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SHORT REPORT

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Infant vaccination education preferences among low-income pregnant women

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ABSTRACT

Childhood vaccination is an important public health intervention, yet many children remain under-vaccinated. The objective of this study was to examine infant vaccination education preferences in a population of low-income pregnant women by ethnicity, nativity, and language. Pregnant women 14–44 y old (n = 335) attending a participating low-income reproductive health clinic in southeast Texas from May 26-July 21, 2017, and who completed a paper survey offered in English and Spanish were included. Participants were asked to complete questions about their demographic characteristics and preferences about infant vaccination education. To examine differences in vaccine education preferences by participant demographic characteristics, chi-squared tests, or Fisher's exact tests and one-way analysis of variance (ANOVA) were conducted using Stata SE Version 15.1 with α = 0.05. Nearly half (47.5%) of participants considered pregnancy the best time to get information about infant vaccination and were most likely (40.6%) to indicate the nurse who gives vaccines during pregnancy as the health-care worker with whom they would like to discuss infant vaccination. There were no demographic differences in preferred timing of vaccine education delivery or provider who delivers vaccine education. Prenatal, nurse-delivered vaccine educational programs would be well accepted in this low-income population.

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Childhood vaccination is one of the most important public health interventions, yet many children do not receive the recommended vaccines on time. In 2017, only 70.4% of children ages 19–35 months in the United States (US) were up to date on the seven-vaccine series recommended by the Advisory Committee on Immunization Practices (ACIP).[1] Parental attitudes, beliefs, knowledge, and perceptions of susceptibility to vaccine-preventable illnesses all contribute to differences in uptake of childhood vaccines.[2] Further, children in low-income families and whose parents have low education are more likely to be under-vaccinated, i.e. having some but not all of the recommended vaccines, though the reasons for under-vaccination are often not reported.[3,4] Differences in intervention designs may be required to address barriers to vaccination depending on target population characteristics.[5]

Parental preferences about the timing of vaccine education and whether the timing of vaccine education impacts up-to-date vaccination in the US are not well established. In an observational study of parents of children ages 1–19 months at health supervision visits, 26% of parents discussed vaccines with their child's provider for the first time.[6] However, mothers with concerns about vaccine safety may prefer to receive vaccine information before the first vaccination visit.[7] Prenatal education programs have been successful in improving timeliness and completeness of vaccination in both Japan[8] and China,[9] but have only had modest success in the US.[10]

One important factor cited by parents in their decision to vaccinate their child is provider recommendation.[11] Over half of the physicians reported spending ten or more minutes discussing vaccines with parents who had concerns about vaccines.[12] Yet, some parents report a desire for discussing vaccines with a variety of sources and without the strict time constraints of a doctor's visit.[13] Though primary care providers are important in vaccine education, studies reveal that women may accept vaccine education from other types of health-care providers. For example, one study found that most women are likely to accept childhood vaccine information from their obstetricians, despite preferring to receive vaccine education from their child's doctor.[14] However, the role in vaccine education of non-physician primary care providers, such as nurses, has not been examined thoroughly in the US.[15]

Moreover, previous research into parental preferences regarding vaccine education delivery has often taken place in populations with little racial, ethnic, or socioeconomic diversity. Early childhood vaccine education preferences of women who are lower-income and/or racial and/or ethnic minorities are not well established, although some studies have found that parents who have emigrated to another country found it difficult to understand and access vaccine information in their new country and language.[13] More research is needed to develop interventions appropriate for different contexts and populations.[16] The objective of this study was to examine

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infant vaccination education preferences in a population of low-income pregnant women by ethnicity, nativity, and language.

Women (N = 795) attending one of the five participating low-income reproductive health clinics in southeast Texas agreed to participate in an in-person health and behavior questionnaire available in English and Spanish from May 26–July 21, 2017. The survey was available in the clinic only and was conducted electronically using provided tablets (n = 48) or in paper and pencil format (n = 747). Oral informed consent was obtained from those who agreed to take part in the study. Participants received a small item (< $5 value) for their time. Of 372 participants who consented to complete the survey and chose the survey intended for pregnant women, 18 participants who completed an online version of the survey were excluded due to that version of the survey not including vaccine education questions. Of the 354 remaining participants, 6 were excluded for indicating that they were not sure if they were currently pregnant and 13 were excluded for not answering the question about current pregnancy. Pregnant women 14–44 y old (n = 335) who completed an anonymous paper and pencil survey were eligible for inclusion in the present analyses. Respondents were asked to provide their name on a separate list that was not linked to their paper forms to ensure no respondent was included in the study more than one time. This study was approved by the University of Texas Medical Branch Institutional Review Board (#17-0078).

Participants responded to demographic questions and indicated preferences about infant vaccination education. Participants were asked to indicate their age in years, their highest level of school completed (never attended school/kindergarten only; primary school (1st grade–8th grade); some high school, but no diploma; high school diploma (or GED); some college, but no degree; 2-y college degree; 4-y college degree; or master's/doctoral degree), their current relationship status (married; widowed; divorced; separated; living with partner but not married; single, never married), whether they consider themselves to be Hispanic or Latina (yes or no), what race or races they consider themselves to be (select one or more: white, black/African American, Asian, Native American/Alaskan Native, Native Hawaiian/Pacific Islander, other (with the option to provide a text response)), the primary language spoken in their home (English, Spanish, or other (with the option to provide a text response)), and whether they were born in the US (yes or no). Race and ethnicity categories were combined to examine differences between combined racial and ethnic groups. However, because many self-reported Hispanics "treat that identity as a race"[17] and did not indicate a race, Hispanic ethnicity was also examined separately.

To assess the ideal timing of vaccine education, participants were asked, "What do you think would be the best time to get information from your doctor or nurse about baby shots? Check ONE answer." with the following response options: during pregnancy; in the hospital or birthing center after my baby is born; or at my new baby's first visit to the doctor. One participant who wrote "no preference" on the survey was considered to have indicated all three responses and additional 24 participants endorsed multiple responses. Responses were examined as participants responded, allowing participants to indicate more than one option.

To assess the overall acceptance of prenatal vaccine education, participants were asked, "Would you be willing to discuss baby shots during pregnancy?" with the following response options: yes; no; or I don't know. To assess openness to vaccine education delivered by nurses, participants were asked, "During your pregnancy, who would you like to talk to about your baby's shots? (Check ALL that apply.)" with the following response options: Nurse who measures weight and blood pressure; nurse who records my medical information; nurse who gives physical exams; nurse who gives me vaccines during pregnancy; nurse-midwife who delivers babies; or someone else.

Differences in infant vaccination education preferences between participants were examined with chi-squared tests or Fisher's exact tests (when appropriate) for categorical demographic characteristics and one-way analysis of variance (ANOVA) for continuous age in Stata SE Version 15.1 with $\alpha = 0.05$.

The mean age of respondents was 26.4 y (Table 1). Most participants were Hispanic (78.2%), born outside of the US

Table 1. Demographic characteristics of pregnant women surveyed in prenatal clinics in southeast Texas (N = 335).

Age, mean	26.4 y (standard deviation 6.39, range: 14–44 y)
Race, n (%)	
White	171 (51.0%)
Black	32 (9.6%)
Asian	12 (3.6%)
Native American/Alaskan Native	14 (4.2%)
Native Hawaiian/Pacific Islander	3 (0.9%)
Other	34 (10.1%)
Missing response	69 (20.6%)
Ethnicity, n (%)	
Hispanic or Latina	262 (78.2%)
Not Hispanic or Latina	69 (20.6%)
Missing response	4 (1.2%)
Race/Ethnicity, n (%)	
Hispanic or Latina, any race	262 (78.2%)
Not Hispanic or Latina, white	27 (8.1%)
Not Hispanic or Latina, black	27 (8.1%)
Not Hispanic or Latina, other race	15 (4.5%)
Missing response for race and/or ethnicity	4 (1.2%)
Nativity, n (%)	
US born	138 (41.2%)
Born outside of US	196 (58.5%)
Missing response	1 (0.3%)
Education, n (%)	
Less than high school	79 (23.6%)
High school or GED	140 (41.8%)
Some college or 2-y degree	87 (26.0%)
4-y degree or higher	22 (6.6%)
Missing response	7 (2.1%)
Relationship status, n (%)	
Married or partnered	216 (64.5%)
Divorced or separated	29 (8.7%)
Single, never married	82 (24.5%)
Missing response	8 (2.4%)
Primary language, n (%)	
English	119 (35.5%)
Spanish	185 (55.2%)
Other	9 (2.7%)
English & Spanish	21 (6.3%)
Missing response	1 (0.3%)
Survey language, n (%)	
English	197 (58.8%)
Spanish	138 (41.2%)

(58.5%), and primarily spoke Spanish at home (55.2%). Of participants who indicated that they were Hispanic or Latina (n = 262), most (n = 144, 55.0%, data not shown in table) indicated that they were white. Many Hispanic/Latina participants (n = 66, 25.2%) did not indicate a race, while one non-Hispanic/Latina participant did not indicate a race. Most participants were married or living with a partner (64.5%). Approximately one-quarter (23.6%) of participants had less than a high school education and few participants (6.6%) had a 4-y degree or higher. More (58.8%) participants completed the survey in English than Spanish (41.2%).

Close to half (47.5%) considered pregnancy the best time to get information about infant vaccination (Table 2). Including participants who endorsed more than one response did not qualitatively change results. The highest proportion of participants chose either the nurse who gives vaccines during pregnancy (40.6%) or the nurse-midwife who delivers babies (32.5%) as the health-care worker with whom they would like to discuss infant vaccination. About one-fifth (21.8%, data not shown in table) of participants endorsed multiple responses.

Age, education, relationship status, combined race/ethnicity, Hispanic ethnicity, nativity, and primary language were not associated with preferred timing of vaccine education or preferred provider delivering vaccine education (p-value >0.05). There were no differences in preferred timing of vaccine education or willingness to discuss infant vaccination during pregnancy by those who completed a survey in English compared to those who completed a survey in Spanish. Compared to Spanish survey respondents, English survey respondents were slightly more likely to indicate willingness to discuss infant vaccines with the nurse who gives physical exams (27.0% vs. 13.7%, p = .006) and nurse-midwives who deliver babies (42.5% vs. 30.7%, p = .039) and less likely to indicate willingness to discuss infant vaccines with the nurse who gives vaccines (41.3% vs. 54.0%, p = .032). There were no differences in survey language for other types of providers.

We found that prenatal education about childhood vaccination is supported by more than half of low-income pregnant women attending reproductive health clinics in southeast Texas. Parents often report that their decision-making regarding childhood vaccination begins during pregnancy,[18,19] yet many parents report desiring more information before pediatric vaccination visits instead of at the visits themselves.[20] Still, prenatal interventions aiming to increase childhood vaccination have had limited success in the US,[10] though further research is underway.[21]

Table 2. Infant vaccine education preferences of pregnant women surveyed in prenatal clinics in southeast Texas (N = 335).

What do you think would be the best time to get information from your doctor or nurse about baby shots?[a]	n (%)
During pregnancy	159 (47.5%)
In the hospital/birthing center after baby is born	94 (28.1%)
At baby's first doctor visit	100 (29.9%)
Missing response	10 (3.0%)
Would you be willing to discuss baby shots during pregnancy?	
Yes	247 (73.7%)
No	27 (8.1%)
I don't know	39 (11.6%)
Missing response	22 (6.6%)
During your pregnancy, who would you like to talk to about your baby's shots?*	
Nurse who measures weight and blood pressure	67 (20.0%)
Nurse who records medical information	66 (19.7%)
Nurse who gives physical exams	62 (18.5%)
Nurse who gives vaccination during pregnancy	136 (40.6%)
Nurse-midwife who delivers babies	109 (32.5%)
Someone else	23 (6.9%)
Missing response	44 (13.13%)

aParticipants selected more than one option so proportions will not add to 100%.

In the present study, there were no differences in vaccine education preferences between demographic groups. While there were no differences in vaccine education preferences by self-reported language spoken at home or whether a participant was US-born or born outside of the US, there were minor differences between those who chose to take an English survey compared to those who took a Spanish survey. A systematic review found that immigrants may face a variety of barriers to vaccination that frequently result from lack of information about vaccination and vaccine-preventable diseases, but that other barriers faced by immigrants are similar to those in the general population.[22] Still, greater understanding of cultural considerations when providing vaccines and vaccine education to pregnant women in minority groups is needed.

Most participants in this study were open to vaccine education delivered by nurses. These professionals remain an under-researched resource for providing vaccine information in the US. Lack of insurance reimbursement for nurse visits for vaccination and parent education[23] and vaccine hesitancy among nurses[24] are all critical barriers to practice implementation. Further, health-care providers report the need for more support in addressing questions from vaccine-hesitant families and need training to address questions.[25]

There are several limitations to this study. The study examines perspectives from a single geographic region and may not be generalizable to other populations. Participants in this study receive most of their prenatal care from nurse-midwives and nurse practitioners, so the results may not be generalizable to populations who receive care from other provider types. Whether there are differences in preferences by income was not assessed here since all participants were attending a clinic serving low-income patients. Due to problems with implementing the electronic survey option in the clinics, it was quickly discontinued, and whether electronic compared to paper and pencil survey responses would have differed is unknown. Vaccine hesitant attitudes and beliefs were not discussed or examined. There are also strengths of this study. This study examines vaccine education preferences in a low-income, racially, and ethnically diverse and underserved population that may be difficult to reach through other types of clinics.

Thus far, educational interventions, primarily timed at the office visit when a vaccine is recommended to occur, have had little success in increasing childhood vaccination. Multiple strategies are needed to address vaccine hesitancy and increase early childhood vaccination.[5] This study indicates that prenatal, nurse-delivered educational programs aiming to improve infant vaccination would be well accepted among low-income women.

Disclosure of potential conflicts of interest

No potential conflicts of interest were disclosed.

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