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The effect of race and residence on the receipt of childhood immunizations: 1993–2001

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Abstract

Objective: To determine if rural minority children ages 3–71 months are more likely than similar aged urban minorities to have delays in their immunization status.
Methods: Secondary analysis of the National Health Interview Survey (NHIS) for the years 1993–2001.
Findings: There were no substantial differences between the up-to-date immunization status of children living in metropolitan areas compared to children living in rural areas. There does appear to be a delay in introducing new vaccines into rural areas compared to metropolitan areas during the first 2 years of the vaccine recommendation. There were no significant differences in immunization status between Whites, Blacks and Hispanics living in metropolitan and rural areas.
Conclusions: Rural minority children are no more likely than other children to have delayed immunizations.

Keywords: Race; Residence; Immunizations

1. Introduction

Limited access to health care services results in fewer medical visits and may make rural and minority populations particularly vulnerable to the consequences of lower access to care [1–3]. This may be especially true for children who live in rural areas, and even more so for rural minority children. Studies have shown that rural minority children have indicators of poorer public health, including low housing quality and less access to mental health services [4–7]. If lower access to care also presents a barrier to the delivery of preventive care services, then children living in rural areas may be at a greater risk for underimmunization.

The immunization of children against common preventable diseases has been of great interest to public health advocates since the first vaccination campaign against polio in the 1960s. While all states now have childhood immunization laws that affect children entering school [8], the US Department of Health and Human Services has set the goal to have 80% of 2-year old children receiving all doses of recommended vaccines by the year 2010 [9]. While childhood immunization rates are already high in most parts of the country, there are still children who are at risk for not receiving timely immunizations [10].

Rural children are a vulnerable population for receiving all of the recommended vaccine doses. Although some studies have shown that rural children receive immunizations at rates similar to urban children, these findings have generally followed interventions in the public sector [11,12]. Immunization rates are less than optimal with both urban and rural areas having approximately one-third of eligible children not up to date on their vaccinations [13]. Moreover, it has also been shown that being non-white and having parents with lower income increases a child's risk of being underimmunized [14].

Several interventions have been put in place to try and increase immunization rates. For example, Congress passed

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the Vaccines for Children Program in 1993 which provides publicly purchased vaccines to all eligible children born in the United States. The purpose of the Vaccines for Children Program was to eliminate vaccine cost as a barrier to immunizing eligible children and to reduce the practice of referring children from the private sector to the public sector for vaccination, thereby keeping children in their medical home for comprehensive health care [15]. It is unclear how these broad interventions affected immunization rates in rural and metropolitan areas, particularly for African Americans. One study conducted in the early 1990's showed that federal programs that provide free vaccinations have differential effects on the provision of immunizations in rural and urban areas [11].

The purpose of this study was to examine the impact of race and residence on the receipt of childhood immunizations during the years 1993–2001. We hypothesized that white children, both in rural and metropolitan areas, would have less delayed immunizations than their minority counterparts. We further hypothesized that rural African-American and Hispanic children would have more delayed immunization than similar metropolitan minorities.

2. Methods

This study was a secondary analysis of the National Health Interview Survey (NHIS), a personal interview household survey using a nationwide sample of the civilian, noninstitutionalized population of the United States. The NHIS has been used for many previous studies in the area of immunizations [16–18]. The interviewed sample for each year was composed of about 40,000 households containing approximately 100,000 persons. The number of children ages 3–71 months who had immunization data ranged from a low of 3838 (1993) to a high of 7690 (1994). The NHIS utilized a complex multistage design with oversampling for targeted subpopulations, particularly for minority populations. Sampling weights have been developed to account for the survey design and to provide an adjustment for survey nonresponse. We used SUDAAN analyses to incorporate the sample weights and account for the complex sampling design. By using this analysis method, we are able to make national population estimates from the data.

2.1. Primary variables

2.1.1. Area of residence

Area of residence was assessed in this project according to residence in or out of a metropolitan statistical area (MSA). Although a wide variety of definitions exist to operationalize rural/urban residence, we used residence in an MSA to indicate urban status. Other studies used this as a similar marker for residence [19–21]. The NHIS contains data indicating if a respondent resides in an MSA.

2.1.2. Race/ethnicity

The race of the respondent was determined through standard self-report items used by the National Center for Health Statistics. There were four possible categories for this variable: White, Black, Hispanic, and Other. However, population numbers of "other" race children were too small for meaningful analyses.

2.1.3. Childhood immunization status

All children were assessed according to whether they were up-to-date on their immunizations. Immunization status was determined for six vaccinations: Diphtheria-Tetanus-Pertussis (DTP), Polio, Varicella, Hepatitis B, Measles-Mumps-Rubella (MMR), and Haemophilus Influenza B (HIB). Each record for these immunizations indicates not only whether the child had received these shots, but also how many. The parent was asked to remember whether immunizations were given as well as to present the immunization shot record. Based upon previous studies that showed significant discrepancies between parental recall of immunizations and immunization as recorded on a shot record [22], only children with shot records were included in the analysis. Provider verification of these records was not obtained.

To determine if an individual was "up-to-date", or not delayed, regarding recommended immunizations, the Advisory Committee on Immunization Practice (ACIP) recommendations were used, adjusted for the age of the child. In order to allow a parent to have a full month to obtain the immunization for their child, all immunizations were counted as deficient if not given by 1 month (28 days) after the child was eligible. For example, a child who did not receive his or her first IPV by 3 months of age would be considered deficient for the IPV dose that usually is given at the 2 month HMV. For immunizations that can be given within a window of time, a child was considered deficient 1 month after the end of the immunization window. Immunizations for children older than 19 months of age were adjusted so that immunization recommendations in place at the time of their birth were followed.

2.2. Independent variables

2.2.1. Health insurance

The child's insurance status was determined based upon a NHIS variable indicating if the child had any health insurance coverage.

2.2.2. Poverty

Poverty status was determined through a specific variable that is a ratio of the family's income to the previous year's federally defined poverty level, accounting for the number of household members. A dichotomous variable was created describing the subjects as either below or above the poverty level.