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Trends in reasons for non-receipt of influenza vaccination during pregnancy in Georgia, 2004–2011

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ABSTRACT

Background: Considerable research has identified barriers to antenatal influenza vaccination, yet no research has explored temporal trends in reasons for non-receipt.
Purpose: To examine trends in reasons for non-receipt of influenza vaccination during pregnancy.
Methods: Serial cross-sectional analyses using 8 years of Georgia Pregnancy Risk Assessment Monitoring Survey (PRAMS) data were conducted. Weighted logistic regression was used to examine trends in the prevalence of citing reasons for non-receipt over time.
Results: Between 2004 and 2011, 8300 women reported no influenza vaccination during or immediately before pregnancy. Proportions of women citing "doctor didn't mention vaccination," "in first trimester during influenza season," and "not pregnant during influenza season" decreased significantly over time (Doctor didn't mention: 48.0% vs. 27.1%, test for trend $p < 0.001$; in first trimester: 26.8% vs. 16.3%, test for trend $p < 0.001$; not influenza season: 24.2% vs. 12.7%, test for trend $p = 0.001$). Safety concerns increased over 2004 proportions in 2010 (concern about side effects for me: 40.2% vs. 28.5%, prevalence ratio (PR): 1.41, 95% confidence interval (CI): 1.16, 1.71; concern about harming my baby: 38.9% vs. 31.0%, PR = 1.26, 95% CI: 1.04, 1.53) and 2011 (concern about side effects for me: 39.0% vs. 28.5%, PR = 1.37, 95% CI: 1.13, 1.65; concern about harming my baby: 38.8% vs. 31.0%, PR = 1.25, 95% CI: 1.04, 1.50). Following the 2009/2010 H1N1 pandemic, more Hispanic women cited concern about vaccination harming their baby than other women; in 2011, their concern remained elevated relative to non-Hispanic white women (63% vs. 35%; adjusted PR = 1.79, 95% CI: 1.23, 2.61).
Conclusion: Examining trends in reasons for non-receipt of antenatal influenza vaccination can reflect successes related to vaccine promotion and areas for improvement. By highlighting differential impacts of the 2009/2010 H1N1 pandemic, we reveal opportunities for additional research on tailoring vaccine promotion efforts to specific types of women.
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1. Introduction

Influenza vaccination has been recommended for all pregnant women regardless of trimester since 2004 [1]. Despite research demonstrating increased risks of hospitalization and death from influenza-related complications, achieving high vaccination rates among this population has been challenging [2–4]. Considerable research has explored why women do not get vaccinated, and reasons for non-receipt range from concerns about the safety of the vaccine to perceptions of not being susceptible to influenza [5–9]. Additional reasons like inadequate knowledge of the benefits of antenatal vaccination and lack of a provider's recommendation for the vaccine have highlighted clear education-related gaps and opportunities for intervention [10,11]. Initiatives fostering clinical promotion of antenatal vaccination have resulted in increases in antenatal vaccination rates [12], and with the 2009/2010 H1N1

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pandemic amplifying awareness of maternal vulnerability and the need for protection, national antenatal influenza vaccination coverage estimates increased from 35% in 2008–2009 to nearly 50% in 2009–2010 [13,14].

Since the H1N1 pandemic, however, antenatal vaccination rates have plateaued. National antenatal coverage estimates for the 5 influenza seasons following the pandemic have remained around 50% [15–17]. While studies have explored trends in antenatal vaccine coverage rates [6,13,18,19], no research has explored temporal changes in reasons women cite for not getting vaccinated during pregnancy. Valuable insights may be garnered from exploring these trends; for example, changes in reasons for non-receipt could identify contemporary gaps that could guide development of interventions aimed at improving vaccine coverage in the post-H1N1 era. Using 8 years of data from the Georgia Pregnancy Risk Assessment and Monitoring (PRAMS) survey, this study identifies prevalence trends in reasons women cite for not receiving an influenza vaccination during pregnancy, determines whether these trends differ by certain maternal characteristics, and assesses any influence the 2009/2010 H1N1 pandemic may have had on the non-receipt profile.

2. Methods

Data are from the Georgia Pregnancy Risk Assessment and Monitoring (PRAMS) survey. PRAMS is a collaboration between the Centers for Disease Control and Prevention (CDC) and participating health departments that collects population-based, state-specific information on women's experiences and behaviors before, during, and after pregnancy [20]. Participants' responses are linked to their infants' birth certificates, so data collected through PRAMS supplements information recorded on birth certificates. The survey employs a stratified random sampling method among all women with a recent live birth in a given state 2–6 months post-partum. From 2004 to 2008, PRAMS required a response rate of ≥70% to release the data; from 2009 to 2011, they required ≥65% response rate.

To account for oversampling of women of certain races, from certain counties and having infants with low birth weights, data from each year were weighted according to the oversampling strategy used for that year. Weights were calculated and provided by the Georgia Department of Public Health.

To explore temporal trends in the prevalence of reasons cited for non-receipt, a serial cross-sectional approach was taken to examine changes in the annual proportions of women citing specific reasons for non-receipt of influenza vaccination during pregnancy. Only women who indicated not receiving an influenza vaccination during their most recent pregnancy were instructed to answer the question "What were your reasons for not getting a flu vaccination during your most recent pregnancy?" Response choices included: "My doctor didn't mention anything about a flu vaccination during pregnancy," "I was worried about side effects of the flu vaccination for me," "I was worried that the flu vaccination might harm my baby," "I wasn't pregnant during the flu season (November–February)," "I was in my first trimester during the flu season (November–February)," "I don't normally get a flu vaccination," and "Other (please specify)." For each response choice, women were instructed to circle "Yes" if the reason applied to them or "No" if it did not. Thus, women could report multiple reasons for why they were not vaccinated. Thirty-nine women who did not answer the question about influenza vaccine receipt but answered any or all of the questions about reasons for non-receipt were recoded as not having received an influenza vaccine during pregnancy. Linear trends in the prevalence of citing certain reasons for non-receipt were determined by combining data from all years and modeled using weighted logistic regression with an ordinal variable for survey year. We also modeled year as an independent categorical variable to compare proportions of reasons for non-receipt between years.

To assess bivariate associations between maternal characteristics and reasons for non-receipt over time, the following maternal characteristics were assessed: age (≤19, 20–24, 25–29, 30–34, ≥35), education attained (<12 years, 12 years, >12 years), race/ethnicity (non-Hispanic white, non-Hispanic black, non-Hispanic Asian/other, Hispanic), prenatal insurance status (Medicaid/No private insurance, At least some private/military insurance, None), and urban/rural residence. If no information was provided about prenatal insurance coverage, insurance status at delivery was substituted as a proxy for prenatal insurance coverage. Reasons for non-receipt exhibiting a linear association between annual prevalence and time were modeled using weighted logistic regression with a variable for the characteristic, an ordinal variable for year and a (characteristic x year) interaction term. For reasons not demonstrating a linear association between annual prevalence and time, dummy variables for each year were included so as to examine individual interactions between each year and a given maternal characteristic. Any model for which the (characteristic x year) interaction term resulted in a statistically significant Wald-test was considered to have significant differences in the trends of citing that reason across levels of the maternal characteristic.

To determine the impact of the 2009/2010 H1N1 influenza pandemic on the non-receipt profile, we re-ran each of the aforementioned weighted logistic regression models exploring associations between each maternal characteristic and each reason for non-receipt with a dummy variable for pandemic. While we retained an ordinal variable for year in each model to account for secular trends in citing a given reason for non-receipt, we substituted the (characteristic x year) interaction term for a (characteristic x pandemic) interaction term. Women who gave birth before 09/01/2009 were considered as pregnant pre-pandemic; women who gave birth on or after this date were considered as pregnant during or post-pandemic. While pandemic vaccines did not became available in Georgia until mid to late October 2009, the 2009/2010 seasonal vaccine was available by September. Women giving birth in the interval of time between seasonal vaccine availability and pandemic vaccine availability would not have had the opportunity to receive the H1N1 vaccine, but publicity around H1N1 influenza over summer 2009 could have influenced their decision to also receive the seasonal vaccine. The 47% median coverage rate for seasonal influenza vaccination among pregnant women during the 2009/2010 compared to 35% coverage during the 2008/2009 season supports this hypothesis [21]. For any model in which the (characteristic x pandemic) interaction term resulted in a significant Wald-test, the pandemic was considered to have significant differential effects across levels of the maternal characteristic on the proportions of women citing that reason for non-receipt.

Finally, to ascertain each maternal characteristic's association with each reason for non-receipt, we limited analyses to 2011 data in order to reflect a more current state of these associations given contemporary societal and policy contexts surrounding maternal influenza vaccination. All 5 maternal characteristics were included in each weighted logistic regression model for each reason for non-receipt.

Results of all weighted logistic regression models are reported as prevalence ratios and 95% confidence intervals unless otherwise noted. In interaction models, Wald test p-values assessing the significance of interaction terms were adjusted using the Holm–Bonferroni correction to account for multiple hypothesis tests run on the data [22]. SAS version 9.3 (Cary, NC) and SAS-callable SUDAAN version 11.0.1 (Research Triangle Park, NC) were used to conduct analyses accounting for the complex survey

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