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Research Article

Factors Associated Participation in a School Based Typhoid Vaccination Campaign in Nepal

Imran Khan M[1]*, Deepak Bajracharya[2,3], Alfred Pach 3rd[1], Shyam Raj Upreti[4], Sushant Sahastrabuddhe[1], Thomas Wierzba[1], Leon Ochiai R[1] and VIVA Pilot Introduction Group-Nepal[5]

[1]*International Vaccine Institute, Seoul, Republic of Korea*

[2]*MITRA Samaj Pani Pokhari, Kathmandu, Nepal*

[3]*Group for Technical Assistance, Sanepa, Nepal*

[4]*Department of Health Services, Child Health Division, Ministry of Health and Population, Kathmandu, Nepal*

[5]*VIVA Pilot Introduction Group*

VIVA Pilot Introduction Group: *Rajan Pudasaini, Parisha Shrestha, Nilesh Joshi, Jin Kyung Park, Mahesh Puri, Sanjay Dhakal, Samir Koirala, Chandra Bahadur Thapa and Amit Arjyal*

Abstract

Objective

The study aimed to determine the factors associated with parents' decision of their child participation in a school-based typhoid vaccination program in Lalitpur District, Nepal.

Methods

Following a typhoid vaccination campaign in 2012, a household cross-sectional survey, following a two stage stratified, cluster-sampling strategy. The strata were based on type of school (public/private) and geographic location (urban/rural). Data were collected through a structured questionnaire ensuring standard quality practices. Logistic regression analysis was used to assess the effect of socio-economic and behavioral characteristics with participation in the school-based vaccination campaign. The study was approved by Institutional Review Board of International Vaccine Institute and Nepal Health Research Council.

Results

A total of 1,248 interviews were conducted with parents of children from 42 schools with a response rate of 85 percent. The participation in the vaccination campaign was statistically significantly associated with confidence on the organization conducting the vaccination campaign (OR=0.2; 95% CI: 0.1 - 0.7) knowledge of typhoid vaccine preventing the disease (OR=9; 95% CI: 4.2 - 19.7), concern of vaccine related adverse events following vaccination (OR=0.3; 95% CI: 0.2 - 0.6), information on typhoid vaccination campaign (OR=3; 95% CI: 1.9 - 5.0), and receipt of a permission slip for the child to receive the vaccine from school (OR=2; 95% CI: 1.3 - 3.2).

Discussion

Our results suggest that participation in a school-based vaccination program is associated with knowledge of disease specific vaccine on safety and effectiveness, if the parent was reached effectively by the vaccination teams through information material, and if the population have confidence in the organization that is conducting the vaccination campaign. Our results are consistent with the findings from vaccination programs on typhoid and other vaccines, globally and in Asia on a perceived risk of the disease, knowledge and confidence over vaccines and a set of communication channels by which parents are informed about the vaccine benefits to the target population.

Keywords: Bacterial infections; Nepal; *Salmonella*; Typhoid fever; Typhoid vaccines; Vaccination participation

Background

Salmonella enteric serovars are associated with three distinct clinical syndromes: a) enteric fever results from infection by the typhoidal *Salmonellas* (*Salmonella* Typhi and *Salmonella* Paratyphi A, B, and C; b) non-typhoidal *Salmonella* gastroenteritis; and c) non-typhoidal *Salmonella* bacteremia (invasive disease caused by non-typhoidal *Salmonellae*) [1]. Enteric Fever (EF) is an acute systemic infection, representing two similar clinical illnesses, typhoid and paratyphoid fever, caused by different serotypes of the bacteria *Salmonella enterica*, serotypes Typhi (*S.* Typhi) and Paratyphi (*S.* Paratyphi A, B, and C), respectively. Combined morbidity and mortality caused by infections of *Salmonella enteric* serovars is considerable since this group of bacterial pathogens are responsible for a global toll of approximately one million deaths annually, making them as one of the leading causes of mortality worldwide [2].

The World Health Organization (WHO) recommends targeted typhoid fever vaccination in typhoid endemic regions through school-based and high-risk vaccination campaigns [3]. Typhoid polysaccharide vaccines are licensed for use in children older than 2 years, limiting their use in routine immunization programs such as Expanded Program on Immunization (EPI) in typhoid endemic countries. School-based programs are considered an effective strategy to attain high vaccination coverage rates. The key issue in the feasibility and value of conducting a school-based typhoid vaccination program is the additional logistical support required to reach all eligible children. Parental refusal to accept their child's participation in a program affects vaccination coverage and in turn increases the cost per vaccine dose [4]. The influential reasons for parental acceptance and refusal in vaccination programs vary by region and country: from perceived vaccine efficacy, to perceived need for a vaccine, to perceived adverse events associated with vaccines and their cost. Socio-demographic factors also affect vaccination participation (e.g., a lack of risk perception for contracting the disease among the population with a high Socioeconomic Status (SES)) [5-8]. However, all of such concerns can be addressed through provision of adequate

***Corresponding author:** Imran Khan M, International Vaccine Institute, Seoul, Republic of Korea, E-mail: khan.m.imran@outlook.com

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information on the disease, the vaccination program, and the organization leading the effort [9].

Typhoid fever is very common in Nepal, and has had repeated outbreaks in the past. Multi-drug resistance *Salmonella* typhi and paratyphi are the most common infectious organism isolated from the blood stream of children [10]. Drinking water in Kathmandu valley is highly contaminated with *Salmonella* Typhi and Paratyphi [11]. Approximately 9000 cases of *S.* Typhi were isolated between 1993 and 2003 from only one hospital, highlighting the magnitude and burden of enteric infection in the valley. Currently there are two vaccine licensed for marketing globally. The injectable, single dose Vi polysaccharide vaccine, and live attenuated oral Ty21a vaccine that has a four dose schedule. Both vaccines are licensed for two years and older population. The duration of protection for injectable vaccine is three to seven years, whereas the oral vaccine is five to seven years [12]. The Vi-based Vaccines for Asia Initiative (ViVA) of the International Vaccine Institute (IVI) aimed to provide evidence for the feasibility and effectiveness of school-based typhoid vaccination to reduce the burden of typhoid fever in school-aged children (5-15 years). Children in this age group have high rates of typhoid fever. In addition, resistance to commonly used antibiotics continues to increase in south Asia and in Nepal [13]. The Vi vaccine pilot introduction project was developed with support from the IVI and implemented by the District Public Health Office of Lalitpur District, Kathmandu Valley, Nepal with a help of a non-governmental organization, MITRA Samaj between 2010 and 2013. A single dose of injectable typhoid polysaccharide vaccine was given through a mass vaccination campaign to the children attending the schools of Lalitpur District, Nepal. Coverage records showed that nearly 35% of eligible students did not receive the vaccine through the school-based program. Initial reasons for parental refusal during social mobilization campaign and vaccination monitoring indicated that there was a fear of the vaccination due to rumors and prior experiences with other prevention/treatment campaigns. Along with skepticism towards the general safety of the vaccine, prior information on experiences with the vaccine added to the concerns of the parents [14].

We collected information following the vaccination campaign in order to understand the reasons that either engaged or hindered parents' participation in typhoid vaccination campaign. Specifically, the study aimed to identify factors that influenced parents' decision to allow their child/children participation in the school-based mass vaccination.

Methodology

We conducted a household survey of the parents of children attending schools in the Lalitpur District, Nepal. Lalitpur district is the largest district in Nepal and has comparatively better access to health care. The content of the survey was based on the theory of the Health Belief Model, which involves assessing perceptions of the severity and risk for typhoid fever, and value of a vaccine to prevent the disease [15]. The survey was further based on former socio-behavioral evaluations and the literature on vaccine acceptance [16,17]. Issues that arose during the conduct of the social mobilization and the vaccination campaign were also considered in developing and modifying survey topics and response categories (e.g., reasons for not participating).

The Lalitpur District is divided into Lalitpur Sub-Metropolitan City (LSMC) District (comprised of urban and semi-urban populations) and rural Village Development Committees (VDCs). The District has a total of 109,051 students in 498 schools. These students were the target group for receiving the vaccine in the typhoid vaccination program. The study involved a cross-sectional design to assess demographic, social mobilization, communication, and vaccine acceptance factors related to participation in the vaccination campaign.

Sample size and sampling strategy

A stratified two-stage cluster sampling strategy was adopted to enroll respondents in the survey. The sampling element for the survey was a parent (mother/father) or a caretaker (e.g., grandparent) whose child was enrolled in a school in the Lalitpur District. A total 42 schools were randomly selected from the list of schools collected as part of the project. The schools were stratified by rural/urban setting, public vs private and vaccination coverage. Vaccination coverage was categorized into low (<50%), medium (50% - 65%) and high (>65%). The survey sampling design ensured representation of the target population to understand issues related to variation in participation and experience in the vaccination program. Assuming a probability that a non-participant is exposed to *Salmonella* Typhi at 0.73, detecting odds ratio of 2.0 for an association of participating in the vaccination campaign to exposure to typhoid fever, with a power of 90%, type I error at 1%, and design effect of 1.2, one class per school from 42 schools were enrolled.

The teams then visited the schools and randomly selected one class from the total number of classes in the school. An information slip was sent from the school through the teacher to schedule the interview time and date with the parents at their respective homes. During the visit, the survey teams collected information on the demography of respondents, their use of health care; their knowledge and perceptions of the symptoms of typhoid fever, their perceived risk of the disease, its severity, prevention and treatment, and the most useful sources and communication channels of information and social mobilization for the vaccination. It also collected information on reasons why parents did or did not allow their child to participate in the vaccination.

Data was collected through a structured questionnaire by trained field staff. Study teams extensively reviewed the questionnaire. Field staff received classroom training on the purposes and issues of the study, and data collection principles and procedures. There was a careful terminological and conceptual review of the items of the questionnaire, mock interviews and pilot testing of ten percent of total sample size. Revisions in the questionnaire were made where needed to ensure its intelligibility and conceptual accuracy. On a regular basis completed questionnaires were reviewed in the field, a detailed tracking list was maintained every day and daily debriefing was conducted to ensure the quality of the collected data.

Data Analysis

The data analysis involved descriptive statistics for sample demographics using Stata version 9.0. Pearson's chi square test was performed for categorical variables, along with t-tests and ANOVA for continuous variables to test statistically significant difference between groups. Based on the results from the descriptive analyses, adjusted analyses were performed to determine factors affecting vaccination participation using logistic regression analysis.

The research was approved by the Institutional Review Board (IRB) of the International Vaccine Institute, the Nepal Health Research Council and the Ministry of Health and Population of the Government of Nepal.

Results

Coverage and demographic results

A total of 1,248 interviews were conducted with parents of children from 42 schools. 965 interviewees (77%) were enrolled from the Lalitpur Sub-Metropolitan City and 283 (23%) from the Village Development Committees. Based on the vaccination coverage, 117 (9%) from low, 895 (71%) from medium and 236 (19%) from high coverage schools were enrolled (Table 1). A majority of the respondents (parents) had some form of formal education (85%). There was no statistical difference on average household members, monthly household income and household expenditure between the household where a child was vaccinated compared to where the child was not vaccinated (Table 2).

Vaccination Coverage	Number of participants						Total	
	Low		Medium		High			
Area	n	%	n	%	n	%	n	%
LSMC	71	7.36	741	76.79	153	15.85	965	77.3
VDC	46	16.25	154	54.42	83	29.33	283	22.7
Total	117	9.38	895	71.71	236	18.91	1248	

Table 1: Distribution of the study sample by area and vaccination coverage in the typhoid vaccination campaign in Lalitpur, Nepal.

LSMC=Lalitpur Sub-Metropolitan City

VDC=Village Development Committee

Variable	Received vaccine		Did not receive vaccine		Odd Ratio	95% CI for Odds Ratio
	Yes (893)		No (356)			
	N	%	N	%		
School attendance						
No	136	15.3	52	14.7	REF	
Yes	755	84.7	302	85.3	1.1	0.76 - 1.59
Education Level						
Primary	94	12.5	25	8.2	REF	
Lower Secondary	72	9.5	22	7.2	0.92	0.48 - 1.78
Secondary	158	21.0	64	21.1	0.69	0.4 - 1.19
Higher Secondary	166	22.0	74	24.3	0.6	0.34 - 1.05
Bachelor	185	24.5	87	28.6	0.56	0.32 - 0.98
Masters	79	10.5	32	10.5	0.61	0.32 - 1.17
Household member (Mean/SD)	5		4.75		1.06	0.99 - 1.13
Monthly Household Income (Mean/SD)	25308		30135		1	1
Monthly Household Expenditure					1.4	0.69 - 2.82

Table 2: Distribution and association of respondents' socio-demographic factors with participation in the typhoid vaccination campaign in Kathmandu, Nepal.

Disease and campaign related factors to participation

A parent was 2.3 times more likely to vaccinate their child if he/she thought that typhoid fever was a very serious disease compared to those who thought it was not a serious disease; 40% more likely to receive vaccine if they considered that cost of treatment would have an effect on their household budget compare to those who did not think typhoid disease would have an effect on their household budget; and 8 times more likely if they had the knowledge that typhoid can be prevented with a vaccine. For parents who thought that all household members should be vaccinated, their child was 4.4 times more likely to have received the vaccine (Table 3).

Variable	Received vaccine		Did not receive vaccine		Odd Ratio	95% CI for Odds Ratio
	Yes (893)		No (356)			
How serious of a disease is typhoid fever?						
Not serious	121	13.7	72	20.6	REF	
Serious	644	73.0	249	71.1	1.45	1.04 - 2.02
Very serious	117	13.3	29	8.3	2.31	1.39 - 3.83
Bearing the cost						
No	183	21.7	96	29.5	REF	
Yes	660	78.3	229	70.5	1.4	1.04 - 1.89
Do you think typhoid can be prevented by a vaccine?						
No	12	1.5	26	7.4	REF	
Yes	809	98.5	223	63.9	7.8	3.84 - 15.81
Do you think all members from your family should be vaccinated for typhoid?						
No	41	5.0	57	19.5	REF	
Yes	779	95.0	236	80.5	4.4	2.86 - 6.78

Table 3: Distribution and independent association of typhoid fever knowledge with participation in the typhoid vaccination campaign in Kathmandu, Nepal.

Sources of campaign information, consent and communication

If the parents had information about the vaccination campaign (OR=3.39; 95% CI: 2.5 - 4.6), and the information was conveyed by the child (OR=2.43; 95% CI: 1.86 - 3.17), teacher and/or a letter was sent by the school as a request for consent/permission to participate (OR=1.82; 95% CI: 1.41 - 2.36), their child was more likely to participate in the vaccination campaign (Table 4). Though concerns on adverse events related to vaccine were a significant factor in receiving the vaccine. However, if the parent discussed concerns with her/his respective health care provider and or the teacher at the school, she/he was seven times more likely to have her/his child receive the vaccine (OR=6.76; 95% CI: 1.61 - 28.35) (Table 4). In spite of finding the language technical, respondents who signed the consent/permission form were more likely to vaccinate their child (OR=4.51; 95% CI: 2.2 - 9.2) (Table 5). Among the sources of information that were used to inform the community about the vaccination campaign, if the parent had received the brochure from the school (OR=2.82; 95% CI: 2.12 - 3.75), had seen the banner outside school (OR=2.72; 95% CI: 1.79 - 4.13), and had heard public service messages (OR=1.7; 95% CI: 1.16 - 2.49), he/she was more likely to have his/her child vaccinated. Those parents whose children received the vaccine had a better recall of information material compared to those who did not vaccinate their children (Table 5).

School-based vaccination and participation in the vaccination

The parents who were encouraged to vaccinate their child by the school were more likely to vaccinate their child compared to those where the school did not encourage the vaccination (OR=3.2; 95% CI: 2.4 - 4.4) (Table 6). The parents who agreed to a school vaccination program (OR=3.5; 95% CI: 2.3 - 5.3), and wanted to be present at the time of vaccination (OR=1.6; 95% CI: 1.2 - 2.2) were more likely to

Variable	Received vaccine		Did not receive vaccine		Odd Ratio	95% CI for Odds Ratio
	Yes (893)		No (356)			
Typhoid vaccination campaign knowledge						
No	114	12.8	115	32.4	REF	
Yes	779	87.2	240	67.6	3.39	2.5 - 4.58
Typhoid Knowledge source - Child						
No	208	23.3	150	42.1	REF	
Yes	685	76.7	206	57.9	2.43	1.86 - 3.17
Typhoid Knowledge source - Letter from school						
No	456	51.1	234	65.7	REF	
Yes	437	48.9	122	34.3	1.82	1.41 - 2.36
Typhoid Knowledge source - Teacher						
No	815	91.3	344	96.6	REF	
Yes	78	8.7	12	3.4	2.48	1.32 - 4.65
Children could not receive vaccine (Mean/SD)	0.2		1.33		0.1	0.08 - 0.13
Concern of vaccine adverse effect						
No	771	89.2	207	71.6	REF	
Yes	93	10.8	82	28.4	0.3	0.21-0.42
Discussed AE concern with health care provider						
No	857	96.0	354	99.4	REF	
Yes	36	4.0	2	0.6	6.76	1.61-28.35
Discussed AE concern with teacher						
No	862	96.5	352	98.9	REF	
Yes	31	3.5	4	1.1	2.96	1.03-8.52

Table 4: Distribution and independent association of campaign knowledge with participation in the typhoid vaccination campaign in Kathmandu, Nepal.

vaccinate their child. Nevertheless, there was disagreement with the idea that schools may not be capable of handling an emergency in case a child experienced an adverse event following vaccination. Parents were more likely to trust the organization (district public health office) that conducted the campaign compared to those who did not vaccinate their child (Table 6).

Key factors independently associated with participation in the typhoid vaccination

The adjusted analysis across the multiple influential variables showed that the parents who had information on the vaccination campaign (OR=3.0; 95% CI: 1.9 - 5.0), considered that typhoid can be prevented by a vaccine (OR=9.0; 95% CI: 4.2 - 19.7), and had received a consent/permission letter from the school (OR=2.0; 95% CI: 1.3 - 3.2), were more likely to have their child vaccinated in the school based vaccination program in district Lalitpur Nepal. In addition, those that were concerned about adverse events following immunization (OR=0.3; 95% CI: 0.2 - 0.6) and did not have confidence in the organization conducting vaccination program (OR=0.2; 95% CI: 0.1 - 0.7) were less likely to vaccinate their child (Table 7).

Discussion

Our results provide important insights into factors associated with participation in a school-based, typhoid vaccination program in the Lalitpur. We also assessed how social mobilization and the

Variable	Received vaccine		Did not receive vaccine		Odds Ratio	95% CI for Odds Ratio
	Yes (893)		No (356)			
Did you receive any information about the typhoid vaccination program from the school?						
No	79	9.3	80	27.8	REF	
Yes	775	90.7	208	72.2	3.98	2.8 - 5.68
What information did you receive? Vaccinate your children						
No	468	52.4	262	73.6	REF	
Yes	425	47.6	94	26.4	2.46	1.87 - 3.23
Did you get a permission letter from school that was asking your permission for vaccinate your child?						
No	120	14.4	68	25.0	REF	
Yes	716	85.6	204	75.0	1.93	1.37 - 2.71
Did you have any reservations in signing the form requesting your permission for vaccinating?						
No	579	83.5	146	76.0	REF	
Yes	114	16.5	46	24.0	0.61	0.41 - 0.91
Did you/other responsible person sign the form?						
No	17	2.4	17	8.4	REF	
Yes	702	97.6	186	91.6	4.51	2.2 - 9.25
Did you think the information in the permission form was too technical?						
No	438	74.2	126	85.7	REF	
Yes	152	25.8	21	14.3	2.28	1.36-3.82
We distributed a brochure that was given to the child to bring it to you. Did you receive it?						
No	364	44.7	206	68.7	REF	
Yes	451	55.3	94	31.3	2.82	2.12-3.75
Did you think the brochure had enough information required making a decision of vaccinating your child?						
No	8	3.0	9	19.6	REF	
Yes	256	97.0	37	80.4	9.16	3.19-26.3
Able to recall any information from the brochure?						
No	739	82.8	330	92.7	REF	
Yes	154	17.2	26	7.3	2.75	1.77-4.26
Able to recall: Typhoid is dangerou						
No	798	89.4	337	94.7	REF	
Yes	95	10.6	19	5.3	2.16	1.28-3.65
Saw the campaign banner outside the school?						
No	685	76.8	306	90.3	REF	
Yes	190	21.3	29	8.6	2.72	1.79-4.13
Did not accompany the child	17	1.9	4	1.2	1.98	0.65-5.99
Saw the campaign poster in the school?						
No	719	80.6	298	87.9	REF	
Yes	152	17.0	32	9.4	1.92	1.27-2.89
Did not accompany the child	21	2.4	9	2.7	1.05	0.47-2.33
Did you hear about typhoid on the radio during the vaccination program?						
No	737	82.5	315	89.2	REF	
Yes	156	17.5	38	10.8	1.7	1.16-2.49
Did you think the public service message on radio was informative?						

No	7	8.4	2	11.8	REF	
Yes	76	91.6	15	88.2	1.33	0.24-7.34

Table 5: Distribution and independent association of the consent process, project communication and social mobilization with participation in the typhoid vaccination campaign in Kathmandu, Nepal.

Variable	Received vaccine		Did not receive vaccine		Odd Ratio	95% CI for Odds Ratio
Did your child's school encourage you to vaccinate your child?						
No	218	27.2	123	53.9	REF	
Yes	584	72.8	105	46.1	3.24	2.38 - 4.41
Do you think the fact that this vaccination program was being conducted at the school influenced your decision of participation in the campaign?						
No	268	32.7	174	69.3	REF	
Yes	552	67.3	77	30.7	4.83	3.54 - 6.58
Do you think the fact that this vaccine was given free influenced your decision of vaccinating/not vaccinating?						
No	623	75.7	188	75.2	REF	
Yes	200	24.3	62	24.8	0.94	0.67 - 1.32
Do you think schools are an acceptable place for vaccinating children?						
No	49	5.6	55	17.6	REF	
Yes	825	94.4	258	82.4	3.49	2.3 - 5.28
Are you satisfied with the way the vaccination program was conducted?						
Not satisfied	7	0.8	27	17.6	REF	
Satisfied	739	88.7	125	81.7	23.17	9.85 - 54.5
Very Satisfied	87	10.4	1	0.7	319.5	37.6 - 2718.1
The vaccine should be given at a health clinic?						
Agree	346	39.4	148	44.2	REF	
Disagree	533	60.6	187	55.8	1.25	0.97 - 1.62
The child will miss a school day in case the vaccination						
Agree	530	60.2	223	66.6	REF	
Disagree	350	39.8	112	33.4	1.24	0.95 - 1.62
I want to be present while my child receives the vaccine						
Agree	656	74.6	282	81.7	REF	
Disagree	223	25.4	63	18.3	1.61	1.18 - 2.21
In case something happens to my child, school is not prepared to handle the situation						
Agree	175	31.1	51	18.3	REF	
Disagree	563	100.0	227	81.7	0.69	0.49 - 0.98
We are not sure of the competitiveness of the staff conducting the vaccination.						
Agree	251	31.3	101	34.8	REF	
Disagree	551	68.7	189	65.2	1.33	0.99 - 1.78
The organization conducting the vaccination campaign is important						
Agree	862	98.4	317	93.0	REF	
Disagree	14	1.6	24	7.0	0.22	0.11 - 0.44

Table 6: Distribution and independent association of factors related to the4 school- based vaccination affecting decision making o and participation in the typhoid vaccination campaign in Kathmandu, Nepal.

dissemination of communication material and activities affected participation. We explored the importance of vaccination campaign logistics, such as the consenting process as affecting participation in the vaccination program with a vaccine that is not given in routine

Household Income (UNIT)		
< 17,000	1	
17,001 - 30,000	1.1	0.7 - 1.8
> 30,000	1.7	0.4 - 1.1
Can typhoid be prevented with a vaccine?		
No	1	
Yes	9.1	4.2 - 19.7
Concern of Adverse Event		
No	1	
Yes	0.3	0.2 - 0.6
Information on Typhoid campaign		
No	1	
Yes	3	1.9 - 5.0
Permission Slip		
No	1	
Yes	2	1.3 - 3.2
Organizational Confidence		
Agree	1	
Disagree	0.2	0.1 - 0.7

Table 7: Adjusted effect of factors affecting participation in the typhoid vaccination campaign in Kathmandu, Nepal.

immunization program in Nepal. Our results suggest that participation in a vaccination program is built over a long duration through parental education about the benefits of vaccines, the reputation of the organization in their handling previous community or school-based programs, and regular and proper communication with the parents. Our results are consistent with the findings globally and in Asia on a perceived risk of the disease, knowledge and confidence over the vaccines, and a communication channel by which parents are informed about the vaccine benefits to the children and the population in general [18-20].

The routine immunization coverage for Nepal is one of the highest in the in South Asia (coverage rate of 90% for Diphtheria, Tetanus and Polio (DTP3))[1]. The DTP3 coverage has improved from 72% in 2001 to 90% in 2012. However, the vaccination campaign for typhoid in an urban and semi-urban setting could only achieve 71%. School vaccination coverage is usually higher than vaccination at health posts due to access to a group of children, especially in areas where school enrolment is high, such as Nepal[2]. The comparatively lower vaccination participation in our study highlights the importance of parental confidence, knowledge and communication of the vaccination administration group with the target population. The results of adjusted analyses indicate that there were three important areas that determined the participation: individual knowledge of disease and vaccine safety, information and communication, including prior information on the campaign, and communication by the school administration staff with the parents through permission slips, and prior experience with the vaccination administration authorities. Although vaccine demonstration projects do focus on social mobilization and communication as was in this project, a sustained effort over time as opposed to a short term strategy will have more beneficial effects. We did not find a statistically significant effect in usage of any particular social

1 - http://www.who.int/immunization_monitoring/data/npl.pdf

2 - http://www.unicef.org/infobycountry/nepal_nepal_statistics.html#103

mobilization and communication material on the vaccination participation. The permission slip/consent form had a statistical significant effect on vaccination participation; however, we are unable to differentiate the effect of permission slip/consent form from the effect of a message from school. This could possibly have been due to the regular communication between the parents and the school and not just because of the letter as a mode of communication. We adjusted our final model for the income group, but we did not find a statistically significant association of parental socio-demographic factors with vaccination participation.

Information communication and social mobilization plays an important role in all public health programs especially in vaccine programs. New vaccine introduction in a country is a critical step and should involved bringing in major stakeholders, and the community. The recent examples of such efforts are introduction of strep. Pneumococcal Vaccine, Rotavirus Vaccine, and Human Papilloma Virus Vaccine. These vaccine introduction initiatives have from the very beginning have focused on population information need and the channels that will affect decision making in vaccine update. The global polio eradication campaigns in India proved that community engagement plays an important achieving vaccination targets.

The study has limitations that are mentioned here that limits are analysis of these variables with the outcome. 1) Parents' educational background, financial backgrounds, and cultural backgrounds can have huge impacts on this study. Comprehensive background information on respondents was not collected; 2) more than two thirds of our sample is from the metropolitan area.

Conclusion

Vaccination campaigns with vaccines that are being newly-introduced in a country's immunization program often focus on short term strategies for information communication and social mobilization. The factors that determine compliance with a new intervention need a long-standing channel of communication between the organizing group and the target population. This may not be possible with projects such as ours; however, the results need careful interpretation if participation in intervention studies is found to be lower compared to routine programs. Additionally, prior experience and knowledge of disease and the intervention play a major role for wider coverage of preventive programs in the desired population, such as vaccines.

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