

Evaluating progress towards the elimination of hepatitis B in children in Colombia: a two-phase study

Cielo Yaneth Rios-Hincapié¹; Annemarie Wasley²; Alba Maria Ropero³; Bertha Gómez³; Rania Tohme², Diana Librado¹; Brigitte Neffer Forest¹; Rocío Murad-Rivera⁴; Sandra Marcela Sánchez-Molano⁴; Carlos Eugenio Delgado⁴; Juan Carlos Rivillas-García⁴

¹ Directorate of Promotion and Prevention, Ministry of Health and Social Security of Colombia

² U.S. Centers for Disease Control and Prevention (CDC)³ Pan American Health Organization, PAHO/WHO

⁴ Research Directorate, Profamilia Association

Introduction: The Global Health Sector Strategy (GHSS) on Viral Hepatitis (1) includes a goal to achieve the elimination of hepatitis B virus infection (HBV), defined as a prevalence of hepatitis B surface antigen (HBsAg) of $\leq 0.1\%$ among children by 2030. Verifying HBV elimination using nationally representative serosurveys as is recommended for verifying hepatitis B control targets requires large sample sizes and substantial resources. In Colombia, we piloted a potentially more resource efficient alternative in which a risk assessment was conducted using existing data to identify areas most likely to have ongoing HBV transmission followed by a focused classification serosurvey in those areas.

Methods: In the first phase, we assessed the risk profile for HBV infection in each of the 1122 municipalities using data on reports of HBV in pregnant women received through notifiable disease surveillance, third dose coverage with hepatitis B vaccine (hepB3), and the percentage of births occurring in health facilities. Hepatitis B seroprevalence data from previous studies were also considered. In the second step, a population-based multistage cluster survey of households was conducted in 36 municipalities assessed as being at highest risk. The survey was designed as a classification survey (2) to assess the likelihood that the prevalence of HBV infection in children 5-10 years of age in those areas was at or below the target prevalence of 0.1% (vs alternative threshold of 0.4%). 395 enumeration areas, randomly selected from the targeted municipalities with probability proportional to size, were each divided into segments of approximately 30 households and one segment was randomly selected. One 5-10-year-old child per household was randomly selected for inclusion. A questionnaire was administered to the mother/guardian about the immunization history (card-documented or self-reported), access to health care and other characteristics of the selected child and a 75ul blood sample collected from the child was tested for HBsAg using the VIKIA[®] HBsAg rapid test (bioMérieux SA, Marcy-l'Etoile, France) (sensitivity: 98.92%; specificity: 99.79%). Survey data were analyzed with SPSS[®] 25.0. In addition to basic descriptive statistics, population level estimates of immunization coverage and other parameters were calculated using methods that account for complex survey design through the application of weights reflecting the probabilities of selection at each stage in the survey. Wilson and exact confidence limits were calculated for HBsAg prevalence estimate (3).

Results: A total of 3203 children were enrolled across 3409 households visited for a response rate of 94%. 35 of 36 targeted municipalities were included in the survey. 52% of children had a vaccination card available at the time of the survey; in absence of a card, vaccination history was determined based on oral report of parent/guardian. Using both sources, hepB3 coverage was 96.1% (95.1%, 97.1%) and coverage with hepB birth dose (hepB BD) was 94.5% (93.3%, 95.7%). Among those reported with card confirmed receipt of hepB BD, 30.2% received it 2 or more days after birth with 18.8% receiving it 7 or more days

after birth. Of 3203 children tested for HBsAg, none were positive and 95% one sided confidence limits for prevalence of HBsAg were <0.1%. (exact: 0.09%; Wilson: .08%).

Discussion: In Colombia, use of a two phased approach of risk assessment followed by a focused classification serosurvey in areas assessed as most at risk of having ongoing HBV transmission provided useful information to assess the likelihood that the country has achieved elimination of hepB in children. The identification of no infections in a large probabilistic sample of children in the assessed high-risk municipalities suggests that prevalence of HBV infection in children in those areas is highly likely to be at or below elimination target of 0.1%. The confirmation of high coverage with hepB vaccine including birthdose in those areas, many of which are remote and/or economically challenged, strengthens conclusions that elimination has been achieved in these areas and likely in the country as a whole. The use of this type of approach requires tailoring to the setting in which it is applied, with feasibility dependent upon having necessary data for a thorough risk assessment and sufficient resources to conduct a high-quality classification seroprevalence survey.

References:

1. World Health Organization (2016) Draft global health sector strategy on viral hepatitis 2016-2021 WHO: 2016. http://apps.who.int/gb/ebwha/pdf_files/WHA69/A69_32-en.pdf?ua=1
http://apps.who.int/immunization_monitoring/globalsummary/estimates?c=COL
2. World Health Organization (2018) Vaccination Coverage Cluster Surveys: Reference Manual. Geneva: World Health Organization; 2018 (WHO/ IVB/18.09)
3. Wilson, E. B. (1927). Probable Inference, the Law of Succession, and Statistical Inference. Journal of the American Statistical Association , 209-212.