Risk factors for low vaccination coverage among Roma children in disadvantaged settlements in Belgrade, Serbia

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ABSTRACT

Background: Full vaccination coverage for children under 59 months of age in Serbia is over 90%. This study assesses vaccination coverage and examines its association with birth registration among Roma children who resided in disadvantaged settlements in Belgrade, Serbia.
Methods: The First Roma Health and Nutrition Survey in Belgrade settlements, 2009, was conducted among households of 468 Roma children between the ages of 6–59 months. The 2005 WHO Immunization Coverage Cluster Survey sampling methodology was employed. Vaccinations were recorded using children's vaccination cards and through verification steps carried out in the Primary Health Care Centers. For those who had health records the information on vaccination was recorded.
Results: About 88% of children had vaccination cards. The mean rate of age appropriate full immunization was 16% for OPV and DTP and 14.3% for MMR. Multivariate analyses indicated that children whose births were registered with the civil authorities were more likely to have their vaccination cards [OR = 6.1, CI (2.5, 15.0)] and to have their full, age appropriate, series vaccinations for DTP, OPV, MMR and HepB [OR = 3.8, CI (1.5, 10.0), OR = 3.2, CI (1.5, 6.6), OR = 4.8, CI (1.1, 21.0), OR = 5.4, CI (1.4, 21.6), respectively].
Conclusions: The immunization coverage among Roma children in settlements is far below the WHO/UNICEF MDG4 target in achieving prevention and control of vaccine preventable diseases. It demonstrates the need to include "invisible" populations into the health systems in continuous, integrated, comprehensive, accessible and sensitive modes.

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1. Introduction

Roma people are Europe's largest and most vulnerable minority group, highly concentrated in Central and Eastern Europe [1]. According to the 2002 Census of the Republic of Serbia, 108,193 citizens declared themselves as Roma [2]. However, reports which include non-citizens reveal numbers in the range of 400,000–800,000 people [3]. The vast majority of domestic Roma have been living in Serbia for their entire life and have access to all State services. The internally displaced (IDP) and refugee Roma moved to Serbia proper during the decade of turmoil, in the 1990s, mostly from Kosovo. Many of the last two groups could not fulfill the specific requirements that were needed to ensure access to State services in general, and health services in particular [4].

According to a United Nations Development Fund (UNDP) Regional Survey, 31% of Roma lived in households with a per-capita income below \$4.30 [5]. In the same survey, 96% of Roma lived in households that faced at least three out of nine deprivations according to the European Union (EU) index [5]. A 2006 United Nations Children's Fund (UNICEF) report indicated that 80% of Roma children, living in Roma settlements, were considered to be poor [6]. Additionally, a 2010 study on Roma living in Bulgaria, Romania and Hungary found that Roma were more likely to report worse health in all indicators in the three countries, and were more likely to be at risk of illness due to unhygienic conditions [7].

In calculating immunization coverage, the Serbian Ministry of Health uses children who are registered as citizens as the denominator. Children who completed age appropriate vaccinations are included into the numerator, on the basis of the National Immunization Schedule [8]. Data from the Serbian Public Health Institute indicate that the national average for immunization coverage is over 90% for recommended vaccines [9].

In 2009, the World Health Organization (WHO) Country Office in Serbia carried out the First Roma Health and Nutrition Survey in Belgrade household settlements. In this paper we examine the prevalence and risk factors for low immunization among Roma children living in these settlements.

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2. Methods

The First Roma Health and Nutrition Survey in Belgrade was implemented through a two-stage cluster sampling methodology used in the 2005 WHO Immunization Coverage Cluster Survey [10]. Roma children aged 6–59 months who resided in Roma settlements in Belgrade were the target population.

The primary clusters of 62 Roma settlements were randomly selected from the list of 104 settlements in Belgrade, identified through a pre-assessment phase. The calculated sample size was 12 children from 45 settlements. To compensate for under-response, 51 settlements were randomly selected and the head of the household of 468 children consented to participate in the study (response rate of 76%). The selection of secondary clusters which comprised of households included the following steps: spanning a pencil in a central location in each settlement, selecting the first household in that direction and continuing in both directions until a household that included women 15–49 years of age, and one to three children between 6 and 59 months was found. That household was the first to be interviewed, then continuing to the next house on the right until a total of at least six children aged 6–59 months was reached, in each direction. In cases where only five children were interviewed upon reaching the last household and that household had more than one child, data were collected for all family members.

To allow for comparisons with previous surveys carried out among Roma in Serbia, the questionnaire included questions from the Living Standard Measurement Survey (LSMS) developed by the World Bank (WB) and the Multiple Indicator Cluster Survey (MICS), developed by UNICEF. It also included questions from the EU 7 questionnaire, International Organization for Migration (IOM) civil-legal status and migration questionnaire and WHO STEPS survey. Some questions were taken from the National Health and Nutrition Surveys of the Republic of Serbia and the Republic of Montenegro.

The household questionnaire consisted of six-modules: household and individual demographics, social support, health status, occupational health and safety, women's health and the health of children less than five years of age. These modules covered housing conditions and durable goods, education, health status and use of health services, employment, social protection, migration, as well as food intake and nutritional assessment. For children between the ages of 6–59 months, specific questions on medical care provided in the two weeks prior to the survey and breastfeeding practices were included. Information on their immunization uptake was retrieved, when available, from their vaccination cards, shown by the parent.

A local Roma NGO was tasked for the interviews and anthropometric measurements. Questionnaires were completed for a parent and her/his children who resided with her/him in the household, even if there were more than six children between 6 and 59 months of age. Each day, the WHO team reviewed the filled questionnaires, and followed up on an average, 12% of uncompleted questionnaires. A repeated interview was carried out for 20% of households, following the maps provided by interviewers, and replies were compared. For children who did not possess vaccination cards, a verification step was carried out in which WHO staff looked for their health records in the Primary Health Care Centers that covered their settlements. For those who had records, the vaccination information was recorded.

The two dependent variables examined were physical possession of an immunization card, used as an indicator for accessibility to health services and complete immunization status. Complete vaccination, "yes" or "no," was defined as having a timely vaccination for respective vaccines, according to age, as required by the Serbian Immunization Schedule. Coverage was established by the following: (1) for children less than 17 months-one dose of Bacillus Calmette-Guerin (BCG) and measles, mumps, rubella (MMR), three doses of hepatitis B (HepB), oral polio virus (OPV) and diphtheria,

Table 1
Demographic characteristics of Roma children, 6–59 months, and their households living in Belgrade, Serbia settlements.

Variables	N (%)	95% CI
Age		
6–11 months	46 (9.8)	(7.40, 12.26)
12–23 months	115 (24.6)	(20.92, 28.22)
24–35 months	85 (18.2)	(14.80, 21.53)
36–47 months	113 (24.1)	(20.01, 28.28)
48–59 months	109 (23.3)	(20.03, 26.55)
Sex		
Male	237 (50.6)	(45.77, 55.51)
Female	231 (49.4)	(44.49, 54.23)
Vaccination card		
Yes, seen	412 (88.0)	(83.24, 92.83)
Yes, not seen	56 (12.0)	(7.17, 16.76)
Birth registered		
Yes	411 (87.8)	(6.95, 17.40)
No/do not know	57 (12.2)	(6.95, 17.40)
Place of birth		
Not in hospital	5 (1.1)	(0.16, 2.03)
Public hospital	453 (96.8)	(97.97, 99.84)
Missing	10 (2.1)	–
Mother's education		
Less than primary	276 (59.0)	(50.52, 67.43)
Primary or greater	192 (41.0)	(32.57, 49.48)
Main income		
Waste collection	187 (39.96)	(30.15, 49.76)
Non-waste collection	281 (60.04)	(50.24, 69.85)
Type of settlement		
Illegal	196 (41.88)	(27.60, 56.16)
Legal	272 (58.12)	(43.84, 72.40)

tetanus, pertussis (DTP) or (2) for children 17 months of age or older-one dose of BCG and MMR, three doses of HepB, and four doses of DTP and OPV. The definition of complete vaccination was established only if vaccination cards were physically shown or data retrieved from the records in the primary health care centers.

The independent variables examined were birth registration status, dichotomized either "registered" or "not registered/unknown", mother's education, categorized as less than primary education or primary education or higher, and sex. Other household variables included main source of income, "waste collection" or "other," waste collector occupation, "collector" or "other," and the type of settlement, legal or illegal.

2.1. Statistical methods

Univariate analysis was used to estimate frequencies and 95% confidence intervals for categorical variables. Unadjusted odds ratios and 95% confidence intervals were estimated from bivariate analysis to assess the association between vaccination card status and timely vaccinations, doses required by 17 months of age, by the variables mentioned above. A chi-square test was used to examine the significance of the association or a Fisher's exact test was utilized if cell counts were below five.

To take into account the cluster sampling strategy, multiple logistic regression analysis, based on a generalized estimating equation using a binomial distribution, was used to compute adjusted odds ratios with 95% confidence intervals, to assess the relationship between vaccination card status and for complete immunizations, those required by 17 months of age, and potential factors for low immunization. Data was analyzed using SAS 9.2.

3. Results

A total of 468 children between 6 and 59 months of age were included in the analyses. Over half of the children were 12 months of age or older, equally distributed between girls and boys (Table 1).