents reported measles vaccination by recall, actually had serological immunity against measles.[8] Low card retention and parental recall lead to questionable estimation of coverage,[7] hence, vaccination coverage surveys should use them in conjunction.

Increasing card retention is one of the key measures to evaluate correct coverage rates, which will be helpful in informing health policy designed to improve uptake. While studies have been done to determine predictors of health card retention in Pakistan,[9,10] none we came across had explored the factors effecting vaccination card retention. Therefore, this study aimed to determine the predictors of vaccination card retention among caretakers of children between 12-59 months in Karachi, Pakistan.

Methods

The study was a cross-sectional survey set in Karachi. Located in the southern-most part of Pakistan in Sindh province. Karachi is a large multiethnic coastal metropolitan, which is divided into 18 towns.[11,12] Caretakers of children aged between 12-59 months who were living in Karachi for the last six months were eligible for survey. To identify eligible participants, line listing of the children

Sana Sadiq Sheikh
Department of Obstetrics and Gynecology, Division of Woman and Child Health, Aga Khan University Hospital, Karachi, P.O. Box 3500, PC 34800, Pakistan.
E-mail: docssshk@hotmail.com

Syed Asad Ali
Department of Pediatrics, Division of Woman and Child Health, Aga Khan University Hospital, Karachi, P.O. Box 3500, PC 34800, Pakistan.

in the 12-59 month age bracket from 90 randomly selected clusters from all 18 towns of Karachi was made by the Pediatrics department of Aga Khan Hospital. From the given sampling frame of 90 clusters deemed representative of the city's population, we randomly selected 60 clusters and at least 7 caretakers from each cluster following the EPI's 60 × 7 multistage cluster sampling.[13] If there was more than one eligible child in any household, then one child was selected by lottery method. Data collectors sought out the eligible caretakers in randomly selected households. If a caretaker was not found after three attempts or if a house was locked, then the next randomly selected household was approached. Numbers of approached households and recruited participants are shown in Fig. 1. Structured questionnaires were administered to collect data on socio-demographic characteristics and education of parents and vaccination history of children. Parents were asked to provide vaccination cards of children to record vaccination history and if cards were not provided then caretakers were asked to recall vaccination history. A child was labeled as completely vaccinated if it was reported either by parental recall or vaccination card that three doses of DPT had been administered. This study was approved by the Ethical Review Committee of Aga Khan University and individual written consent was taken from the caretakers of children.

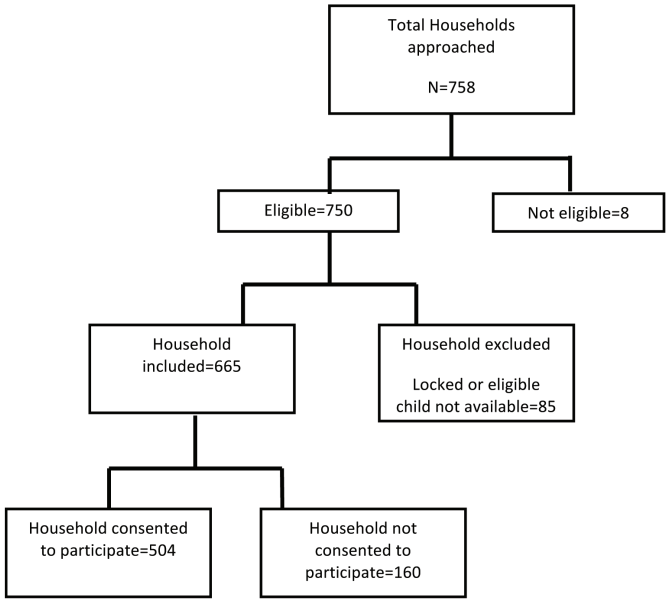

Figure 1: Flow chart of participants.

Sample size was estimated using WHO sample size calculator. Vaccination card retention rate in the general population was taken as 24% and it was assumed that there will be 6% increase in card retention if the mother was educated. Keeping alpha level 5% and power of the study 80%, design effect of 2 sample size came out to be 474. However, we did an analysis on data of 504 participants.

Data was entered twice, checked and validated using Epi data version 3 and analyzed by SPSS version 19. Chi square and student's *t*-test were used to compare categorical and continuous variables, respectively. Predictors of card retention were identified by multivariable logistic regression.

Results

A total of 504 randomly selected caretakers of children aged 12-59 months from Karachi, were enrolled into the study. Table 1 shows the baseline characteristics of caretakers and their children. The mean age of the studied children was 35 months (SD: 13 months) with almost equal distribution of male (251) and female (253) children. Overall, 462 children out of 504 have received at least one routine vaccination. Of the caretakers of 462 children, EPI issued vaccination card was provided by 165 (33%).

Table1: Baseline characteristics of caretakers and their children

Variables		Frequency (%) n= 504
Characteristics of caretakers		
Education of mother	No formal education	146 (29)
	≤10 years	202 (40)
	11 to 14 years	136 (27)
	≥14 years	19 (4)
Education of father	No formal education	109 (20)
	≤10 years	216 (43)
	11 to 14 years	148 (29)
	≥14 years	30 (6)
Employed mothers	No	473 (94)
	Yes	29 (6)
Socio-economic status	Low	211 (42)
	Middle	195 (39)
	High	93 (19)
Access to electronic media	Yes	482 (96)
	No	18 (4)
Size of the household	≤5 people / room	457 (91)
	>5 people / room	43 (9)
Characteristics of children		
Age in months	12 ≤24	126 (25)
	>24 ≤36	129 (25)
	>36 ≤48	143 (28)
	>48 ≤59	106 (21)
Mean (SD)	35 (13)	
Sex	Female	251 (50)
	Male	253 (50)
History of ever vaccination	Yes	462 (92)
	No	42 (8)
Status of vaccination	Completed	422 (84)
	No/partial	82 (16)

Data for 4 participants were missing.
Children who received DPTIII were labeled as having complete vaccination

Statistically significant predictors of vaccination card retention in univariate analysis were socioeconomic status of the family, level of education of father and mother, employment of mother, size of the house hold and age of the child. However, in multivariate model

only size of the household and child's age remained significant predictors at p-value of 0.050. Chances of retaining the card was 73% [Adjusted Odds Ratio (AOR) 0.277; 95% CI: 0.096, 0.797] decreased if size of household was more than 5 people per room as compared to a family with less than 5 people sharing a single room. Odds of card retention by caretaker was 46% (AOR .544; 95% CI: 0.305, 0.970) less if their child was four to five years old as compared to those whose child is one to two years of age. Increase in years of mother's education increased chances of card retention and are twice (AOR 1.974; 95% CI: .728, 5.353) as likely to have retained the card if the mother had received 14 years of education or more compared to a mother with no education. But this association was not statistically significant. Access to media made no difference (AOR 0.325; 95% CI: 0.102, 1.037) in card retention among caretakers. Similarly, sex of child and status of vaccination were not significant predictors of card keeping in our study. (Table. 2)

Table 2: Predictors of vaccine card retention.

Variables		Vaccination card retained Frequency (%)	Vaccination card not retained Frequency (%)	Crude OR (95% CI)	Adjusted OR (95% CI)
Sex of child (n=462)	Female	89 (19)	140 (31)	1	1
	Male	76(16)	157 (34)	0.767(0.524, 1.124)	0.732(0.480, 1.121)
Access to media	No	8(2)	8(2)	1	1
(n=458)	Yes	157(34)	285(62)	0.577(0.209,1.594)	0.325(0.102,1.037)
Mother's education	No formal education	36 (8)	88(19)	1	1
(n=462)	≤10 years	62(13)	128(28)	1.166(0.713,1.905)	1.057(0.636, 1.756)
	11 to 14 years	57(13)	70(15)	1.982(1.178,3.336)	1.698(0.984, 2.930)
	>14 years	11(2)	10(2)	2.313(0.867, 6.167)	1.974(0.728, 5.353)
Age in months	12 ≤24	55(12)	60(13)	1	1
(n=462)	>24 ≤36	42(10)	80(17)	0.593(0.352, 0.999)	0.671(0.393,1.147)
	>36 ≤48	39(8)	88(19)	0.489(0.289, 0.828)	0.583(0.339, 1.001)
	>48 ≤59	29(6)	69(15)	0.467(0.265, 0.824)	0.544(0.305, 0.970)
Size of the household	≤5 people/room	160(35)	263(57)	1	1
(n=459)	>5 people/room	5(1)	31(7)	0.260(0.098, 0.688)	0.277(0.096, 0.797)
Status of vaccination	Incomplete	12(3)	28(6)	1	1
(n=462)	Complete	153(33)	269(58)	1.381(0.682,2.822)	1.320(0.670,2.912)

Discussion

In our sampled caretakers, EPI card retention was 33%. Pakistan Demographic Health Survey (PDHS) done in 2006-07 found vaccination card utilization to be 24% and another survey conducted by the Ministry of Health, Pakistan, in the same time period reported card provision as 11%.[6,14] The highest rate (49%) of card keeping was documented by Pakistan Social and Living Standards Measurement Survey conducted a year prior to PDHS.[14] Results of our study showed card provision falls between the previously reported lowest and highest card retention rates by different national surveys.

The age of the child showed a significant inverse association with card retention by mothers. Chances of card keeping were lowest (AOR .544; 95% CI: .305, .970) for children in oldest age category (48-59 months of age). This finding is concurrent with studies done in Bangladesh and Pakistan, which showed that card keeping was higher in younger age group.[15,16]

The sex of the child and vaccination status were not significant determinants of card keeping in our study, unlike other studies. Moaissi et al. reported in their study that provision of card was better for boys as compared to girls.[17] Their study also found that except for polio, which was given at birth, chances of receiving the remaining vaccinations were higher for children with card.[17] The mother's education was not a predictor of card retention and it was consistent with existing literature.[17] However, trials conducted on educating mothers to increase coverage resulted in an increase in card retention.[1,18,19]

We found that access to media plays no role in card keeping. This may be due to few participants who did not have media access (8 participants in each 'card retained' and 'card not retain' group, see Table 2). This can also be explained by there being no broadcasted public service messages regarding the importance of holding onto the vaccination card. Association of access to media and card retention has not been evaluated previously and could be worth exploring in future studies.

Size of the household/crowding index was taken as a surrogate of socioeconomic status and it showed an inverse association with card retention. Lower socioeconomic status has been associated with low immunization coverage in several studies but its association with low card retention among vaccinated children is a novel finding.[20]

Our study had some limitations. It would have been interesting to look at more variables such as number of children less than five years of age, difference between receiving vaccinations from public

and private sector, ever having participated in education intervention on vaccination and reasons for not retaining the vaccination card. Nonetheless, our study is the first of its kind from Pakistan to show factors behind low retention rates of vaccination cards in the community.

Relying on parental recall alone leads to improper immunization coverage estimates and hence suboptimal planning, which is not enough to vaccinate all children. Recent outbreak of measles in Pakistan is an example of inadequate planning based on false estimates. A study conducted in 2010 in Karachi, showed that the officially reported 97% coverage of measles was too high and did not correspond with the estimated measles serologic immunity in children.[8]

Conclusion

This study showed that vaccination card retention for children 12-59 months of age was low (33%) in Karachi. There is a need to educate caretakers of children regarding the importance and usage of vaccination card. Parents should be educated that card retention will help them in getting their children vaccinated on time as has been reported in a Kenyan study.[17] Providers should also counsel parents about the same, which in turn will help them to determine vaccination status of the child immediately, immunization coverage will be assessed more accurately, which will go on to help policy makers design evidence-based interventions.

Acknowledgements

Authors gratefully acknowledge the support of Huma Khawar from the GAVI Alliance CSO Program and Altaf Bosan (National EPI Manager) for their help in this project.

References

1. Usman HR, Rahbar MH, Kristensen S, Vermund SH, Kirby RS, Habib F, et al. Randomized controlled trial to improve childhood immunization adherence in rural Pakistan: redesigned immunization card and maternal education. Trop Med Int Health 2011 Mar;16(3):334-342.
2. Bolton P, Holt E, Ross A, Hughart N, Guyer B. Estimating vaccination coverage using parental recall, vaccination cards, and medical records. Public Health Rep 1998 Nov-Dec;113(6):521-526.
3. jlevy. Baseline Survey - Final Report: 2008 Polio Survey Results: India. [cited 23 Jan 2012]; Available from: http://www.comminit.com/africa/content/baseline-survey-final-report-2008-polio-survey-results-india.
4. Expanded Programme on Immunization. [cited 10 July 2013]; Available from: http://www.epikp.gov.pk/Shedule.php.
5. Federal Bureau of Statistics [Pakistan]. 2007c. Pakistan Social and Living Standards Measurement Survey 2005-2006. Islamabad, Pakistan: Federal Bureau of Statistics.
6. Ministry of Health [Pakistan], and Global Alliance for s and Immunization. 2006. Expanded Programme on Immunization Coverage Evaluation Survey 2006. Third Party Evaluation, National Summary Report. Islamabad, Pakistan: Ministry of Health.
7. Ramakrishnan R, Rao TV, Sundaramoorthy L, Joshua V. Magnitude of recall bias in the estimation of immunization coverage and its determinants. Indian Pediatr 1999 Sep;36(9):881-885.
8. Sheikh S, Ali A, Zaidi AK, Agha A, Khowaja A, Allana S, et al. Measles susceptibility in children in Karachi, Pakistan. 2011.
9. Mukanga DO, Kiguli S. Factors affecting the retention and use of child health cards in a slum community in Kampala, Uganda, 2005. Matern Child Health J 2006 Nov;10(6):545-552.
10. Pahari DP, Bastola SP, Paudel R. Factors affecting retention of child health card in a rural area. J Nepal Health Res Counc 2011 Oct;9(2):154-158.
11. Karachi.: City district government of Karachi.; [cited 2010 5-8-10]; Available from: http://221.132.118.186/cdgk/Home/AboutKarachi/GeographyDemography/tabid/270/Default.aspx.
12. Karachi. [cited 2009 18-3-09]; Available from: cdgk/hometowns/tabid/72/Default.aspx
13. Hong R, Banta JE. Effects of extra immunization efforts on routine immunization at district level in Pakistan. East Mediterr Health J 2005 Jul;11(4):745-752.
14. Pakistan demographic and health survey 2006–07 [cited 2011 26 Jan 2011]; Available from: http://www.measuredhs.com/pubs/pdf/FR200/FR200.pdf.
15. Khan MN, Rahman ML, Awal Miah A, Islam MS, Musa SA, Tofail F. Vaccination coverage survey in Dhaka District. Bangladesh Med Res Counc Bull 2005 Aug;31(2):46-53.
16. Nida Tariq. Dpt3 coverage and the role of the private sector in vaccinating children 12-23 months of age, in karachi: a cross sectional survey. Master's Thesis. Aga Khan University; 2010.
17. Moaissi JC, Kabuka J, Mitingi D, Levine OS, Scott JAG. Spatial and socio-demographic predictors of time-to-immunization in a rural area in Kenya: Is equity attainable? . 2010;28(35):5725-30.
18. Mansuri FA, Baig LA. Assessment of immunization service in perspective of both the recipients and the providers: a reflection from focus group discussions. J Ayub Med Coll Abbottabad 2003 Jan-Mar;15(1):14-18.
19. Owais A, Hanif B, Siddiqui AR, Agha A, Zaidi AK. Does improving maternal knowledge of vaccines impact infant immunization rates? A community-based randomized-controlled trial in Karachi, Pakistan. BMC Public Health 2011;11:239.
20. Topuzoglu A, Ozaydin GA, Cali S, Cebeci D, Kalaca S, Harmanci H. Assessment of sociodemographic factors and socio-economic status affecting the coverage of compulsory and private immunization services in Istanbul, Turkey. Public Health 2005 Oct;119(10):862-869.