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North Carolina PRAMS Non-Response Analysis, 2003-2004

by

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ABSTRACT

Objectives: The North Carolina Pregnancy Risk Assessment Monitoring System (PRAMS) is a mail and telephone survey of mothers who have recently given birth. Potential participants are randomly selected using North Carolina birth certificates. The purpose of PRAMS is to gather information on maternal behaviors and experiences before, during, and after pregnancy. This information is used for planning and evaluating perinatal health programs. When the characteristics and outcomes of respondents and non-respondents differ, non-response to the survey causes bias in the survey results. In an effort to find ways to increase PRAMS response rates and therefore improve the quality of the data, this study examines which maternal characteristics are associated with survey non-response.

Methods: This study includes 4,258 records from 2003 and 2004 for mothers who responded to PRAMS and for sampled mothers who failed to respond. In addition to describing the characteristics associated with survey response, multivariate logistic regression was used to specify which maternal and infant characteristics were independently associated with non-response.

Results: During 2003-2004, 72.4 percent of sampled mothers responded to the PRAMS survey. The strongest independent predictors of non-response were low maternal education, late prenatal care initiation, Hispanic ethnicity, being unmarried, maternal age less than 20 years, African American race, and smoking during pregnancy.

Conclusions: North Carolina PRAMS has an established surveillance method that has achieved reliable response rates over time. Future efforts need to focus on improving response rates among the high-risk subgroups identified in this report.



Background

This report examines variables associated with non-response in the North Carolina Pregnancy Risk Assessment Monitoring System (PRAMS) survey. Non-response occurs when sampled mothers are unwilling or unable to participate in the PRAMS survey. Non-response causes bias in survey results when the characteristics and outcomes of respondents and non-respondents are different. To help reduce such bias, PRAMS sample data are weighted to adjust for non-response.¹

The Centers for Disease Control and Prevention (CDC) considers a response rate of 70 percent to be a minimum threshold to reduce response bias. North Carolina PRAMS survey response rates have traditionally been above the 70 percent mark. However, over the last three years, the North Carolina PRAMS survey has experienced a decline in response rates (see Figure 1). Unweighted overall response rates in 2003 and 2004 were 73 percent and 71 percent, respectively; however the overall unweighted response rate dropped to 68 percent in 2005.

It is known that non-response can affect the quality of survey data.² This study will improve our understanding of maternal and infant characteristics associated with non-participation in PRAMS. The results of this study may also be useful for de-

veloping the composition of focus groups throughout North Carolina to gain a deeper understanding of the nature and characteristics of non-responders.

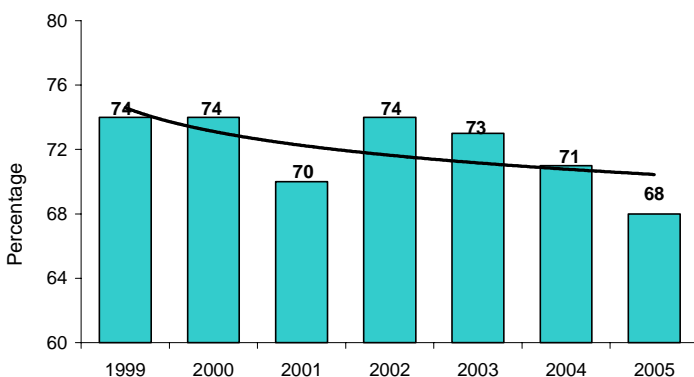
Methods

The data for this study were collected by the North Carolina Pregnancy Risk Assessment Monitoring System (PRAMS). In this surveillance system, a stratified random sample of women who recently had a live-born child is selected from North Carolina's birth certificates. The survey instrument is a questionnaire that contains 77 questions concentrating on health care and maternal behaviors before, during, and shortly after pregnancy. The first contact with selected mothers is attempted via mail, approximately 2 to 6 months after delivery. Non-response to the first mailing initiates a follow-up schedule that includes two additional mailings. Follow-up by phone is employed in cases of non-response to the mail phase. The mailed questionnaire and telephone interview script both have information on what the PRAMS survey is and tell the respondent that participation is voluntary.

North Carolina PRAMS over-samples low birth weight babies in order to assure that adequate information is gathered about this small but important subgroup. The PRAMS data set contains questionnaire data, selected birth certificate information, and the mode (mail or phone) of data collection. The data are weighted by the Centers for Disease Control and Prevention (CDC), with adjustments made for the sampling design and non-response. For this study, the PRAMS sample data were linked to North Carolina's composite matched birth file, which is a linked birth file containing information on the infant and mother from Medicaid and other public health service databases.

This study includes 2003 and 2004 records for mothers who responded to PRAMS and for sampled mothers who failed to respond (non-responders). A total of 57 observations were deleted due to miss-

Figure 1: North Carolina PRAMS Unweighted Response Rates



ing values for key study variables. Of 4,258 sampled mothers during the 2003-2004 period, a total of 1,175 (27.6%) could not be located or did not participate. In addition to descriptive analyses, multivariate logistic regression was used to specify which population, behavioral, and health-related characteristics were independently associated with non-response.

After a review of the literature on factors affecting non-response, the following characteristics (for which we have data) were found relevant to non-response in both mail and phone surveys: maternal education, race, marital status, Medicaid use, Hispanic origin (or language barrier), parity (having given birth one or more times previously) and region of residence.^{3,4} Late prenatal care (PNC) has also been cited in the literature as factor associated with non-response.⁵ We also hypothesized that there may be associations between non-response and having complications of labor and/or delivery, as well as smoking during pregnancy. All of these variables were considered potential predictors of non-response and are therefore included in our analysis. All of these variables are included on the composite matched birth files and are therefore available for both PRAMS responders and non-responders. The SAS procedure PROC LOGISTIC was used for the logistic regression analysis to estimate adjusted odds ratios and 95 percent confidence intervals.⁶

Study variables

The dependent variable (non-response) was coded in the logistic regression analysis to model the probability of non-response. Independent variables included: age of mother (10-19, 20-24, 25-34, 35+), race of mother (white, African American, other races), Hispanic origin (yes, no), education of mother (less than 12 years of education, 12 years of education, at least some college), marital status of mother (not married, married), parity (one or

more previous births, no previous births), complications of labor and/or delivery (yes, no), mother's residence region (Eastern, Western, Piedmont), baby's birth weight (<2500 grams, ≥2500 grams), entry into PNC (very late entry or no PNC, 1st or 2nd trimester), Medicaid (yes, no), and maternal smoking during pregnancy (yes, no).

Results

Table 1 and Table 2 show response rates by demographic and maternal/infant characteristics. Response rates were higher for white women (74.8%) than for African American women (65.6%), for

Table 1: Response Rates by Demographic Characteristics North Carolina PRAMS, 2003-2004

Characteristic	Number Who Responded (%)	Total Number in Sample*
Maternal Age		
< 20 years	329 (60.8%)	541
20-24 years	812 (67.9%)	1,195
25-34 years	1,533 (75.4%)	2,033
≥ 35 years	382 (78.1%)	489
Maternal Race		
White	2,097 (74.8%)	2,803
African American	830 (65.6%)	1,266
Other races	129 (68.3%)	189
Hispanic Origin		
Yes	330 (62.6%)	527
No	2,723 (73.1%)	3,727
Maternal Education		
Less than 12 years	645 (59.7%)	1,081
12 years	889 (69.6%)	1,277
At least some college	1,517 (80.2%)	1,892
Marital Status		
Not Married	1,160 (63.1%)	1,838
Married	1,896 (78.4%)	2,420
Region		
Eastern	953 (69.9%)	1,364
Western	291 (73.7%)	395
Piedmont	1,812 (72.5%)	2,499
TOTAL	3,083 (72.4%)	4,258

*Numbers in categories may not add to TOTAL due to missing or unknown values.

Table 2: Response Rates by Maternal and Infant Characteristics North Carolina PRAMS, 2003-2004

Characteristic	Number Who Responded (%)	Total Number in Sample*
Labor Complications		
Yes	1,284 (71.0%)	1,808
No	1,772 (72.3%)	2,450
Birth Weight		
Low (< 2500 g)	1,385 (69.2%)	2,003
Normal (>= 2500 g)	1,671 (74.1%)	2,255
Began Prenatal Care		
3rd trimester or none	70 (50.7%)	138
1st or 2nd trimester	2,965 (72.7%)	4,076
Medicaid		
Yes	1,406 (66.6%)	2,111
No	1,650 (76.8%)	2,147
Smoking During Pregnancy		
Yes	464 (63.7%)	728
No	2,589 (73.5%)	3,524
Parity		
One or more previous births	1,690 (70.3%)	2,403
No previous births	1,366 (73.7%)	1,854
TOTAL	3,083 (72.4%)	4,258

*Numbers in categories may not add to TOTAL due to missing or unknown values.

married women (78.4%) than for unmarried women (63.1%), and for women with higher levels of education compared with less-educated women (Table 1). Eighty percent of women with at least some college responded to the questionnaire, while only about 60 percent of those with less than 12 years of education participated. The response rate was highest in the oldest age group — about 61 percent of mothers under age 20 responded to the questionnaire, compared to about 78 percent of mothers in the oldest age group. The response rate was the lowest in the Eastern North Carolina region (69.9%) and not much different between the Western (73.7%) and Piedmont (72.5%) regions. Hispanic mothers had a substantially lower response rate than non-Hispanic mothers (62.6% vs. 73.1%).

The response rate for women who delivered a normal birth weight baby (74.1%) was somewhat

Table 3: Association between Overall Non-response and Selected Characteristics, Using a Logistic Regression Model (n=4,258)

Characteristic	Adjusted OR	95% CI	P-value
Maternal Age			
< 20 years	1.40	(1.01,1.95)	0.0442
20-24 years	1.26	(0.96,1.65)	NS
25-34 years	1.10	(0.86,1.41)	NS
>= 35 years	Referent	-	-
Maternal Race			
African American	1.37	(1.17,1.65)	0.0004
White and other races	Referent	-	-
Hispanic Origin			
Yes	1.47	(1.18,1.88)	0.0011
No	Referent	-	-
Maternal Education			
Less than 12 years	1.79	(1.43,2.22)	<.0001
12 years	1.38	(1.14,1.66)	0.0007
At least some college	Referent	-	-
Marital Status			
Not married	1.41	(1.18,1.69)	0.0002
Married	Referent	-	-
Began Prenatal Care			
3rd trimester or none	1.70	(1.10,1.62)	0.0035
1st or 2nd trimester	Referent	-	-
Smoking During Pregnancy			
Yes	1.33	(1.10,1.61)	0.0034
No	Referent	-	-

CI=Confidence Interval

OR=Odds Ratio

NS=Not Significant

P-values are from Wald Chi-Square tests of association for categorical variables.

higher than the rate for those who delivered a low birth weight baby (69.2%) (Table 2). Women who had complications of labor and/or delivery had a response rate that was almost the same as the rate for those who had no complications. The response rate for women with one or more previous births (70.3%) was slightly lower than the rate for women with no previous births (73.7%). Women enrolled in Medicaid had a lower response rate (66.6%) than women who were not enrolled in Medicaid (76.8%). The response rate was substantially lower for women who smoked during pregnancy than for those who did not (63.7% vs. 73.5%). Women who started prenatal care in the first or second trimester had a much higher response rate than women who

started care in the third trimester or had no prenatal care (72.7% vs. 50.7%).

Figures 2-4 graphically portray the percentages of women who responded to the PRAMS survey by selected demographic characteristics. It is easy to see the linear relation between age and response in Figure 2; the younger the maternal age, the less likely mothers were to participate in the survey. The linear relationship between education and response is also pronounced; response rates increase consistently with higher levels of education (Figure 3). African American mothers and mothers of “other races” had lower response rates than white mothers (Figure 4).

Figure 2. N.C. PRAMS Response Rates by Age, 2003-2004

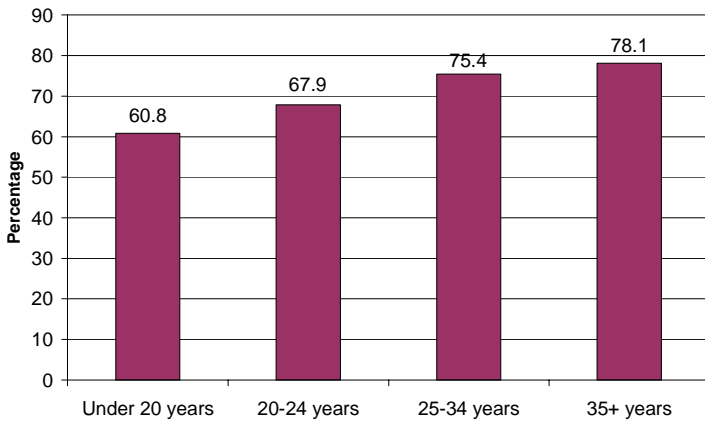


Figure 3. N.C. PRAMS Response Rates by Education, 2003-2004

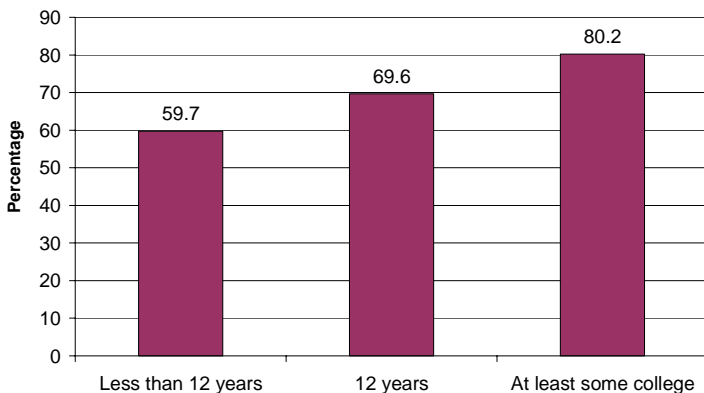
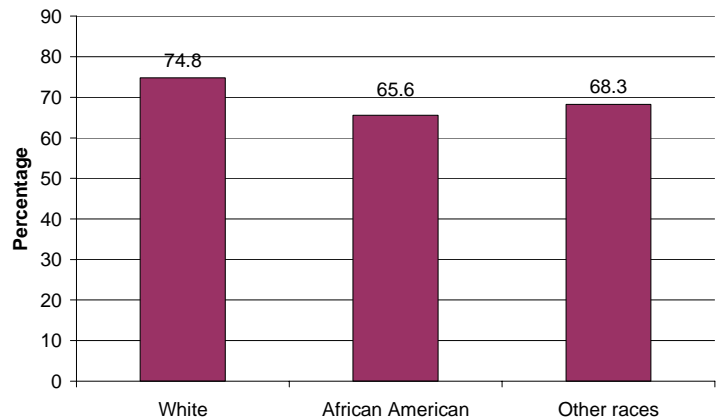


Figure 4. N.C. PRAMS Response Rates by Race, 2003-2004



The logistic regression results revealed that several factors were independently associated with low response rates. There were twelve possible predictors to be investigated in the model (see Tables 1 and 2). Seven independent variables were found to be statistically significant and only these seven variables are included in the regression model in Table 3. The strongest predictor of non-response was maternal education (adjusted odds ratio of 1.79 for women with less than 12 years of education). The adjusted odds of non-response were significantly higher for mothers who were not married (1.41), were African American (1.37), and were younger (1.40 for less than 20 years). The adjusted odds of non-response were also significantly higher for Hispanic mothers (1.47), mothers who smoked during pregnancy (1.33), and mothers who entered prenatal care very late or had no prenatal care (1.70).

Limitations of This Study

While this study focused on characteristics of mothers that might impact PRAMS survey response rates, other operational factors such as ineffective incentives, difficulty obtaining accurate contact information for women sampled, and staff turnover may also have an adverse impact on response rates. In addition, the format of the PRAMS survey may affect response rates. Because PRAMS uses a self-

administered written questionnaire, mail responses from women with low levels of education might be reduced. Lastly, PRAMS is a mail and telephone survey; for non-responders after the first three mailings, up to fifteen attempts are made to call the individual by landline telephone. Those women without telephones or with only cellular phone service would be underrepresented. However, the survey data are weighted for non-response, which reduces bias in analyses of the PRAMS sample data.

Conclusion

Many studies have established the association between mother's minority race, young age, unmarried status, less than high school education, and late prenatal care with survey non-response. The results of this study for North Carolina are consistent with prior research. The most important independent predictors of non-response for North Carolina PRAMS in terms of strength were: maternal education, late prenatal care initiation, Hispanic ethnicity, marital status, maternal age, African American race, and smoking during pregnancy.

Many of the characteristics of women who are hard to reach in a survey are also the characteristics associated with pregnancy-related problems and poor birth outcomes. In order for North Carolina PRAMS to adequately analyze factors associated with infant deaths and low birth weight, it is essential that better response rates be achieved among these subgroups.

North Carolina PRAMS has an established surveillance method that has achieved reliable response rates over time. The North Carolina PRAMS survey protocol currently incorporates many techniques to enhance response such as personalized mailing packages, use of incentives, and repeated mail and phone contact attempts. Future efforts need to focus on improving response rates among the high-risk subgroups identified in this report.

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