Vaccine 34 (2016) 1719–1725

Contents lists available at ScienceDirect

Vaccine

journal homepage: www.elsevier.com/locate/vaccine

Use of rapid needs assessment as a tool to identify vaccination delays in Guatemala and Peru

Katie K. D'Ardenne[a], Juliana Darrow[b], Anna Furniss[c], Catia Chavez[b,c], Herminio Hernandez[d], Stephen Berman[a,b], Edwin J. Asturias[a,b,*]

[a] Department of Pediatrics, University of Colorado School of Medicine, Aurora, CO, USA
[b] Center for Global Health, Colorado School of Public Health, Aurora, CO, USA
[c] Adult and Child Consortium for Health Outcomes Research and Delivery Science (ACCORDS), Aurora, CO, USA
[d] School of Medicine and Public Health, University Cayetano Heredia, Lima, Peru

ARTICLE INFO

Article history:
Received 19 September 2015
Received in revised form 24 January 2016
Accepted 25 January 2016
Available online 19 February 2016

Keywords:
Rapid needs assessment
Immunization delays
Peru
Guatemala
Rotavirus
Measles
Pentavalent
Vaccines

ABSTRACT

Objective: To explore the use of rapid needs assessment (RNA) surveys to determine the prevalence and factors contributing to delays in vaccination of children in two low middle-income countries (LMIC).
Methods: Data from two RNA surveys performed as part of program improvement evaluations in Guatemala and Peru were used for this analysis. The primary endpoint was the timeliness of immunization with delay defined as administration of vaccines beyond 28 days from recommended age for DTwP-HepB-Hib (Penta) and measles–mumps–rubella (MMR) vaccines, as well as past age-restrictions for rotavirus vaccine. Independent risk factors analyzed included child's gender, birth year, number of children in household, maternal age, maternal education, and food insecurity.
Results: Vaccine information was available from 811 children from 838 households surveyed. High rate of immunization delays was observed, with 75.6% of children in Guatemala and 57.8% of children in Peru being delayed for the third dose of Penta primary series. Factors associated with delayed vaccination in Guatemala included advanced maternal age and increased number of children in household. In Peru, significant associations were birth year before 2009, lower maternal education level, and increased number of children in household.
Conclusions: RNA is a fast and effective method to identify timely vaccine coverage and derive a hypothesis of factors possibly associated with vaccination delay.

1. Introduction

Immunization has proven to be the most effective way to prevent childhood infectious diseases at the individual and population levels when administered before the period of risk. Delays in vaccination not only expose children to infections at the time they are most vulnerable, but also place them at risk for never completing their immunization schedule [1,2]. Worldwide, the Global Vaccine Action Plan (GVAP) goal – endorsed by the 194 Member States of the World Health Assembly in May 2012 – seeks to make the benefits of immunizations equitably extended to all people "reaching every community" and engaging underserved and marginalized groups by 2020. The World Health Organization (WHO) has issued immunization guidelines that address the recommended number of doses that can be adapted to each individual country's immunization strategy [3].

Latin America is a pioneer and model region for immunizations that has resulted in the elimination of measles and congenital rubella [4]. Most countries report 90% or more national coverage of immunization in young children; however timeliness of vaccination remains a challenge [4,5]. This trend holds true globally, as studies have shown difficulty in reaching the last 10–15% of unimmunized children in most of low and middle-income countries (LMIC) due to multiple factors associated with immunization delays [6–14]. There is no standardized method to evaluate immunization delay; past studies have utilized a wide range of statistical methods including case control studies, retrospective studies, and cross-sectional survey studies [15]. To our knowledge, no study has utilized a rapid needs assessment (RNA) to evaluate vaccine coverage and factors that could be contributing to immunization delay.

RNA is a fast and reliable tool that can be utilized to quickly develop an initial understanding of a community health status

* Corresponding author at: Center for Global Health, 13199 East Montview Blvd, Suite 310, Aurora, CO, USA. Tel.: +1 303 724 6282; fax: +1 303 72 46286.
E-mail address: edwin.asturias@ucdenver.edu (E.J. Asturias).

http://dx.doi.org/10.1016/j.vaccine.2016.01.060
0264-410X/

Table 1
Baseline demographic characteristics of mothers and children participating in the rapid needs assessment surveys in Guatemala and Peru 2010–12.

Demographic	Level	Guatemala (n = 313)		Peru (n = 498)	
		N	Percent[a]	*N*	Percent[a]
Gender of child	Male	167	53.5	252	51.1
	Female	145	46.5	241	48.9
Child's age (years)	Mean (median)	312	3.0 (3)	492	2.3 (2)
	0 to =1 years	43	13.8	122	24.8
	<1 to =2 years	57	18.3	98	19.9
	<2 to =3 years	65	20.8	104	21.1
	<3+ years	147	47.1	168	34.1
Cohort	Early cohort (<2009)	161	51.6	117	23.8
	Late cohort (≥2009)	151	48.4	375	76.2
Number of children <15 years in household	Mean (median)	313	3.8 (3)	498	3.3 (3)
	1 child	45	14.4	105	21.1
	2–5 children	201	64.2	310	62.2
	>5 children	67	21.4	83	16.7
Mother's age (years)	Mean (median)	313	28.0 (26)	497	28.4 (27)
	18 & younger	25	8.0	34	6.8
	19 to <25 years old	98	31.3	151	30.4
	25 to <35 years old	126	40.3	203	40.8
	35 and older	64	20.4	109	21.9
Mother's education	None	65	21.2		
	Primary	151	49.3	138	28.0
	Secondary/advanced	90	29.4	355	72.0
Food security	Food insecure	217	69.3	200	40.2
	Food secure	96	30.7	298	59.8

[a] Percent reported unless indicated to be mean (median).

and develop hypotheses for future studies and interventions [16]. We took advantage of data available from two RNAs coordinated by the Center for Global Health (CGH) of the Colorado School of Public Health to evaluate maternal and child health programs in Guatemala and Peru to estimate the timeliness of immunization and identify possible factors associated with delays in vaccination.

2. Methods

2.1. Population

Rural communities in the southwest departments of Quetzaltenango and San Marcos in Guatemala, as well as rural and urban communities in the Loreto Region of Peru, were surveyed as part of two RNAs conducted by the CGH and aimed at evaluating maternal-child health needs and program outcomes. Both surveys were considered to be program evaluation rather than human subject research by the Colorado Multiple Institutional Review Board, and therefore informed consent was not required. Interviews were conducted with mothers of children less than 5 years of age who resided in the target communities. In Guatemala, the RNA was designed to evaluate the impact of "Mis Mejores Familias" (MMF), a local health education program intended to improve maternal and child well-being [17]. Preliminary results on vaccine coverage by age in the MMF vs. non-MMF children in Guatemala showed no significant differences, allowing us to use both populations for this study. The target communities in Peru were part of the area of influence of Centura Health's Global Health Initiative on-going maternal-child health programs [18]. Guatemala offers free access to vaccines through the Ministry of Health [19]. Peru has a decentralized health care system, where the Ministry of Health accounts for 60% of coverage, and a combination of private and public insurance accounts for the remaining [20]. Regions targeted by this study in both Guatemala and Peru are considered to be underserved in healthcare resources.

2.2. Design and data abstraction

The RNA surveys consisted of a 90-item questionnaire administered by students and community health workers under the coordination of the CGH in October 2011 in Guatemala and July 2012 in Peru. Families were identified using a cluster sampling technique following the Lot Quality Assurance Sampling (LQAS) method adapted from the WHO [21,22,23]. Thirty clusters of seven households were included in Guatemala using the house of a MMF program participant as the index for each cluster. In Peru, thirty clusters of seven households were selected at random using health districts maps from both urban and rural zones, for a total of sixty clusters. A sample size of 210 households for each area was chosen as per LQAS, plus 30% additional households to account for missing data. For both countries, random selection was done by proceeding to the third house on the left from the previous participant whenever possible. There were no recorded instances of participation refusal; however when a family was absent from the home the surveyors proceeded to an additional house to the left. Mothers were interviewed in privacy of their homes with no other members of the household present whenever possible. Immunization information was obtained from the child's vaccination card. If a vaccination card was not available, the survey was completed leaving the vaccine information blank. For this analysis, children in whom vaccination card information was absent or who were younger than 6 weeks, and therefore ineligible for the targeted vaccines, were excluded.

Data from the Guatemala RNA was entered using Teleform® software (Cardiff, USA), and for the Peru RNA using RedCap® (Vanderbilt University, TN, USA). Both data sets were de-identified at export and no personal information was available to the investigators for this analysis.

2.3. Definition of vaccination delay

The primary endpoint of this analysis was the timeliness of immunization categorized as delayed or not delayed for each