Original Research

Vaccination coverage among children and adolescents below 18 years of age in French Guiana: inventory and determinant factors

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ABSTRACT

Objective: The purpose of this study was to estimate the vaccination coverage (VC) rate in persons aged from 9 months to 18 years and to describe it according to the predictive factors of good vaccination status.

Study design: Descriptive and etiological study.

Methods: The study involved 1332 persons aged below 18 years and members of 521 representative households in French Guiana. VC was estimated by the proportion of people with complete immunization for 13 vaccines (four mandatory, seven recommended, and two specific). This vaccination status was described in terms of sociodemographic characteristics. The relationship between vaccination status and predictive factors was analyzed in a hierarchical mixed, polytomic, and ordered regression model.

Results: For compulsory vaccination, VC was 81.2% for yellow fever, 63.4% for diphtheria, 61.7% for tetanus, and 61.6% for poliomyelitis. The proportion of people with complete immunization for recommended vaccines remains well below 50% (11.7% for pneumococcus and 6.2% for meningitis). Regardless of the vaccine, respondents aged 3–7 years were 2.5 times more likely to have an up-to-date vaccination compared to respondents younger than 3 years of age (P < 0.001).

Conclusion: The VC observed in this study is still below the departmental objectives. The link between age and vaccination status could be explained by the efforts of the national education authorities to systematically check health cards for preschool and school enrollment.

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Introduction

The vaccination coverage (VC) is the proportion of people vaccinated in a population at a given time. For a specific vaccine, the rate is the ratio of the number of people actually vaccinated to the total number of people who should be vaccinated in a given population during a given period.[1] In individual terms, a person covered by a vaccine received, at a given age, the number of doses of vaccine recommended at that age.[2] The estimations of VC are frequently based on a series of surveys of target populations as in the expanded program on immunization (EPI) of the World Health Organization (WHO).[3]

Indeed, measurement of VC is not only necessary to assess the effectiveness of vaccination programs but also to determine the degree of protection of a population against infectious diseases. Sufficient vaccination coverage will protect a population against a given disease, while insufficient coverage will make the disease persist in the population with the possibility of epidemic outbreaks.[2] The demonstrated effectiveness of some national immunization programs has led to the control or even eradication of certain pathologies in the world.[4]

In 2004, workshops were organized in Cayenne with the aim of elaborating the main lines of an EPI adapted to the region of Guiana. The main objectives of this program were to achieve a 95% VC for each vaccine targeted by the EPI and, in the short term, allow more than 95% of children living in isolated communes (or river towns) to be vaccinated.[5] This would prevent the resurgence (diphtheria), eradication (Measles—Mumps—Rubella: MMR) and control (hepatitis B) of vaccine-preventable diseases.

To achieve this, the establishment of an estimation framework and monitoring of VC seemed obvious. In France, the Institute for Public Health Surveillance ('Institut de Veille Sanitaire', InVS) has documented and analyzed all the methods used to evaluate vaccination coverage in relation to the vaccination policy in force. At the end of this analysis, the use of the health record and the vaccination record seems to be the most widely used method for estimating VC.[6]

In French Guiana, the rapid growth (population growth rate estimated at 3.9% in 2007)[7] of the population and the multiculturality are two characteristics that must be taken into account for a better estimation of the VC. In addition to this ethnic and cultural diversity, French Guiana receives a flow of irregular immigrants facilitated by the natural and uncontrollable nature of the borders. This mass influx of people, most often in an irregular situation, remains difficult to assess in terms of numbers, and we have little information about their VC at the time they arrive. This low VC may increase the risk of emergence or reemergence of vaccine-preventable diseases when it is known that low VCs and sporadic cases are recorded locally in the subregion or even in Metropolitan France.[8—10] This population dynamism could also jeopardize any VC measure that does not prioritize a general population survey.

Moreover, despite the obligation to vaccinate in most countries of the world, particularly in the West, vaccine opposition and non-compliance with the vaccination schedule are still recorded in some places. The reasons for these oppositions and postponements are multiple[11—22] and could pose a real threat to the control of the determinants of vaccination in this context of multiculturalism. This study is a secondary exploitation of the data from a general population survey and aims to estimate the VC in French Guiana for people aged 9 months to 18 years and to describe the VC according to the predictive factors for good vaccination status.

Methods

Study design

The data used in this descriptive and etiological study are those of a cross-sectional survey carried out between 17 February and 18 March 2014 in French Guiana.[23] This survey was commissioned by the local institution of the national health insurance system ('Caisse Générale de Sécurité Sociale', CGSS) to evaluate an experimental vaccination program against yellow fever. The survey questionnaire was extended to other vaccines included in the vaccine schedule in effect in 2014. The choice of a representative sample of 2763 individuals from 866 households has already been reported.[23,24] For this study, the sample was reduced to respondents below the age of 18 years, or 1332 people from 521 households.

Operational definition of variables

As an outcome criterion, the study concerned the vaccination status of 13 vaccines from the vaccine schedule in effect in French Guiana in 2014. These were four compulsory vaccines (yellow fever, diphtheria, tetanus, and poliomyelitis), seven recommended vaccines (pertussis, measles, mumps, rubella, *Haemophilus influenzae* type b, meningococcal, and pneumococcus), and two with a specific recommendation for people at high risk (Bacillus Calmette—Guerin [BCG] and anti-viral hepatitis B [HBV]).[25] The vaccination status with respect to each of these vaccines was defined as unvaccinated (when the respondent received no dose of the vaccine concerned), partial immunization (for the vaccine concerned, the respondent did not have all the doses in proportion to his age), and complete immunization (for the vaccine concerned, the respondent had all the proportional doses at his age). Specifically, for yellow fever, people whose vaccination date was older than 10 years were considered complete.

The studied factors were chosen on the basis of their epidemiological relevance among the known determinants of vaccination[11—22] or among the sociodemographic characteristics, in particular: sex (female vs. male), age of respondent (9 mo—3 yr , 3—7 yr, 7—13 yr, and 13—18 yr), and the structure of the household to which the respondent belongs (single adult with one child, single adult with ≥2 children, couple with one child, couple with ≥2 children, and other).

Characteristics of the household head/reference person (determined as the person with the highest level of study when dealing with couples) include: the reference person's level of study (no level/unspecified: for people who have never attended school or unspecified level; level < college level;