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# Community Environment and Women's Health Outcomes: Contextual Data

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Centers for Disease Control and Prevention
National Center for Health Statistics

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## Data From the National Survey of Family Growth

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Centers for Disease Control and Prevention
National Center for Health Statistics

Hyattsville, Maryland
April 2003
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## Abstract

### Objectives

This report presents some illustrative data and analyses from the Contextual Data File for the 1995 National Survey of Family Growth (NSFG). Data are shown by the woman's race and Hispanic origin, and selected characteristics of the community in which she lived.

### Methods

Cycle 5 of the NSFG was based on in-person interviews with a national sample of 10,847 women 15–44 years of age in the United States in 1995. The interview included questions on the woman's births, marriages, contraceptive use, and characteristics such as her race and education. Measures of the characteristics of the woman's neighborhood were added to the interview data.

### Results

This report shows that several simple measures of the social and economic status (SES) and resources of the woman's community of residence are closely associated with outcomes such as delayed childbearing, unwanted births, current marital status, the use of male or female contraceptive sterilization, breast-feeding, vaginal douching, and cigarette smoking.

### Conclusions

It is well-documented that the outcomes studied in this report are closely associated with individual characteristics such as age, race, education, and household income. But this report shows that these outcomes are also related to characteristics of the communities in which the individuals live. Researchers are encouraged to use the NSFG Contextual Data File to study these relationships further.



**Keywords:** *fertility • contraception • sterilization • breast-feeding • marriage • contextual data • multilevel models.*


# Community Environment and Women's Health Outcomes: Contextual Data


*by William D. Mosher, Ph.D., Division of Vital Statistics, National Center for Health Statistics; Lionel P. Deang, Ph.D., Battelle; and Matthew D. Bramlett, Ph.D., Division of Health Interview Statistics, National Center for Health Statistics*


## Highlights

This report presents data from the National Survey of Family Growth (NSFG) Cycle 5 Contextual Data File. The NSFG is a nationally representative survey focused on birth and pregnancy rates, contraception, infertility, marriage and divorce, and women's health. The Cycle 5 survey was based on face-to-face interviews with a national sample of 10,847 women 15–44 years of age in 1995 (1–12). The NSFG web page can be found at: www.cdc.gov/nchs/nsfg.htm.

The Contextual Data File includes a number of characteristics of the communities in which the sampled women live. The characteristics of the communities used in this report are all drawn from the 1990 Census and are measured at the county, census tract, or block group level.

This report contains 22 tables showing illustrative analyses from the NSFG Contextual Data File on a wide range of topics collected in the NSFG. It is intended to:

- Show, using cross-tabulations and graphs, how several key behaviors that vary by individual characteristics also vary by characteristics of the communities in which the women live.
- Show that some of these differences in outcomes appear to be related to characteristics of communities, even after controlling for some major individual-level predictors of those behaviors.
- Introduce statistical researchers to the NSFG Contextual Data File and show some illustrations of how it can be used.

The analyses in this report, which include both cross-tabulations and Hierarchical Linear Models (HLM), were all produced with the widely used SAS computer software. Standard errors for the cross-tabulations were calculated using SUDAAN software. The analyses shown here are not intended to be


The 1995 National Survey of Family Growth was jointly planned and funded primarily by the National Center for Health Statistics (NCHS), the National Institute for Child Health and Human Development, and the Office of Population Affairs, with additional support from the Children's Bureau. Other agencies and individuals also provided helpful advice and assistance. The authors gratefully acknowledge the helpful review and comments of William R. Grady and Dr. John O.G. Billy of Battelle in Seattle, WA, and reviews by Dr. Emily Wong of Family Health International, and by Dr. Glenn Deane of the State University of New York at Albany. This report was edited by Gail V. Johnson, graphics produced by Jarmila Ogburn, and typeset by Zung Le of the Publications Branch, Division of Data Services, NCHS.

definitive or exhaustive, but simply to illustrate the point that some characteristics of communities appear to be strongly related to some of the behaviors measured in the NSFG.

The following statements briefly illustrate the kinds of findings shown in this report (references and further details are given in the later text of the report):

- The proportion of women who are childless at 20–34 years of age increases markedly as the median family income of the neighborhood increases overall and for white, black, and Hispanic women (figure 1). Similarly, women living in areas with low poverty rates are substantially more likely to be childless at age 20–34 than women living in areas with high poverty rates, and this is true for white, black, and Hispanic women (figure 2). A multilevel model suggests that the prosperity of the county of residence in 1990 is directly related to the probability that a woman is childless at ages 20–34 in 1995, even after controlling for several individual characteristics that are known to be associated with childlessness.
- Using a direct measure of delayed childbearing—the percentage of women 18–39 who currently have no children but expect one or more in the future—the same relationships are seen: women in more prosperous neighborhoods are more likely to report that they are delaying childbearing. Further, the differences between white, black, and Hispanic women in delayed childbearing tend to disappear within neighborhoods with similar income levels (figure 3).
- Women who lived in communities with high poverty rates (figure 4) and low proportions of the workforce in professional or managerial jobs in 1990 (figure 5) reported more of their births in 1990–95 as unwanted.
- The proportion of unmarried women—especially unmarried white women—who had had three or more male sexual partners in the last 12 months was somewhat higher for women who lived in areas with the lowest income levels in 1990 than for women in middle and high income areas (figure 6).
- The percent currently married in 1995 is lower in areas with higher male unemployment rates in 1990—especially among black women (figure 7). As the community's median family income in 1990 rises, the proportion of women 30–44 who are currently married in 1995 increases markedly (figure 8). This is a complex relationship that deserves further study (3).
- As neighborhood poverty (measured in 1990) increases, many more contraceptive users chose female sterilization as their method of contraception in 1995 (figure 9). Multilevel models suggest that community characteristics are an important part of the explanation of variations in the use of female sterilization and use of the male condom. The community characteristics used in this report, however, are not strongly related to use of oral contraceptive pills.
- Breast-feeding has well-known benefits for the mother and infant. Breast-feeding is more commonly experienced by babies born to mothers in high-income than in low-income areas, but there is still a large difference in breast-feeding between white and black mothers, even within communities with similar income levels (figure 10). These patterns are clear and the differences are large for white and black women separately, and a multilevel model suggests that community characteristics in 1990 are part of the explanation of patterns of breast-feeding in 1990–94, but there are also large differences by individual characteristics as well. Community prosperity in 1990 is also closely associated with breast-feeding for 12 weeks or more in 1990–94 (figure 11).
- Vaginal douching is a known risk factor for pelvic infection, tubal pregnancy, infertility, and cervical cancer. For white, black, and Hispanic women, douching is markedly more common in low-income communities than in high-income communities (figure 12). A Hierarchical Linear Model shows that community socioeconomic status in 1990 is related to douching in 1995, independently of individual characteristics.
- White and black women who live in low-income communities are more likely to smoke cigarettes than comparable women living in high-income communities. For Hispanic women, however, there is no clear, significant pattern (figure 13). Multilevel analysis suggests, however, that the higher the community's educational level in 1990, the fewer women currently smoke in 1995, even after controlling for age, race/ethnicity, and individual-level income.

In conclusion, these analyses suggest that further studies of the NSFG Contextual Data File may provide further insights into fertility, contraceptive use, sterilization, and such aspects of women's health as breast-feeding, vaginal douching, and smoking. The authors encourage researchers to use the NSFG Contextual Data File to study these and other topics further.

# Introduction

This report shows analyses of results from the contextual data file for the 1995 National Survey of Family Growth (NSFG). Contextual data are sometimes defined as information on the "context," community, or neighborhood, in which the survey respondent lives. The contextual measures used in this report are measures of the characteristics of the county, census tract, or block group in which the respondent lived, derived from the 1990 Census.

The NSFG was conducted by the Centers for Disease Control and Prevention (CDC), National Center for Health Statistics (NCHS), under a contract with the Research Triangle Institute, of Research Triangle Park, NC. The NSFG is a multipurpose study based on in-person (not telephone) interviews, conducted in the homes of the sampled women. The main function of Cycle 5 of the NSFG was to collect nationally representative data on factors affecting birth and pregnancy rates, family formation (including marriage, cohabitation, and adoption), and reproductive health, among a sample of women of childbearing age.

The basic results of Cycle 5 of the NSFG have been published previously (1–12). A more complete list of reports and articles based on the 1995 survey is on the survey's web page at: www.cdc.gov/nchs/nsfg.htm.

This report looks at several aspects of fertility, contraception, and women's and infants' health. These aspects were chosen to represent a wide range of important outcome variables produced by the survey, including many that are of both theoretical and policy interest. More background explaining the importance of each outcome variable is included in the "Results" section of this report. The outcome variables included in this report are:

- The percent currently childless and the percent temporarily childless (tables 1–3)
- The proportion of recent births that were unwanted by the mother (tables 4–5)
- The percent of unmarried women with three or more recent sexual partners (table 6)
- The percent currently married (tables 7, 8)
- The percent of those using contraception who use female sterilization, the pill, or the male condom (tables 9–14)
- The percent of babies who were breast-fed at all and for 12 weeks or more (tables 15–18)
- The percent of women who douche regularly (tables 19–20)—a preventable risk factor for several serious women's health conditions
- The percent of women who smoke cigarettes (tables 21,22).

This report, however, shows that these important behaviors are associated with both individual demographic characteristics and with the characteristics of the communities in which the women lived in 1990 (the census date). Previous reports based on the NSFG have encouraged readers to consider the characteristics of the community as possible explanations of differences among demographic groups. For example, in Series 23, No 19 it is suggested that ". . .Differences among white, black, and Hispanic women. . . in the tables primarily reflect the lower income and educational levels of black and Hispanic women, their more limited access to health care and health insurance, the communities in which they live, and other factors" (1).

This report is presented to encourage readers to consider ways in which differences by individual-level characteristics (such as age, race, and Hispanic origin; education; and income) may be related, in part, to the community environments in which the survey respondents live; and to show statistical researchers some examples of how the NSFG Contextual Data File can be used. Appendix I defines some of the technical or specialized terms used in this report.

## What Are Contextual Data?

For this report, "contextual" data are simply measures of the community or neighborhood "context," or environment, in which a person lives. The NSFG Contextual Data File (described further in Appendix II) includes information on the characteristics of the State, county, census tract, or block group in which the woman lived, at three dates: in 1995 (the date of the NSFG interview); in 1993; and in April of 1990 (when the census was conducted). Examples of characteristics that are included in the NSFG Contextual Data File include:

- The unemployment rate in the area
- The percent receiving public assistance
- The average value of public assistance
- The median rent or the median value of homes in the area
- The percent with incomes below the poverty level
- Indicators of State spending on various categories of programs.

When community-level characteristics such as these are used in a regression model, along with individual characteristics (such as the woman's age, race, Hispanic origin, and how much education she has completed), researchers call these multilevel, contextual, or Hierarchical Linear Models (13). In this report, they will be referred to as multilevel models or Hierarchical Linear Models.

This report contains 22 detailed tables, including 13 tables that show cross-tabulations and 9 tables that show the results of multivariate analyses with multilevel models. The contextual, or community-level, variables used in this report are:

1. Median family income at the census date in 1990
2. Percentage of households with income below the poverty level in 1990
3. Percentage of adults who were college graduates in 1990
4. Male unemployment rate in 1990
5. Percentage employed in professional or managerial occupations in 1990.

The variables are measured in 1990, at the census date, and the outcome variables typically refer to behavior or characteristics that are ongoing at or just before the date of interview in 1995. This is done so that the measures of the community-level variables are temporally prior to the outcome variables being measured in this report.

Certainly, other indicators of community characteristics could be used, but the five characteristics of communities used here were chosen for three principal reasons:

1. Preliminary analyses showed that they are related to the outcomes shown in this report;
2. They represent some of the most important dimensions of community characteristics used in the existing research literature; and
3. The variables measure factors such as unemployment, poverty, and education, which can be affected by public policies.

For the cross-tabulations in this report, we classified the contextual, or community-level variables into three categories. For these community-level variables, the ''low'' category represents the lowest third of the distribution, the ''middle'' category represents the middle third, and the ''high'' category shows the highest third. In some tables where there were too few Hispanic respondents in the sample to show reliable statistics, we included Hispanic women in the total but did not show them separately.

This classification scheme represents a compromise between the need to present reliable statistics based on large sample sizes, and the desire to look at the full range of the distribution by community characteristics. This report does not show any cross-tabulation in which the total number of cases in a row is less than 250, and most rows have many times more than that. The standard errors of the proportions shown in the cross-tabulation tables were calculated using SUDAAN, and are shown in Appendix III, tables I–XIII. Differences discussed in the text are significant at the 0.05 level unless they are qualified as ''small'' or ''not significant.''

The multivariate analyses are run only on selected tables and outcomes. These outcomes have been chosen to represent a wide range of topics, but it was not possible to perform a multilevel multivariate analysis of every cross-tabulation shown in this report.

# Previous Research on Community Characteristics

This section reviews a few selected previous studies of community effects, or contextual effects, on fertility, contraception, and sexual activity in the United States. It does not include the large number of studies of contextual effects outside the United States (14,15) or the large literature on community effects on educational and child development outcomes, which have been reviewed exhaustively elsewhere (16–18).

The studies reviewed below, and others like them, suggest that the characteristics of communities measured in the NSFG Cycle 5 Contextual Data File might have significant effects on some important outcome variables that are also measured in the NSFG.

1. Hogan and Kitagawa (19) studied the fertility of about 1,000 black adolescent females 13–19 years of age in Chicago, Illinois, who were interviewed in 1979. Using an index of neighborhood quality composed of variables like those used in this report, they found that the probability of a premarital pregnancy before age 20 varied from 52 percent of black teens in low-status neighborhoods to 25 percent in high-status neighborhoods.
2. In another study based on the same survey in Chicago, Hogan, Astone, and Kitagawa (20) found that, after adjusting for other variables, 36 percent of black teen females in high-status neighborhoods, and only 20 percent in low-status neighborhoods, used a method of contraception at first intercourse.
3. Billy, Brewster, and Grady (21) used a contextual data file based on the 1982 NSFG to study the effects of various community and individual factors on whether adolescent females had ever had intercourse. Even after controlling for individual characteristics, several community variables were found to affect the probability of premarital intercourse and the effects were somewhat different for white and black teens.
4. Brewster (22) used the same contextual data file with the 1982 NSFG to study the large difference between black and white adolescent females in the risk of premarital intercourse. She found significant community-level effects that suggested that ''the race difference in the risk of first intercourse reflects race differences in access to economic resources and exposure to successful adult role models.''
5. Brewster (23) also used a contextual data file with the 1982 NSFG to study sexual activity and contraceptive use among black teen females and concluded that ''neighborhood socio-economic status, female employment, and marital dissolution rates'' were related to premarital intercourse and use of contraception.
6. Billy and Moore (24) used the 1982 NSFG Contextual Data File to investigate the effects of both individual and community-level variables on both the risk of a birth among married couples (marital fertility) and the risk of a birth among unmarried women. Using hazard-rate models with time-dependent covariates, they found that census characteristics such as area marriage rates and the characteristics of the local labor force affected fertility, but different variables (characteristics of communities) affected marital and nonmarital births.
7. Grady, Klepinger, and Billy (25), also using 1982 NSFG Contextual Data File, found that a number of community-level variables, including the number of family planning clinics, were associated with the effectiveness of contraceptive use. The

relationships remained after controlling for the characteristics of individuals.

8. Mosher and McNally (26) used the 1988 NSFG and a few contextual variables measured in ''minor civil divisions.'' (Minor civil divisions are smaller than counties, but larger than census tracts.) Use of contraception at first intercourse is a major determinant of teenage pregnancy. They found that, after controlling for several individual characteristics, several community characteristics affected the probability that women used a method of contraception at first premarital intercourse.

9., 10. More recently, South and Baumer (27,28) published two studies using longitudinal data from the National Survey of Children, a sample of several hundred children interviewed in 1976, 1981, and 1987. South and Baumer found that black teens were more likely to have premarital births than white teens, and that about two-thirds of the difference was due to the fact that black teens tend to live in lower-SES neighborhoods than white teens. They also found some support for the theory that some of the neighborhood effect is related to the attitudes and behaviors of peers.

11. South and Crowder (29) used data from the Panel Study of Income Dynamics and census data to study the impact of community characteristics on premarital childbearing and on the timing of first marriage, using discrete-time event-history models. They found that growing up in a low-SES community (''neighborhood disadvantage'') has a significant nonlinear effect on black women's chances of marrying before their first birth. Among white women, neighborhood disadvantage is related to both marriage and to the risk of a premarital birth.

# Interpretations of Community-Level Effects

What explains findings like these? Several explanations of community effects have been offered. For example, sociologist William Julius Wilson (30,31) suggested that concentrated ghetto poverty had far-reaching effects on the residents of those areas by removing job opportunities in manufacturing and other industries that could be performed by those with limited education, and by leaving behind only the poor, so that many children and youth living in poor neighborhoods had very few economically successful adult to serve as role models for them. Mayer and Jencks (16) suggested several mechanisms by which growing up in a poor, or affluent, neighborhood could affect the residents.

In addition, educational researchers were attempting to quantify the effects of characteristics of schools versus the characteristics of students, on student performance (32,33).

Recently, Leventhal and Brooks-Gunn (17) reviewed a large amount of research that was done in the 1990s on the effects of neighborhoods on the behavior and achievement of children and adolescents, including a major two-volume study of Neighborhood Poverty coordinated by the Social Science Research Council (18). Leventhal and Brooks-Gunn (17), reviewing existing studies by others and their own factor analytic studies, suggested several dimensions of neighborhoods that appear to have broad effects on the behavior of their residents, including: high Socio-economic Status (SES), low SES, male unemployment, and family composition.

In this report, high SES is measured by the percentage of adults who are college graduates and by the percent of employed workers who are in professional or managerial occupations; low SES is measured by the percentage of persons with incomes below the poverty level. Male unemployment is measured directly by the male unemployment rate in the census tract. Others have suggested that measures of community characteristics should include both average values and extremes (34). This report uses both, including median family income as an average value, and indicators of low SES such as the percent below poverty and high SES such as the percent who are college graduates.

How do these characteristics of communities—high and low SES, male unemployment, and family composition—affect the behavior of their residents? Researchers have suggested (17) that communities may affect individual behavior in at least three important ways:

1. *Institutional resources*—these are community assets that residents and their children can use to enhance their own educational or economic success (for example, schools, child care facilities, libraries, parks, hospitals and health clinics, the quality of housing, or job opportunities).
2. *Relationships*—particularly the quality and effectiveness of relationships within families (between adults as well as between adults and children).
3. *Norms/collective efficacy*—which means the extent to which the community's residents watch, monitor, and supervise the use of ''violence and harmful substances,'' and other behavior, and either correct such behavior or let it spread.

Sampson (35) calls these factors ''a working trust among residents, and a shared willingness of residents to intervene in support of local social order.'' Sampson concluded that ''evidence from social science research can be capitalized on to design and evaluate neighborhood-based prevention strategies for dealing with health- and violence-related outcomes and for building community capacity'' (35).

Additional research will be required to arrive at satisfactory explanations for all the community-level differences

found in this report and whether it makes sense to explain them in terms of ''institutional resources,'' ''relationships,'' ''norms/collective efficacy,'' some combination of these, or some new way of understanding community resources. This report is intended to suggest starting points for further research using NSFG and other NCHS contextual data. The final section of the text of this report describes how researchers can use the Cycle 5 (1995) NSFG Contextual Data File in the NCHS Research Data Center.

# The Multilevel Statistical Models Used in This Report

## Summary

This summary will give the general reader a brief, relatively nontechnical review of the statistical models used in this report. The next section, called ''Hierarchical Linear Models,'' describes the techniques further and in somewhat more technical language.

One common feature of the studies presented previously is an interest in using both individual-level and community-level independent variables to explain individual-level outcomes. While the studies cited above employed several different statistical techniques, they clearly illustrate a growing recognition that neighborhood or community context can influence individual behavior. These studies also show an effort to measure the effects of community context in a rigorous statistical manner. De Leeuw, writing in Raudenbush and Bryk's text (36), defines the issue in the following way: ''in the social sciences, data are often hierarchical. . .: We have variables describing individuals, but the individuals also are grouped into larger units, each unit consisting of a number of individuals. We also have variables describing those higher order units.'' This idea is illustrated with the four examples below. Each example has 1,000 level-1 units (individuals), which are grouped into 50 level-2 units. The examples are:

1. 1,000 students (level 1) grouped into 50 schools (level 2)
2. 1,000 adults (level 1) grouped into 50 counties (level 2)
3. 1,000 employees (level 1) working for 50 companies (level 2)
4. 1,000 suspects (level 1) tried by 50 judges (level 2) (37).

In each case, a Hierarchical Linear Model may be used to test the idea that characteristics of the schools, the county, the company, or the judge may have effects on the outcome that are independent of the effects of the individuals (level-1 units).

One assumption that can be tested with these models is whether level-1 units (individuals) within the same group (or level-2 unit) are more similar to each other than individuals in different level-2 units. If that is true, then special statistical models are needed. According to Raudenbush and Bryk (36), these models are described by different names in different disciplines: Hierarchical Linear Models, Mixed Models, Random-Effects Models, or Random-Coefficient Models (36–41).

Using these techniques with data files like the NSFG Contextual Data File allows the researcher to study whether or not counties differ in an individual-level outcome variable. If there is no variation across counties in these outcomes, then it is not necessary to measure community characteristics and it is not necessary to adapt research and policy to that fact.

When counties do differ significantly, tests can be done to see if specific county characteristics predict the individual-level outcomes (for example, whether the woman smokes cigarettes). If the counties differ in these outcomes, then the models allow us to test whether it is the county-level independent variables, or the individual-level independent variables, or both, that affect smoking. The outcomes we will study include whether or not women:

- Delay childbearing until after their teenage years (tables 1–3)
- Have unwanted births (tables 4, 5)
- Choose different contraceptive methods (tables 9–14)
- Breast-feed their babies (tables 15–18)
- Douche (tables 19, 20), and
- Smoke cigarettes (tables 21, 22)

This report contains 22 tables, including 13 cross-tabulations and 9 Hierarchical Linear Models. The cross-tabulations do not prove that there are community-level ''effects''—only that there are wide variations in these individual-level behaviors between communities with different characteristics that deserve further study. The next step is taken with some of these topics and a Hierarchical Linear Model (HLM) is constructed. Hierarchical Linear Models can be thought of as regression models that are done at two levels: the individual level and the group (or county) level. Essentially, they allow the researcher to make statements about the statistical ''effects'' of community-level variables on an outcome, controlling for individual-level variables, and statements about the effects of individual-level variables on an outcome, controlling for the effects of a community-level variable. For example, they allow us to say that if a county had a higher median income in 1990, then women living in that county had an increased chance of being childless in 1995, controlling for the age, race, and individual-level income of those women (table 3).

## Hierarchical Linear Models

This section is intended for professional statistical researchers or others who want a more precise understanding of Hierarchical Linear Models. It assumes a basic knowledge of the concepts and terminology of ordinary least-squares (OLS) regression and logistic regression techniques. This description, like the previous section, draws primarily on those in Raudenbush and Bryk (36), Snijders and Bosker (37), and Kreft and de Leeuw (38). Readers may also wish to review Appendix I, which gives definitions of some of the technical terms used in this report;

Appendix IV, which shows some examples of GLIMMIX models; and Appendix V, which shows the SAS procedure called PROC MIXED (used for continuous outcome variables). PROC MIXED and GLIMMIX were chosen over other specialized HLM software for this report because they are SAS procedures (42–45) and therefore can be used with the NCHS Research Data Center's Remote Access Procedure. Readers who do not need further discussion of these statistical techniques may wish to skim this section, or skip to the ''Results'' section.

In some data sets, including the NSFG Contextual Data File, the individuals are clustered in second-level units—such as students who are in the same school, women who live in the same neighborhood or county, or people who live in the same State. Such data are sometimes said to have a ''nested structure.'' This nested structure may mean that the assumptions of OLS regression—including uncorrelated errors and constant variance—do not hold. Thus, a technique is needed to see if there is a clustering effect, and if there is, to use that fact explicitly in the multivariate model. HLM allows us to do this by using an estimation procedure that explicitly models this clustering; correlated errors due to clustering are no longer left in the error term as they would be in a single-level OLS regression model. If a single-level model were used on clustered data, it could produce misleading results, in some cases identifying individual characteristics (for example, race) as a determinant instead of a community-level characteristic (for example, median family income or the unemployment rate). According to Snijders and Bosker (37), HLM may be thought of as a regression model that has an error term, or residual, for the individual level and another error term for the group level. HLM estimates a model in which the value of the outcome variable depends on both the group's characteristics and the individual's characteristics, and an error term at both the group level and the individual level.

In this report, the social context is modeled explicitly by specifying two-level hierarchical models (36–45). These models are sometimes called Random-Intercept Models because the intercept (e.g., the overall probability of being childless at age 20–34) may vary as a function of a known community-level variable (included in the model) and other random variables (not included in the model) (37). These models may be more realistic than models positing that county characteristics have either no effect, or a constant effect on the probability of childlessness.

The Hierarchical Linear Models in this report begin with a ''Null'' Model—a model with no explanatory variable specified. The Null Model tests whether counties differ significantly on a given outcome—breast-feeding, smoking, or childlessness. It therefore measures the county-level variation in the absence of control variables. If results from the Null Model indicate significant county variation, the next step is to introduce explanatory variables into the model at the individual and/or county levels. As in the Null Model, this new Random Intercept Model allows for random variability in the outcome variable across counties. The only difference between the two models is that the Null Model has no explanatory variables, while the random intercept model has at least one explanatory variable. (It is possible to study more complex effects of community characteristics. For example, a Random Coefficient Model would allow the researcher to study whether there is variation across counties in the relationship between an individual characteristic, age, and being childless. The effect of age on childlessness may be stronger in high-income counties than in low-income counties, for example. Random Coefficient Models, however, are more difficult to analyze and to describe in understandable terms however, so they are not included in this report.)

Modeling variability between groups on a given outcome variable (childlessness) is not a new statistical procedure. Analysis of Covariance (ANCOVA) is an alternative method for multivariate modeling, which estimates fixed effects for contextual variables. Estimating mixed models (as done in this report), however, has some advantages over Analysis of Covariance. First, previous findings and the cross-tabulations shown in this report, show that these outcomes are likely to vary across counties. Random coefficient models such as the Random Intercept Models estimated here are therefore more realistic than the other methods (fixed effects models), which assume a constant level for the outcomes. Second, the large number of counties in the NSFG dataset prevents the use of ANCOVA: the number of counties in the NSFG data is much too large for the efficient use of ANCOVA. Third, the Random Coefficient Model estimated here allows for testing the effects of group-level variables, in this case, a county. In a fixed effect model, outcome variability between the groups is assumed to have all been explained away by the explanatory variables. If there is no between-group variability left, then there is no need for group-level variables (36–38).

No claim is made here that the multivariate techniques used in this report are the only correct or the only appropriate techniques to analyze contextual (community-level) data. In addition, even if multilevel or HLM is the most appropriate kind of technique, the models shown in this report are illustrative, and should not be considered the only possible ones. It is always possible to try using different sets of community variables, different sets of individual-level variables, and different sets of sample persons to analyze.

This report does show researchers some illustrations of how the NSFG Contextual Data File can be analyzed, using SAS PROC MIXED and GLIMMIX. Using these SAS procedures, it is possible to use the NCHS Research Data Center to do multilevel modeling from the researcher's own location, using the Remote Access Procedure. In addition to SAS PROC MIXED and GLIMMIX, however, there is a growing collection of software available to estimate multilevel models. For example, Raudenbush and Bryk's software is called HLM, for Hierarchical Linear

Models. HLM is described further at: http://ssicentral.com. Other software available to implement these models includes MLwiN, MIXOR, VARCL, and a Bayesian software program called WinBUGS (35). Some of these are available on the internet; for example, WinBUGS is available at: www.mrc-bsu.cam.ac.uk/bugs. Kreft and de Leeuw have also presented a software program, called MLN, which is described further at: http://multilevel.ioe.ac.uk/index.html.

Kreft and de Leeuw (38) recommend fitting models with just a few independent, or explanatory, variables. The techniques used for fitting multilevel models—Maximum-Likelihood Estimation and Bayesian estimation—are useful for many situations, but they also use considerable computer memory. Kreft and de Leeuw (38) caution that if the model has too many explanatory variables that are closely related to each other, the equations will sometimes not be solved at all (that is, the models will not "converge"). Thus, Snijders and Bosker (37) and Kreft and de Leeuw (38) recommend using available substantive knowledge and preliminary analyses to choose a short list of explanatory variables to include in a multilevel model. We followed this advice in order to keep the number of explanatory variables in each model as small as possible. We also kept the number of cases in each table quite large, to obtain the maximum possible stability in the estimates. Researchers doing more specialized analyses may wish to select more targeted subsamples for analysis.

## The Intra-Class Correlation

An early step in the Hierarchical Linear Modeling process is to compute the intra-class correlation. In a traditional Ordinary Least-Squares regression analysis of survey data, the individuals in the sample would be assumed to be sampled independently. But it is common for people who live near each other and share common experiences to be similar to each other in some ways—more similar to each other than to people far away (38). The intra-class correlation ". . .can also be called a measure of group homogeneity. More formally, with data having a two-level. . . structure, it is defined as the proportion of variance in the outcome variable that is between the second-level units"—in this report, the counties—as opposed to variance that is between individuals in the sample.

When the intra-class correlation is high, then a high proportion of the variation (in the outcome) is between the level-2 groups (counties). In this situation, a level-2 explanatory variable (median family income or the unemployment rate) may be introduced into the model when the researcher wishes to explain the second-level variance (36–38).

Table A shows the estimated intra-class correlations for the selected outcome variables in this report. They indicate a degree of similarity between women living in the same county from low (7 percent) to high (44 percent). The intra-class correlation for childlessness is 14.9 or about 15 percent, a significant but moderate level of intra-class correlation. Similar levels are found for use of female sterilization (18.6 percent) and smoking (14.7 percent). The intra-class correlation for unwanted births is higher, at about 29 percent. For vaginal douching, it is about 33 percent. For breast-feeding, the intra-class correlation is nearly 44 percent.

The estimated models in this report have dependent variables that are dichotomous. As a result, the assumptions of normality and constant variance in the individual-level residual (error) term do not hold. The application of GLIMMIX takes care of the normality assumption but it does not result in having a constant variance. In dichotomous variables, the mean already determines the variance, that is, the variance is the product of the probability of success times the probability of failure ($V=p(1-p)$). Put simply, counties have different within-county variances. It is however permissible to interpret first-level residual variance as the "average residual variance" in the population of counties. With this interpretation, the intra-class correlation as computed for continuous variables can be applied to dichotomous variables (37).

## Units Used for the Community-Level Analysis

The analyses in this report use two "levels" of data: individual-level data on women, such as her age, race, or educational attainment (sometimes called "level 1"); and "community-level" data (sometimes called "level 2"). For the cross-tabulations in this report—such as tables 1 and 2—block groups were used as the "community" or "level 2" units. Block groups are more homogenous than counties or States, and measure the immediate neighborhood environment. (The male unemployment rate was measured at the census tract level, because census tracts are larger than block groups and they yielded more stable unemployment rates.)

The Hierarchical Linear Models used in this report compute average regression coefficients for the

**Table A. Estimated Intra-class correlations for selected outcome variables**

| Model | (1) Between-group variance | (2) Within-group variance | (1)/(1)+(2) Intra-class correlation (percent) |
|---|---|---|---|
| Childless (table 3) | 0.169 | 0.969 | 14.9 |
| Unwanted birth (table 5) | 0.352 | 0.859 | 29.1 |
| Using female sterilization (table 10) | 0.220 | 0.964 | 18.6 |
| Using the pill (table 12) | 0.078 | 0.974 | 7.4 |
| Using the condom (table 14) | 0.208 | 0.935 | 18.2 |
| Breast-fed at all (table 16) | 0.721 | 0.930 | 43.7 |
| Breast-fed 12 weeks or more (table 18) | 0.633 | 0.916 | 40.9 |
| Douches regularly (table 20) | 0.465 | 0.951 | 32.8 |
| Smoking (table 22) | 0.166 | 0.965 | 14.7 |

NOTE: The Intra-class correlations are derived from the estimated Null Models in the multilevel analyses in this report.

individuals in each level-2 unit (in this case the county), so they require a minimum sample size within the level-2 units. Snijders and Bosker (37) caution that when there are very few cases in too many of the level-2 groups, the coefficients for the contextual variables are likely to be unstable, and possibly biased. Preliminary analysis suggested that there would not be enough cases to obtain stable estimates if block groups or census tracts were used as level-2 units. So it was decided that counties would be used in the multivariate analysis. There are more than enough cases to compute reliable level-2 coefficients for nearly all counties in Cycle 5. As a precaution, a few counties with less than five sample cases were excluded from the multivariate models only. (Such cases were, of course, included in the cross-tabulations because only three categories of each ''level 2'' variable in the cross-tabulations were used.) The samples in other surveys, and in the 1982 NSFG, were much more clustered, however, so it was possible to use census tracts in their analyses of the 1982 NSFG data (21–24).

The potential disadvantage of using counties is that their heterogeneity (compared with block groups or census tracts) may understate the effects of the community-level factors. Thus, the estimates of county-level effects in the multilevel models in this report may represent a conservative estimate of the community-level associations in these data.

## Community-Level Indicators

All of the community-level characteristics used in this report were derived from the 1990 census. They were chosen after extensive preliminary analysis and a review of the literature cited in this report. Many of these measures are correlated with each other. Table B shows the correlations of the measures with each other for all women 15–44 years of age. In the top left of the table, the correlation between the median family income (MEDFINC) and the percent below poverty (BELOWPOV) of counties in the NSFG sample was –.75 ($p$<0.0001); the correlation between the male unemployment rate (URTMALE) and the percent below poverty (BELOWPOV) was +.74. The correlation between the percent of adults 25 and older with a college degree (ABGRAD) and the county's median family income (MEDFINC) was +.77. The proportion of adults who were college graduates (ABGRAD) and the percent who were professionals and managers (MANAGER) were correlated at +.94, nearly a perfect correlation.

**Table B. Pearson correlation coefficients for the correlations between pairs of contextual or community-level variables**

| Variables | MEDFINC | BELOWPOV | URTMALE | ABGRAD |
|---|---|---|---|---|
| MEDFINC[1] | . . . | . . . | . . . | . . . |
| BELOWPOV[2] | –.75 | . . . | . . . | . . . |
| URTMALE[3] | –.49 | .74 | . . . | . . . |
| ABGRAD[4] | .77 | –.53 | –.58 | . . . |
| MANAGER[5] | .74 | –.40 | –.23 | .94 |

. . . Category not applicable.
[1]MEDFINC=Median family income in the county in 1990.
[2]BELOWPOV=Percent below poverty in the county in 1990.
[3]URTMALE=Male unemployment rate in the county in 1990.
[4]ABGRAD=Percent of adults in the county who were college graduates in 1990.
[5]MANAGER=Percent of employed who were professionals and managers in 1990.

NOTE: Each of the variables used in the tables in this report is measured for the woman's county of residence in April 1990, at the time the census was taken.

The county-level variables may be viewed as socioeconomic status (SES) indicators. These include median income, percent below poverty, unemployment rate, percent with a college degree, and the percent of workers who are professionals or managers. These correlations are large enough that several of these variables cannot be entered into the same model at once. Preliminary analyses (not shown here) showed that the problem of multicollinearity was significant with these indicators. Multicollinearity leads to unstable estimates with large sampling errors when more than one of the socioeconomic status indicators is entered in a model. When this situation arises, some researchers create an index of neighborhood characteristics; for example, Hogan and Kitagawa called their index ''neighborhood quality,'' while South, Kryder, and Baumer called their index ''neighborhood disadvantage'' (27–29). This can be an elegant procedure, but we have chosen not to do this because it increases the complexity of the analysis, and increases the complexity of the interpretation. Instead, substantive concerns were used to choose the five community-level variables shown throughout this report. Of the five community-level variables, we retained the one or two variables in each equation that improved the fit of the model the most. The high correlations among the community-level variables means, however, that similar results are obtained with most of the other variables.

For convenience in writing, in the text of this report, non-Hispanic white women will be referred to as white and non-Hispanic black women will be referred to as black. The full labels are used in the tables.

# Results

## Childlessness

Table 1 shows the percent of women 20–34 years of age who have never had a birth, by race, Hispanic origin, and a series of community-level variables. The age range 20–34 was chosen for this table because we want to relate the environment in which women have lived recently to whether or not births have occurred recently. Birth rates are highest in the United States at ages 20–34. Thus, most of the births to these women who have had a birth will have been only a few years before the

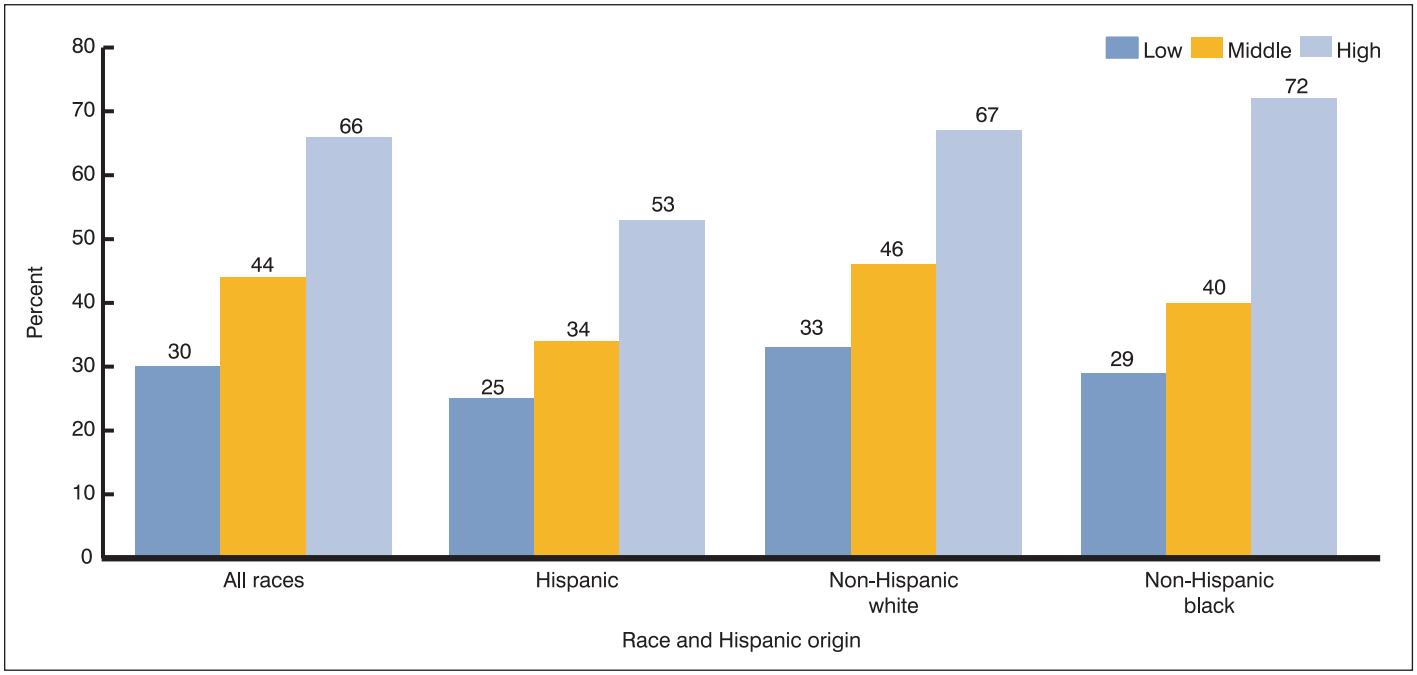


**Figure 1. Percent of women 20–34 years of age who have never had a birth, by race and Hispanic origin and community median family income in 1990: United States, 1995**

interview, and therefore near or after the time the community factors were measured in 1990.

Remaining childless until after age 20 often indicates that the woman has successfully postponed pregnancy, and is pursuing employment, education beyond high school, or both. On the other hand, births to younger women—especially before age 20—often result from unintended pregnancies (1,7,10). Pregnancy rates before age 25 are much higher for black and Hispanic women than for white women. In fact, much of the difference between the birth and pregnancy rates of white women compared with black and Hispanic women is found at the younger ages (7).

The proportion childless in the United States varies from lowest among Hispanic women to highest among white women (1). In table 1 of this report, those results are found as well: 31 percent of Hispanic, 36 percent of black, and 47 percent of white women 20–34 years had no births when interviewed in 1995. In most cases in the United States, having had no birth in this age range represents deliberate and successful delayed childbearing.

The pattern by the community variables in table 1 is striking. For example, in the data on the percent childless by median family income of the community, 30 percent of women living in communities with the lowest incomes were childless, compared with 66 percent in areas with the highest incomes (figure 1). Among Hispanic women, 25 percent in the lowest-income areas were childless at the date of interview, while 53 percent of Hispanics in high-income areas were childless. The same pattern held for white women: 33 percent childless in low-income areas and 67 percent childless in high-income areas. The pattern was very similar for black women (figure 1). In addition, the differences between white and black women are smaller within high-income areas (67 versus 72 percent) and low-income areas (33 versus 29 percent) than overall (36 versus 47 percent).

A similar picture is shown by the percentage of households with below-poverty incomes: in neighborhoods with low poverty rates, 58 percent of white women were childless compared with 36 percent in areas with a high percent below poverty (figure 2). The pattern is similar for each variable in table 1, and the differences by the prosperity of the neighborhood are large, for white, black, and Hispanic women.

Table 2 shows the proportion of women 18–39 years of age who have not had a birth as of the date of interview, but expect to have one or more births eventually. In other words, they are currently childless, but expect to have children eventually. This is a direct measure of delayed childbearing. This measure might also be called the "temporarily childless" or those "postponing motherhood." About 34 percent of women ages 18–39 were temporarily childless in 1995. The proportion was slightly lower among black women (25 percent) and Hispanic women (28 percent) than among white women (35 percent).

But the percent temporarily childless was strongly associated with every contextual measure in table 2. For example, 26 percent of those living in low-income communities in 1990 were temporarily childless in 1995 compared with 46 percent of those living in high-income communities (figure 3). This pattern was consistently observed for Hispanic, white, and black women separately. Of those living in areas with low poverty rates, 40 percent were temporarily childless compared with 28 percent of those living in areas with high rates of poverty. Again, the pattern is quite similar for Hispanic, white, and black women separately. These findings are consistent with the hypothesis that

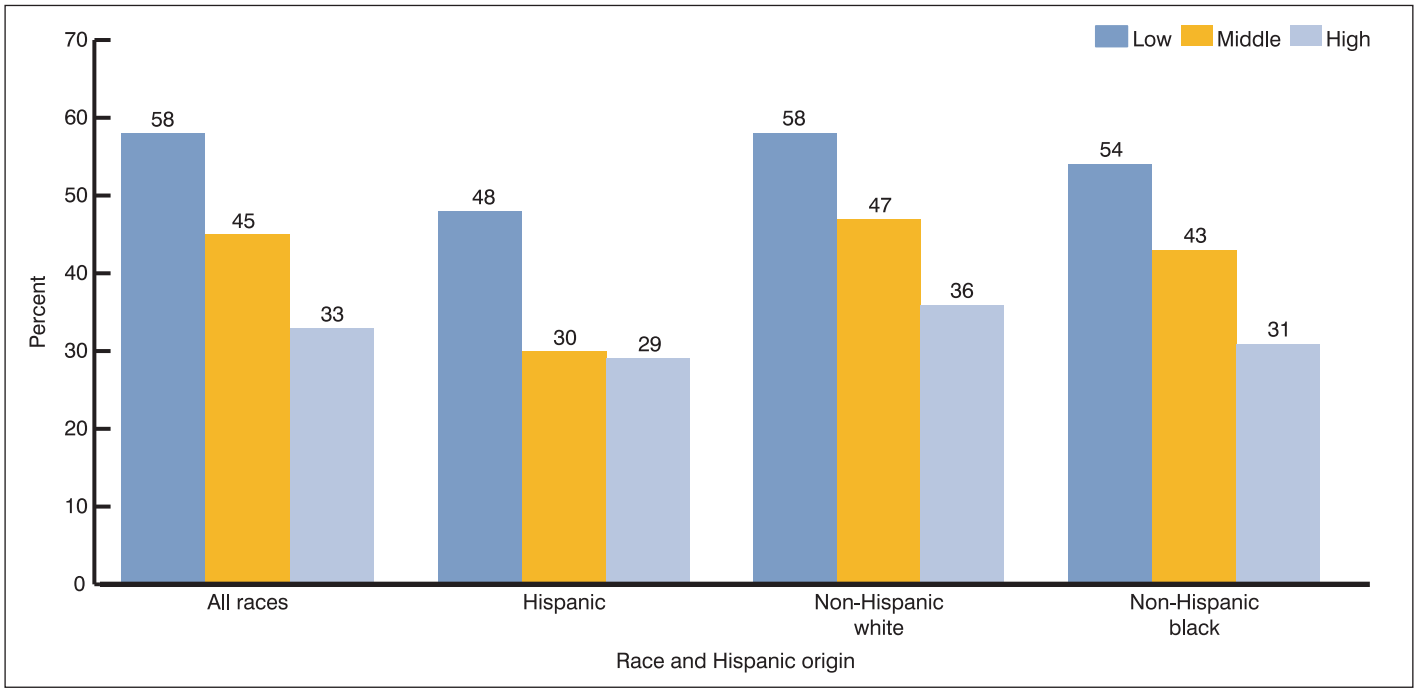


**Figure 2. Percent of women 20–34 years of age who have never had a birth, by race and Hispanic origin and community poverty rate in 1990: United States, 1995**

the economic prosperity of the community one lives in is strongly associated with delayed childbearing. To obtain more rigorous evidence on this point, however, we conducted the analysis shown in table 3.

Table 3 shows results from a multilevel model, estimated using the statistical procedure GLIMMIX as discussed in previous sections. Here the dependent variable = 1 if a woman 20–34 years of age is childless and 0 if she is not. The community-level variables are measured at the county level. The results of table 3 are perhaps best described by indicating the steps that were used to produce the model shown there. The steps were suggested by Bryk and Raudenbush (36,39):

1. The first step is to look at the results of the Null Model in the first two panels of table 3. The Null Model shows that there is, in fact, significant variation in the intercepts across counties. It is, in effect, a test to see if there is significant variation between the groups. If there is no significant variation in the Null Model, we do not need to go further; we can estimate an individual-level model without contextual variables. The results, in the second panel of table 3, show the variance of the intercept (that is, the proportion of the total variance accounted for by the county-level variability). The variance of the intercept term indicates that the counties vary significantly ($p<0.0001$) in the percent childless.

   The Null Model shows that the intra-class correlation (table A) accounts for about 15 percent of the total variance in childlessness. This means that some counties have higher rates of childlessness than other counties and there is a substantial portion of the total variance that is explainable by county variation in median family income.

2. The next step is to rerun the ''Null'' Model in step 1 and add some individual-level (''level 1'') characteristics that are well-known strong correlates of current childlessness. The results show that the effects of each variable are significant (except for non-Hispanic ''other'' race, which has a small sample size). The model shows the following relationships, controlling for other variables in the model:
   - If the woman's family income is higher, the probability of childlessness is higher.
   - If she is Hispanic or black, the probability of childlessness is lower.
   - If the woman is older than 24, the probability of childlessness is lower.

   Again, it is not possible to enter dozens of variables into the model because the models become unstable and cannot be solved—that is, they do not ''converge.'' In this case, we enter income (in three categories, with ''under $20,000'' as the reference category), race/ethnicity (with non-Hispanic white as the reference category), and age, with 20–24 years as the reference category, and one county-level variable.

3. With 15 percent of the total variance that is explainable by group (i.e., county) variation, the community-level variable is added to the model (as described in the section ''Community-Level Indicators''). This model is a restricted one in that only the Level 2 intercept (mean) is allowed to vary from county to county; the relationship between the

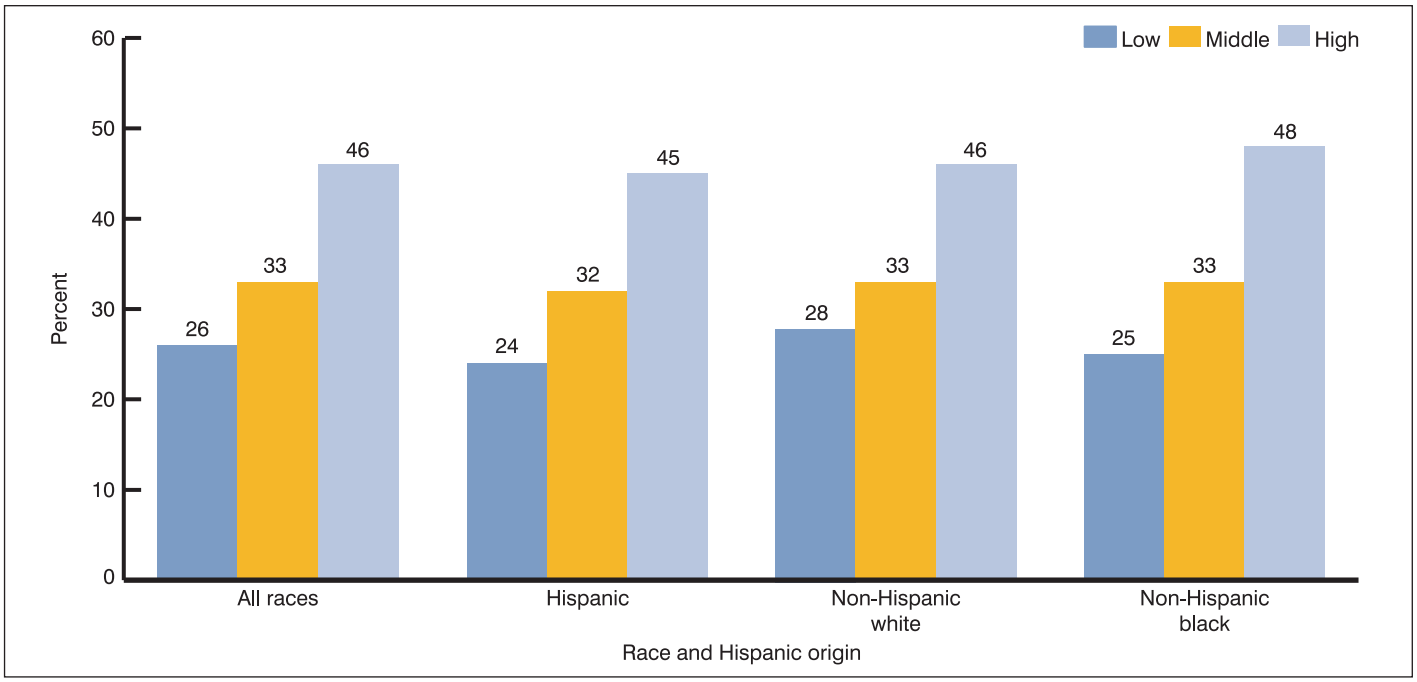


**Figure 3. Percent of women 18–39 years of age who have had no births but expect to have children in the future, by race and Hispanic origin, and community median family income in 1990: United States, 1995**

outcome variable, being childless at age 20–34 years, and any of the Level 1 predictors (age, race, etc.) is constrained to be only a fixed effect. The model thus predicts the probability of being childless, for a given combination of values for the individual-level variables, using the mean for a county plus a random (varying) component. In other words, some counties have a larger (or smaller) effect on the level of childlessness when their value for a given community-level variable is above (or below) the mean level for the counties.

The overall importance of the community-level variables is seen in their ability to explain variability in childlessness. As noted previously, this works through each county's value for a given county-level variable (holding other predictors constant). The total effect of clustering can be obtained and computed from the variance figures presented under the "Random Effects" panel for both the Null Model and the Random Intercept Model. A comparison of the two Random Effects (the variances) indicates the extent to which the community characteristics affect childlessness. As the results show, the community-level variable median family income (MEDFINC) reduced much of the explainable between-group variance (from .169 to .079). The z-test presented in the bottom panel of table 3 shows that after including the fixed effects of median family income in the model as well as the random effect of the counties' median family income on the intercept, there still remains statistically significant variation ($p \leq 0.0162$) across counties in the proportion childless at 20–34 years of age.

4. The Random Intercept Model presented in table 3 significantly improved the fit of the model. A comparison of the deviance statistic—a measure of the statistical "lack of fit" of the model—shows a deviance in the Null Model of 5,523, declining to 4,840 in the Random Intercept Model, a difference of 683 (12 percent smaller), a substantial and significant decline.

In sum, this two-level model shows that the median family income of the county has a significant effect on the probability of childlessness in the county: childlessness is more likely in communities with higher median family income. After controlling for the effects of the median family income of the county, race, age, and individual household income also have significant effects on the probability that an individual woman will be currently childless. It is particularly noteworthy that county-level median family income has an effect on childlessness that is independent of the woman's household income.

It is logically possible to go two steps further in each model: first, to model the effects of contextual variables on the estimated slopes for individual-level variables; and second, to test for "cross-level interactions" (for example, to see if the effect of an individual woman's race or income interacts with county-level median family income). Because both are complex and beyond the scope of this report, neither have been done here. However, those who are interested in answering these questions for one of the outcome variables in this report are encouraged to pursue them.

## Unwanted Births

Table 4 shows the proportion of births (in the 5 years before the survey) that were reported as "unwanted" by

the mother at the time they were conceived. "Unwanted" means that, when she became pregnant, she did not want to have that many births in her lifetime. For example, if she wanted to have only two births in her life, and had a pregnancy that resulted in a third birth, that third birth is classified as unwanted. The same is true if she wanted three children, but had a fourth: the fourth would be classified as unwanted at the time it was conceived (1). (Births that were unwanted at conception do not necessarily become unwanted children. Even if a pregnancy is unwanted at the time of conception, the child's parents may later cherish the child born as a result of that pregnancy (46).)

The overall proportion of recent births that were unwanted was about 9 percent. About 7 percent of births to white women, 10 percent of births to Hispanic women, and 19 percent of births to black women, were unwanted. For all races, and for Hispanic, white, and black women separately, the proportion of births that were unwanted is higher in areas with the lowest median incomes, the highest poverty rates (figure 4), the highest male unemployment rates, the fewest college graduates, and the fewest professional and managerial workers (figure 5).

For example, the proportion of births unwanted was 4 percent for white women in areas with the lowest poverty rates and 10 percent for white women in areas with the highest poverty rates (figure 4). For Hispanic women, the comparable figures were 8 and 14 percent unwanted. For black women, the comparable figures were 14 percent unwanted in areas with the lowest poverty rates and 21 percent in areas with the highest poverty rates (figure 4).

Using the proportion of adults in the community employed in professional or managerial jobs in 1990 (figure 5), the findings were quite similar. In areas with few professional workers, 13 percent of births were unwanted; in areas with more professional workers, 5 percent were unwanted.

Table 5 shows a multilevel model in which the dependent, or outcome variable is whether a birth was unwanted by the mother. The contextual variable used in this case is the male unemployment rate in the county. As in table 3, the first two panels indicate whether there is significant variation by county, and if so, how much variance

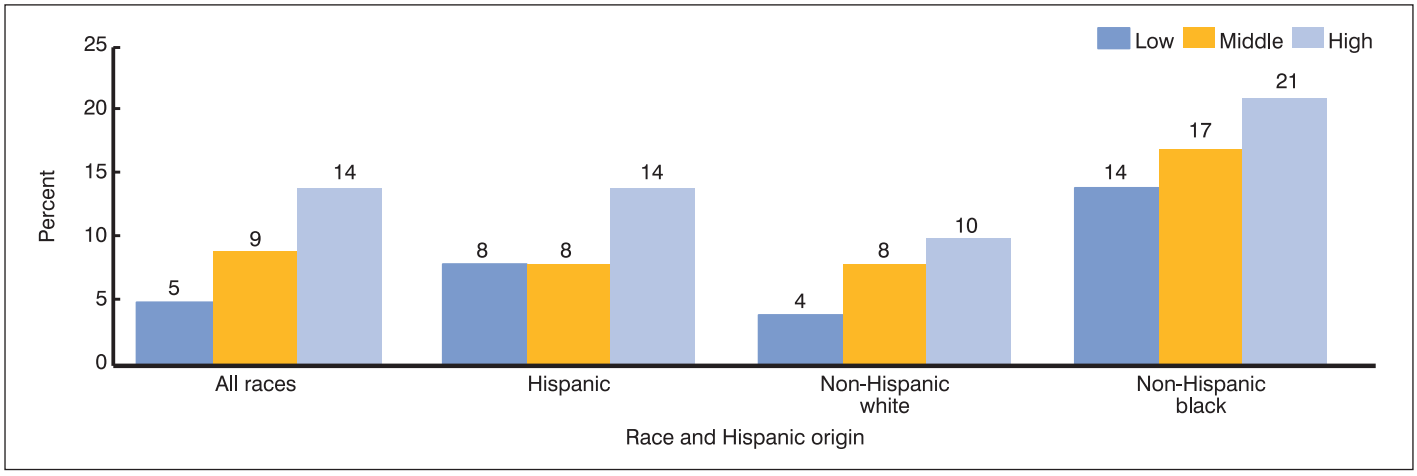


**Figure 4. Percent of births in 1991–95 reported as unwanted by the mother, by race and Hispanic origin and community poverty rate in 1990: United States, 1995**

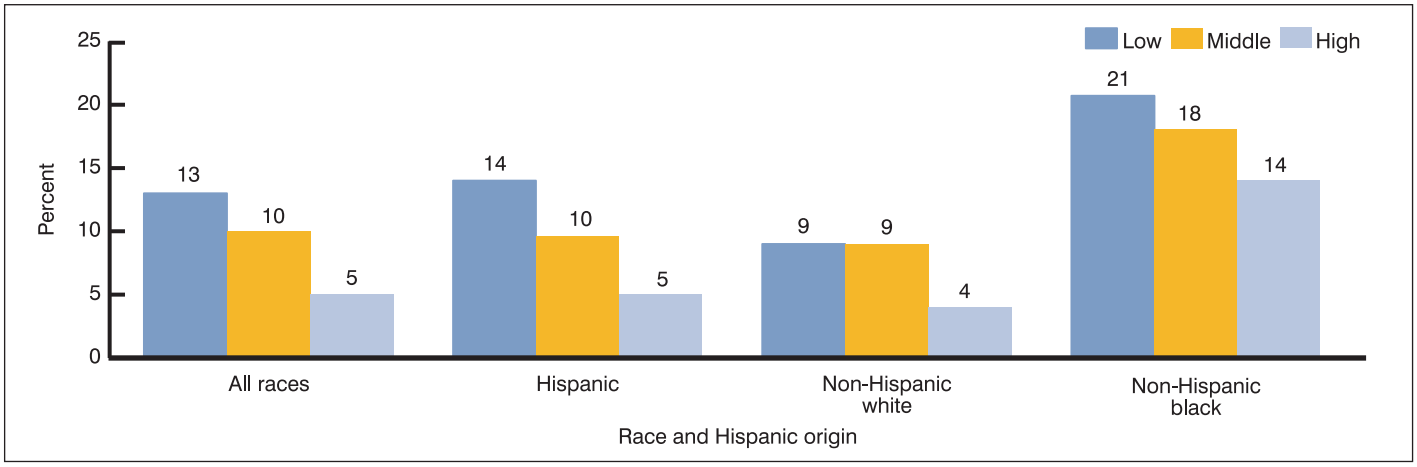


**Figure 5. Percent of births in 1991–95 reported as unwanted by the mother, by race and Hispanic origin and percent of employed adults in professional or managerial jobs in 1990: United States, 1995**

there is between counties in unwanted births.

The county-level (intercept) variance is .35, which shows that there is significant and substantial variation across counties in the proportion of births that were unwanted. The intra-class correlation (shown in table A) shows that this county-level variation accounts for about 29 percent of the total variance in unwanted births.

In the third panel of table 5, the "Random Intercept" model, the male unemployment rate in a county has a significant effect on the proportion of births that were unwanted; unwanted births are more likely in communities with higher male unemployment. A conventional individual-level regression model would miss that county-level variation, perhaps including it in the error term or attributing that variation to individual-level variables such as the mother's race. Controlling for the county-level unemployment rate and looking at the individual-level variables, the probability of an unwanted birth increases significantly if the woman is Hispanic or black, or is 40 years of age or older.

In the fourth panel of table 5, under the "Random Effects," the estimate of the intercept variance indicates that there is still significant variation across counties in unwanted births, but it is substantially smaller (.2412 versus .3521) than it was before the male unemployment rate was controlled. This suggests that other community-level variables not included in this model may be associated with some of the remaining variation in unwanted births.

## Number of Sexual Partners

Table 6 shows the number of unmarried women 15–44 years of age who have had sexual intercourse at some time in their lives, and the percent who had three or more male sexual partners in the last 12 months, by race, origin, and community characteristics. Those with multiple partners within a short period of time are more likely to acquire and spread sexually transmitted diseases, possibly including HIV/AIDS. Overall, 17 percent of unmarried women (who had had sexual intercourse at some time) had three or more partners in the last 12 months, including 16 percent of white women and 24 percent of black women. Table 6 shows that overall, for all races combined, the proportion with three or more recent partners is higher in communities that have the lowest median incomes (figure 6), the highest levels of poverty, and the highest male unemployment rates, than in areas with the opposite characteristics.

Looking at the results by the percent of adults in the community who were college graduates, the proportion with three or more partners in the last 12 months was around 14–17 percent in most areas, but in areas with the least-educated populations it was 21 percent (table 6). This suggests that unmarried women living in communities with lower incomes and less education are somewhat more likely to have multiple recent partners, but the pattern is not dramatic or pronounced.

Within categories of the contextual variables, it appears that black unmarried women are more likely to have three or more partners in the last 12 months than white or Hispanic unmarried women. For example, in areas with low median incomes, 18–19 percent of white and Hispanic women, and 27 percent of black unmarried women, had three or more partners in the last 12 months. In areas with high poverty rates, 17–19 percent of white and Hispanic women and 25 percent of black unmarried women had three or more partners.

## Marital Status

Both scholarly works and policy discussions have speculated on the effects of the economic and social environment on marriage and the family (3,30,31). To illustrate how marital status is related to the community environment, tables 7 and 8 show the percent of women 20–44 years of age who are currently married, by race and the community-level variables. Table 7 shows women 20–44 years of age and table 8 is limited to women 30–44 years of age.

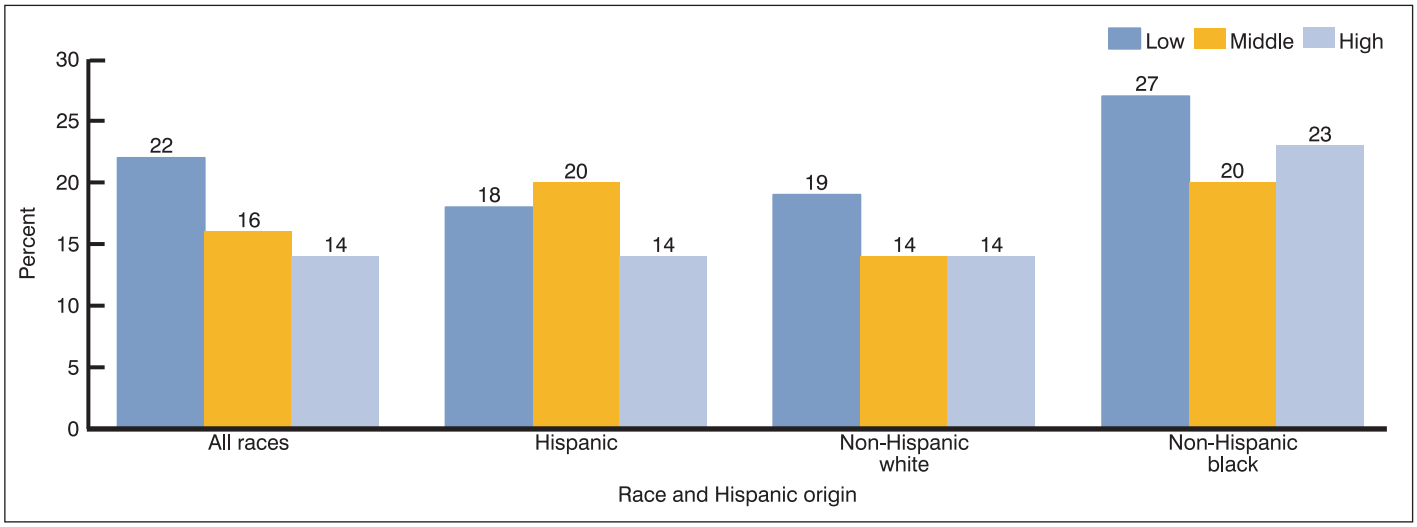


**Figure 6. Percent of unmarried women 15–44 years of age with 3 or more male sexual partners in the last 12 months, by race and Hispanic origin and community median family income in 1990: United States, 1995**

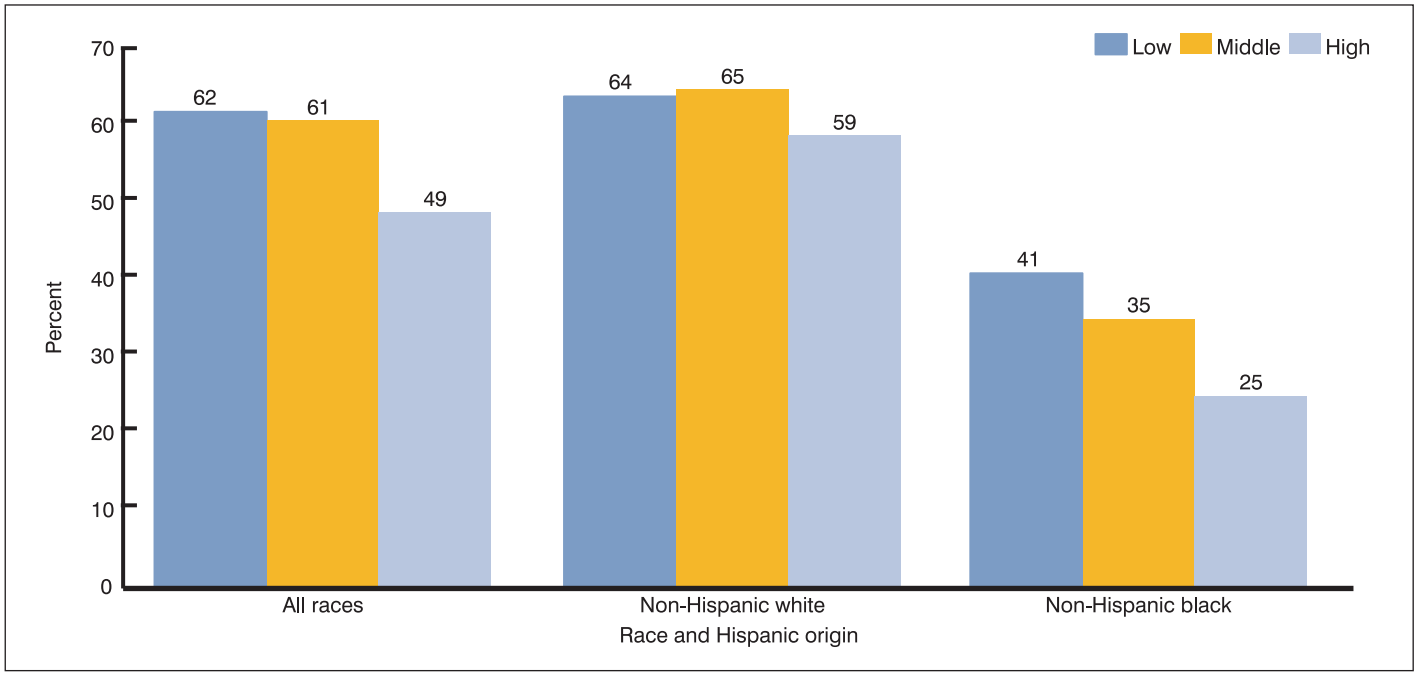


**Figure 7. Percent of women 20–44 years of age who are currently married, by race and Hispanic origin and community male unemployment rate in 1990: United States, 1995**

The percent currently married for women 20–44 years of age in 1995 was about 57 percent overall, about 63 percent for white women and only 30 percent for black women (table 7). Among black women, the percent who are currently married (in 1995) increases as the area's income in 1990 increases. For example, in areas with the lowest median income (under $20,000 in 1990), 25 percent of black women were currently married in 1995; in areas with the highest median income in 1990, 42 percent of black women were currently married in 1995. Among white women, differences were much smaller and generally not significant (table 7).

Only 29 percent of black women in the lowest-income communities were married compared with 57 percent of black women in the highest-income communities. The difference by community income level was much smaller for white women compared with 16 percentage points for black women (table 7 and figure 7).

At age 30–44, about 67 percent of all women were currently married in 1995, including 73 percent of white women and only 38 percent of black women (table 8). In figure 8 and table 8, a similar result is found when the percent of women 30–44 years of age who are currently married is shown by the median family income in the community. The percent married ranges from 65 to 78 percent among white women (a difference of 13 percent) and 29 to 57 percent among black women (a difference of 28 percent).

## Use of Contraception and Sterilization

Table 9 shows the percent of contraceptive method users ("contraceptors") 20–44 years of age who were using female sterilization by race, Hispanic origin, and by the community-level variables; table 10 shows a multilevel model predicting use of female sterilization; table 11 shows the percent of contraceptors 20–44 years of age using the pill; table 12 shows a multilevel model predicting use of the pill; table 13 shows the percent of contraceptors 20–44 years of age using condoms, and table 14 shows a multilevel model predicting use of the condom. Female sterilization is the leading method of contraception in the United States; in 1995, about 30 percent of contraceptors were using it, including 44 percent of black contraceptors, 40 percent of Hispanic contraceptors, and 26 percent of non-Hispanic white contraceptors. These differences among these three groups have been well-documented (1,4,8). It is also known that use of female sterilization is related to family income, female education, the woman's age, and other individual characteristics.

The differences in use of female sterilization by the contextual (or community) variables are large (table 9). For example, by the poverty rate in the community, the percent of white contraceptors 20–44 years of age using female sterilization varies from 21 percent in areas with the lowest poverty rates to 34 percent in areas with the highest poverty rates. Among Hispanic contraceptors 20–44 years of age, 29 percent of those in areas with the lowest poverty rates and 47 percent in areas with the most poverty, were relying on female sterilization for contraception. Among black contraceptors, this range was from 34 to 44 percent (table 9 and figure 9). Within communities with similar poverty rates, black and Hispanic women had higher proportions using female sterilization than white women (figure 9).

Table 10 shows a multilevel model in which the dependent variable is use of female sterilization as a contraceptive method:

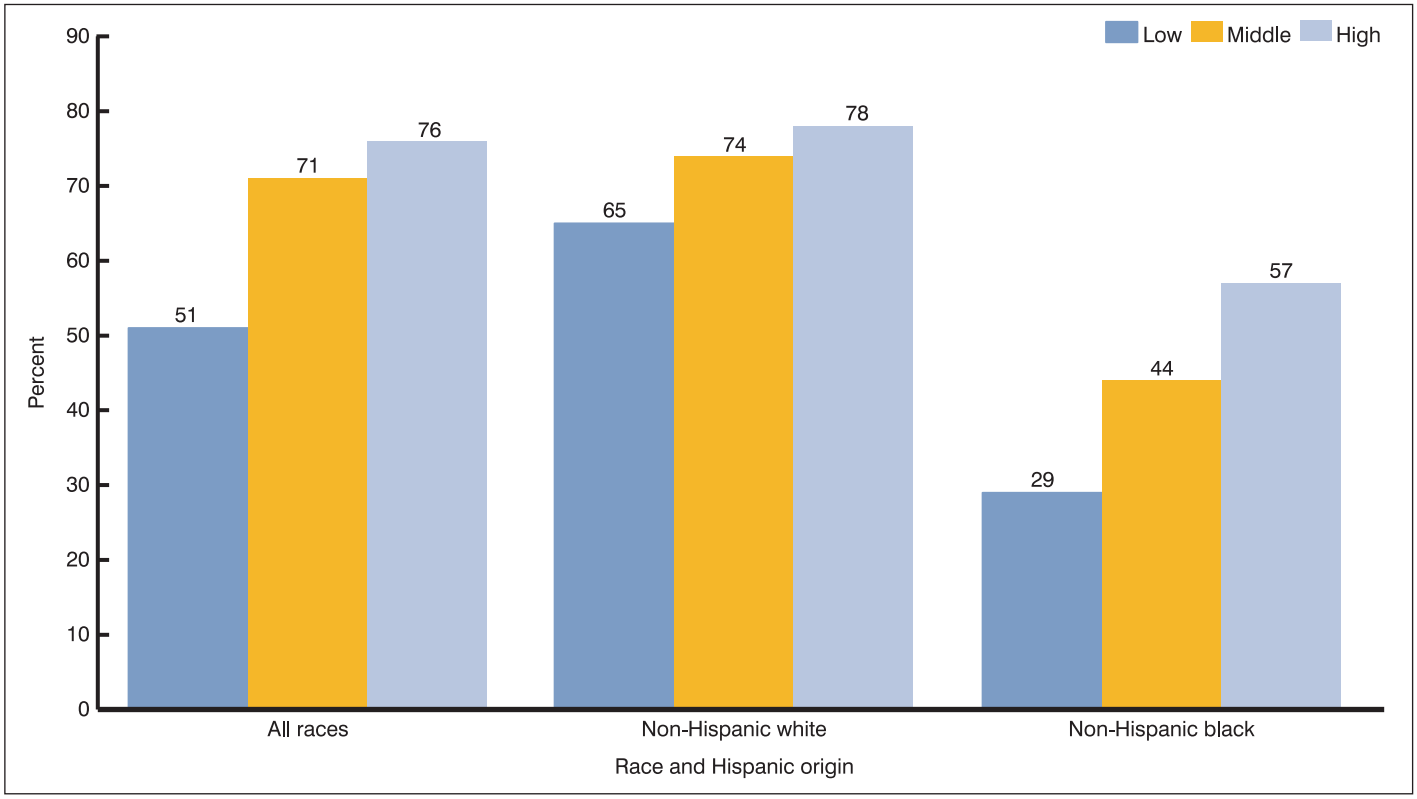


**Figure 8. Percent of women 30–44 years of age who are currently married, by race and Hispanic origin and community median family income in 1990: United States, 1995**

1. The second panel, the Random Effects Null Model, shows that there is significant variation between counties in the proportion using female sterilization ($p<0.0001$). Table A shows that this between-county variation accounts for about 19 percent of the variance.
2. The third panel in table 10 is the Random Intercept Model. The level 2 variable shows that as median family income in the county (MEDFINC) rises, the county's mean proportion of contraceptors using female sterilization declines, significantly and very substantially ($p<0.0001$)
3. The level 1 variables show that, controlling for the county's mean level of female sterilization, the probability that a woman will use female sterilization as her contraceptive method increases significantly as her age increases; it increases significantly if she is either Hispanic or black; and it decreases significantly as her family income increases. It is interesting to note that both individual-level family income and community-level median family income are independently associated with the probability of using female sterilization.

Table 11 shows the proportion of contraceptive users 20–44 years of age who were using the pill, by community characteristics. The differences by community characteristics are much smaller for pill use than for female sterilization and not always consistent across categories of communities.

Table 12 shows a multilevel model in which the dependent variable is use of the pill as a contraceptive method:

1. The second panel, the Random Effects Null Model, shows that there is significant variation between counties in the proportion using the pill ($p<0.0058$). Table A shows, however, that this between-county variation accounts for only about 7 percent of the total variance. Of all the values in table A, this is the smallest percent of total variance that is accounted for by variance between counties, suggesting that the effect of the community environment is smaller for pill use than for other variables examined in this report.
2. The third panel in table 12 is the Random Intercept Model. The level 2 variable shows that the median family income in the county (MEDFINC) has no significant effect on pill use. The Null Model showed that there is significant variation between counties in pill use, but median family income is not the best characteristic of communities to use to try to explain the effect of community. (In the interest of providing comparisons between the effects of community on the choice of different methods of contraception, we estimate the same model for female sterilization, pill use, and condom use, but a model with a different contextual variable might be more appropriate for studying pill use.)

The level 1 variables show that, controlling for the county's mean level of pill use, the probability that a woman will use the pill as her contraceptive

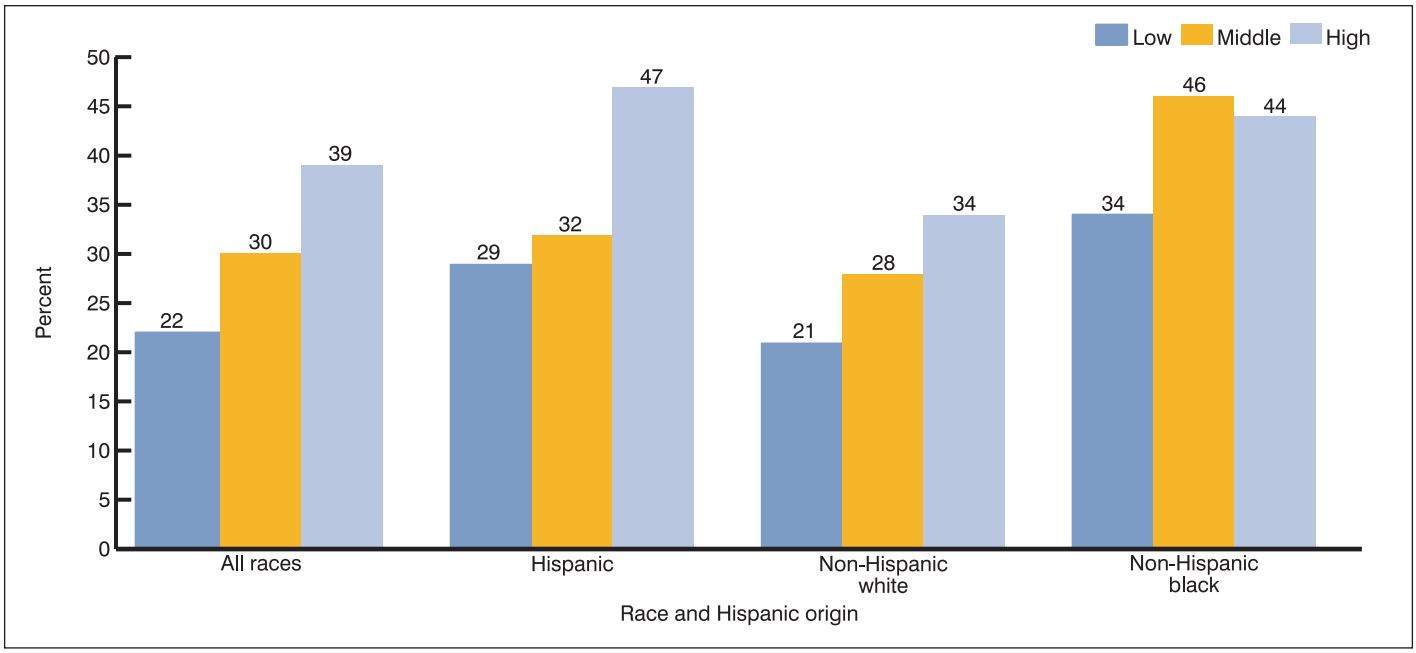


**Figure 9. Percent of contraceptors 20–44 years of age using female sterilization, by race and Hispanic origin and community poverty rate in 1990: United States, 1995**

method increases significantly if her family income is greater than $20,000 and decreases significantly as her age increases or if she is not white.

Table 13 shows the proportion of contraceptive users 20–44 years of age who were using the condom, by community characteristics. The measurement of condom use includes use of the condom along with other methods such as the pill. Women are more likely to have their partners use the condom if the woman lives in communities with higher median family income, more college-educated adults, and more of the local labor force in managerial or professional jobs. The differences by community context are much larger among Hispanic women than non-Hispanic women (table 13).

Table 14 shows a multilevel model in which the dependent variable is use of the condom:

1. The second panel, the Random Effects Null Model, shows that there is significant variation between counties in the proportion using the condom ($p<0.0001$). Table A shows that this between-county variation accounts for about 18 percent of the total variance.

2. The third panel in table 14 is the Random Intercept Model. The level 2 variable shows that as the median family income in the county (MEDFINC) increases, condom use in the county increases.

The level 1 variables show that, controlling for the county's mean level of condom use, the probability that a woman will use the condom as her contraceptive method increases significantly if her family income is greater than $50,000 and decreases significantly as her age increases. There is no significant difference among white, black, or Hispanic women but women of other races are more likely to use the condom.

Comparing the models for female sterilization, pill use and condom use reveals that higher median family income in the community is associated with a lower proportion using female sterilization and a higher proportion using the condom, but is not related to pill use. Hispanic or black women are less likely to use the pill but are more likely to use female sterilization than white women (compared with white women, women of other races are less likely to use the pill and more likely to use the condom but do not differ from white women in the choice of female sterilization). Older women are less likely to use the pill or the condom and more likely to use female sterilization than younger women, and women with higher family income are more likely to use the pill or the condom and less likely to use female sterilization (tables 10, 12, and 14).

The multilevel model for female sterilization was applied to the other methods of contraception in order to provide this kind of comparison, but it may be more appropriate to model each contraceptive method independently. For example, in the pill use model, median family income was not significant and may not have been the most appropriate measure of context to include. The pill use and condom models should be viewed as preliminary and needing further study.

## Breast-Feeding

Research suggests that breast-feeding confers a number of health benefits for babies and for their mothers. Benefits for babies include short-term immunity from diarrhea, respiratory and ear infections, a lessened risk of asthma, and others. The benefits for the mother include reductions in postpartum bleeding, earlier return to pre-pregnancy weight, and reduced risks of breast cancer and osteoporosis (47).

The NSFG data have shown that, since the 1970s, white and Hispanic mothers have been more likely to breast-feed their babies than black mothers; that college-educated mothers are more likely to breast-feed than less-educated mothers, and that mothers in the Western United States are more likely to breast-feed than those in other regions (47). One recent study of NSFG data suggests that education and income are strongly related to breast-feeding, and concluded that the lower levels of breast-feeding among black mothers were just as important a predictor of the higher level of infant mortality among black babies as their lower levels of timely prenatal care (1,12).

Table 15 shows the proportion of babies born between 1990 and 1994 who were breast-fed at all, by race, Hispanic origin, and community characteristics. Looking at the data in table 15 by median family income, about 41 percent of babies in low-income areas and 73 percent of babies in high-income areas, were breast-fed in 1990–94. Among babies with black mothers, this range was from 19 percent in low-income areas to 48 percent in high-income areas. Among babies with white mothers, 55 to 72 percent were breast-fed (table 15 and figure 10). Within communities in the same income categories, the proportion breast-fed was lower for babies with black mothers.

Table 16 shows a two-level model with breast-feeding as the dependent variable, and the percent of employed people working in professional or managerial jobs as the contextual variable. The second panel of table 16, showing the Null Model Random Effects, shows that there is highly significant variation between counties in the proportion of recently born babies who were breast-fed (z-value = 6.52, $p<0.0001$). Table A shows that an unusually large proportion of the variance, 44 percent, can be explained by variation across counties. This suggests that ignoring the county-level variation in these data could lead to misleading conclusions.

The fixed effects Random Intercept Model, the third panel of table 16, shows that as the county's proportion of employed people who are professionals or managers (MANAGER) increases, so does the proportion of babies in the county who are breast-fed. The level 1 (individual) variables show that, controlling for the county mean proportion breast-fed, the probability of breast-feeding is lower if the baby's mother has a lower income, is younger than age 25, is black, or did not graduate from high school. After these variables are introduced into the model, the fourth panel, "Random Effects," shows that the remaining between-county variance has been reduced by about a third (.49 versus .72).

Table 17 shows the proportions of babies born between January 1990 and September 1994 who were breast-fed for 12 weeks or more. This longer term breast-feeding increases the chances that the benefits of breast-feeding for the mother and child, described above, would be significant. The proportion of babies who were breast-fed for 12 weeks or more is closely associated with measures of community socioeconomic status. For example, the percent breast-fed 12 weeks or more is higher in communities with higher median income (table 17 and figure 11), a lower poverty rate (percent of households with incomes below the poverty level), a higher percentage of college graduates, a lower male unemployment rate, and a higher percentage with professional or managerial jobs.

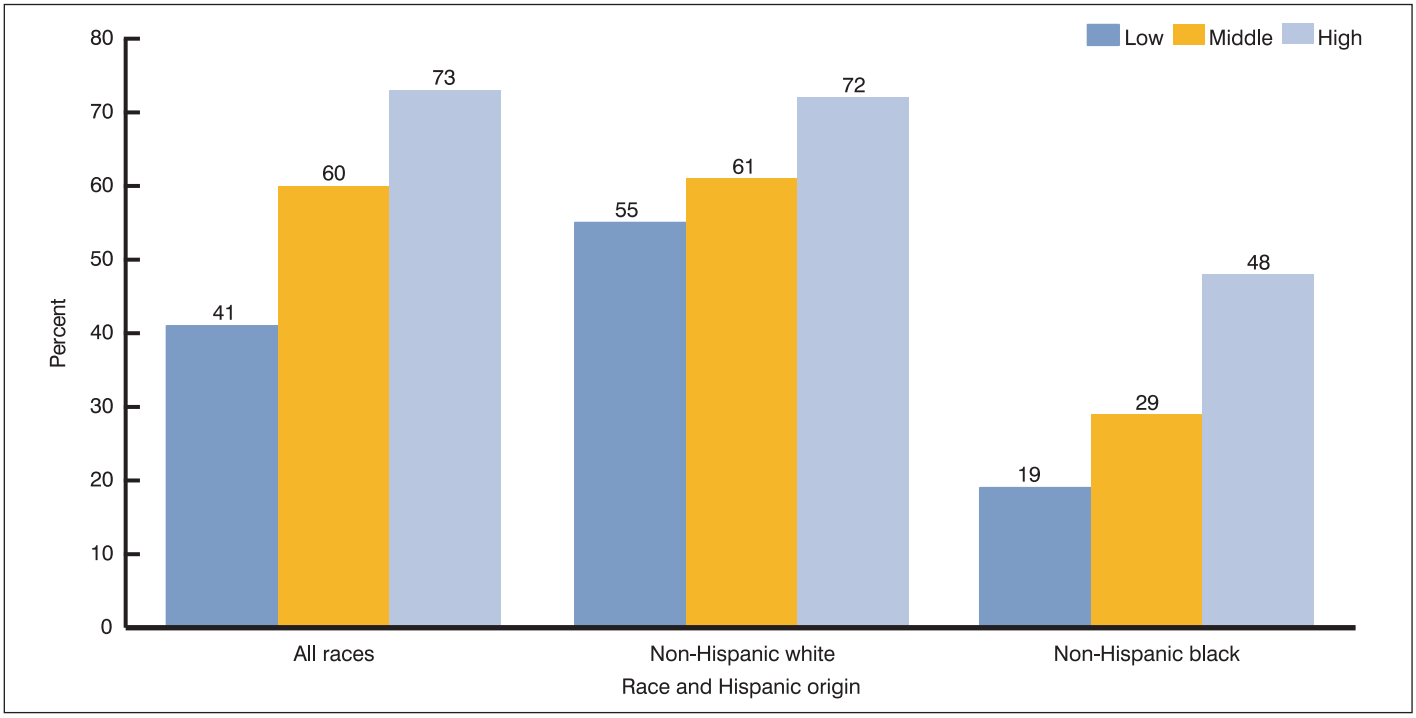


**Figure 10. Percent of babies born between January 1990 and September 1994 who were breast-fed at all, by race and Hispanic origin and community median family income in 1990: United States, 1995**

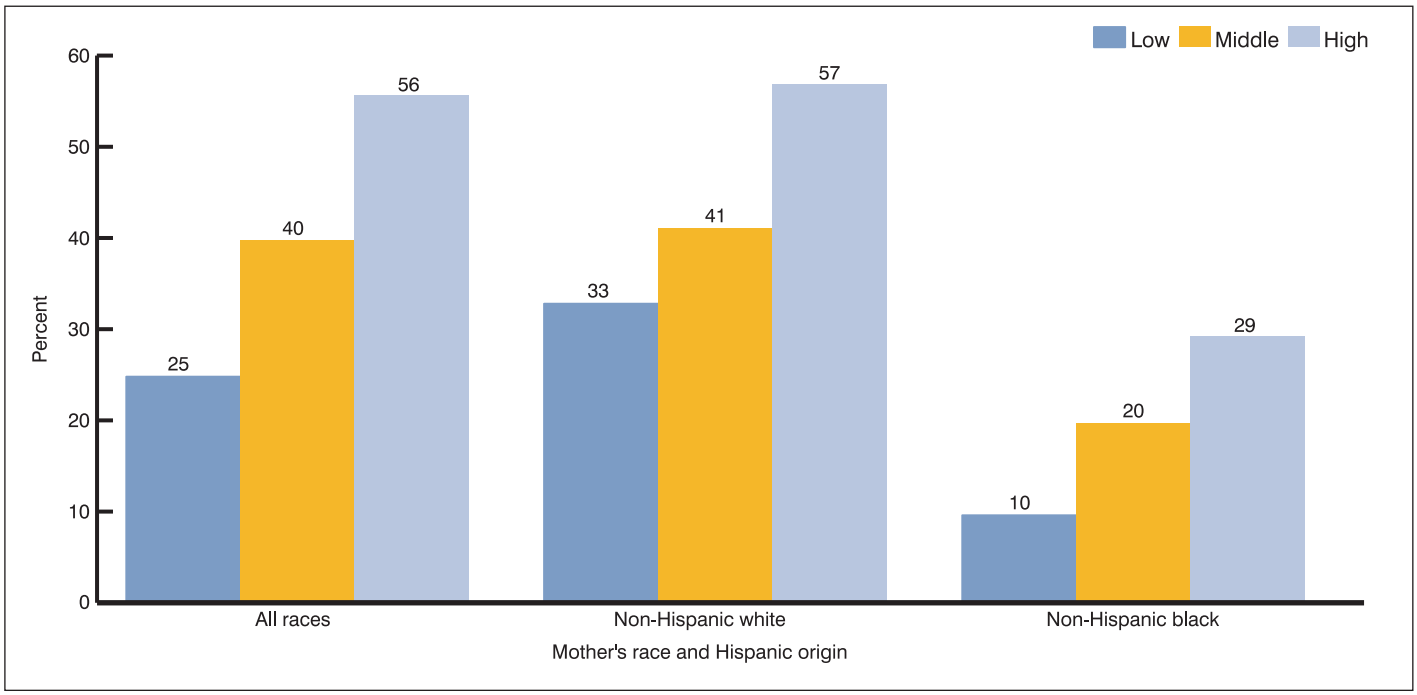


**Figure 11. Percent of babies born between January 1990 and September 1994 who were breast-fed for 12 weeks or more, by race and Hispanic origin and community median family income in 1990: United States, 1995**

Thus, regardless of which measure of community characteristics is used, longer term breast-feeding (like breast-feeding at all) occurs most frequently in communities with higher socioeconomic resources. This pattern appears to hold for white and black women for most of the contextual measures. The data appear to suggest, then, that the correlations between community characteristics and breast-feeding apply to both short- and long-term breast-feeding.

Table 18 repeats the multilevel breast-feeding model, this time using breast-feeding at least 12 weeks as the dependent variable. The second panel of table 18, showing the Random Effects Null Model, shows that there is significant variation between counties in the proportion of recently born babies who were breast-fed. (z-value = 5.79, $p<0.0001$). Table A shows that 41 percent of the variance is explained by variation across counties.

The Random Intercept Model for Fixed Effects, the third panel of table 18, shows that as the county's proportion of employed people who are professionals or managers (MANAGER) increases, so does the proportion of babies in the county who are breast-fed at least 12 weeks. The level 1 (individual) variables show that, controlling for the county mean proportion breast-fed at least 12 weeks, the probability of breast-feeding at least 12 weeks is lower if: the baby's mother is younger than age 25, or the baby's mother is black. Unlike the model for breast-feeding at all, the effects of individual-level income and education are not statistically significant in the model of breast-feeding at least 12 weeks.

## Vaginal Douching

Vaginal douching has been associated in epidemiological studies with infertility, pelvic inflammatory disease, and cervical cancer (48–53). In the 1988 NSFG, 37 percent of women 15–44 reported that they used douching regularly (53). By 1995, that proportion had declined to 27 percent, but douching was still more common among black, Hispanic, and less-educated women than among other women. (1).

In 1995, douching was also most prevalent in neighborhoods with the lowest median incomes (table 19 and figure 12), and in neighborhoods with the highest poverty rates, the lowest educational levels, the highest male unemployment rates, and the lowest proportion of professional and managerial workers. Figure 12 shows that these differences are very large in each racial/ethnic group—white, black, and Hispanic.

Table 20 shows the results of a multilevel analysis of the data on vaginal douching. In table A, the intra-class correlation is 33 percent, suggesting that any attempt to explain douching practices using individual factors alone is likely to provide an incomplete explanation.

In the third panel in table 20, the results of the Fixed Effects Random Intercept Model show that the overall proportion douching in a county declines as the proportion of employed persons who are professionals and managers (MANAGER) increases. This measure is highly correlated with the educational level of the county (+.94 in table B). Professionals and managers are highly educated workers, and previous studies (1,53) have found that douching declines sharply as a woman's individual level of education increases. The proportion of households with income below the poverty line (BELOWPOV) is also a significant predictor of douching in a county: douching is more likely in communities with more poverty.

Within counties, the level 1 variables in the third panel of table 20 show that douching is significantly more common among: older women than younger women; those with less than a high school education; and Hispanic women, black women, and women of other races (than white women). The fourth panel of table 20, Random Effects, shows that variation between counties has been reduced by more than one-half (from .4651 to .1967) compared with the Null Model.

## Cigarette Smoking

The report *Healthy People 2010* (47), which lists health objectives for the United States in the decade 2000–2010, singles out reducing smoking as a "leading health indicator," saying that, "Cigarette smoking is the single most preventable cause of disease and death in the United States. Smoking results in more deaths each year in the United States than AIDS, alcohol, cocaine, heroin, homicide, suicide, motor vehicle crashes, and fires—combined" (47).

The report, summarizing many other studies, notes that "Cigarette smoking causes heart disease, several kinds of cancer, and chronic lung disease. Cigarette smoking also contributes to cancer of the pancreas, kidney, and cervix. Smoking during pregnancy causes spontaneous abortions, low birth weight, and sudden infant death syndrome" (47).

Data previously published from the 1995 NSFG showed that less-educated women and low-income women were more likely to smoke than women with high levels of education or income (1). It also showed that white women were more likely to smoke than black or Hispanic women.

Table 21 and figure 13 show the percent of women 15–44 who reported that they were smoking at the date of interview in 1995. In communities with the lowest median income, 28 percent of women smoked compared with 18 percent in areas with the highest median income. For white women, 35 percent in the lowest income areas and 19 percent in the highest-income areas were current smokers. For black women, 27 percent of women in the lowest-income areas and 16 percent in the highest-income areas, smoked (figure 13).

Table 22 shows a multilevel model with current smoking as the outcome (or dependent) variable. The first panel, the Fixed Effects Null Model, shows that there is significant ($p$<0.0001) variation by county in the proportion currently smoking. Table A shows that about 15 percent of the variance is between counties, and the remainder within counties.

In the third panel of table 22 is the Fixed Effects Random Intercept Model. As the level 2 (county-level) variable, the percent of adults with a college education (ABGRAD) increases, the proportion smoking decreases. Controlling for the county-level proportion college-educated, the probability that an individual woman smokes: decreases as individual household income rises ($p$<0.0001); is higher for women of other races than for whites; and is higher in the older ages than in the younger ages.

The fourth panel of table 22, Random Effects, shows that the variance in smoking has been reduced (from .1664 to .0981) by more than one-third by the variables in the model, indicating the substantial influence of the community's education level on the smoking practices of women 15–44 years of age.

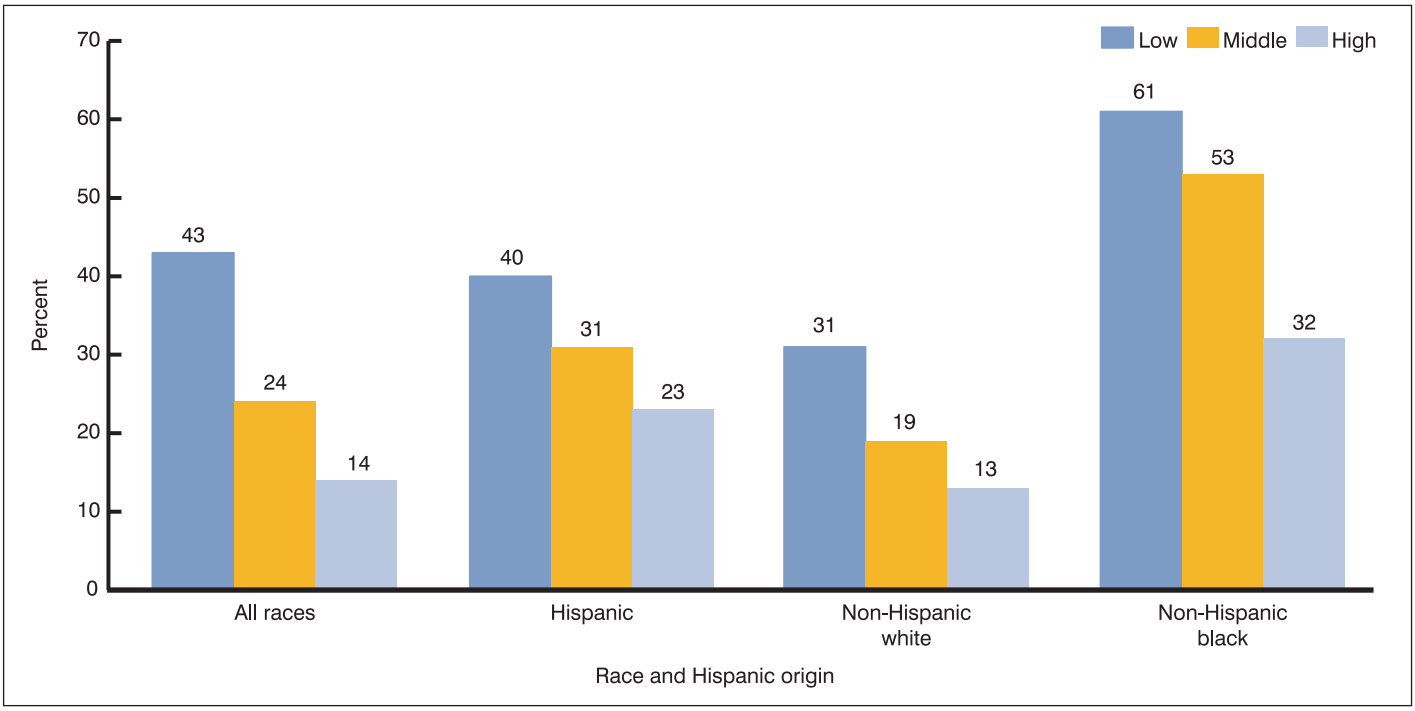


**Figure 12. Percent of women 15–44 years of age who douche regularly, by race and Hispanic origin and community median family income in 1990: United States, 1995**

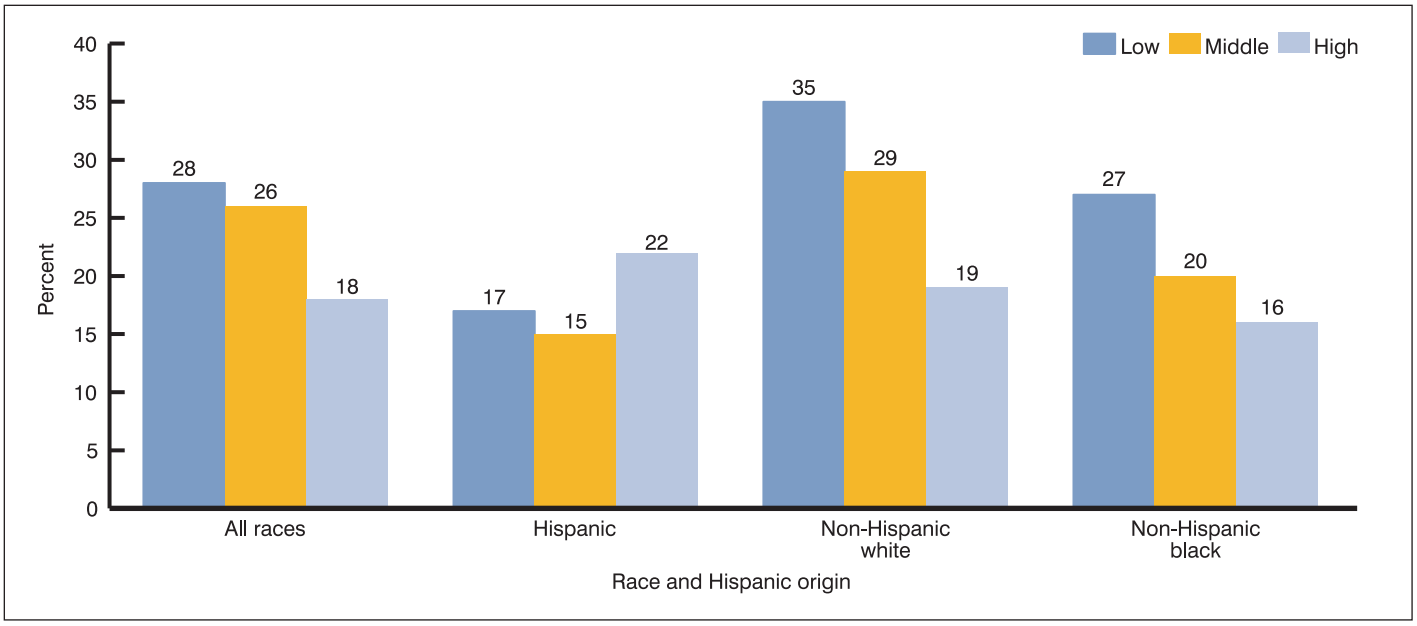


**Figure 13. Percent of women 15–44 years of age who currently smoke cigarettes, by race and Hispanic origin and community median family income in 1990: United States, 1995**

# Discussion

This report has described findings on several topics related to childbearing, pregnancy, and the health of women and infants, by race, Hispanic origin, and community characteristics.

As stated in the introduction, the intent of this report has not been to produce the definitive, causal, theory-driven study of this large and growing area of research. The goal has been much more modest—namely, to investigate whether factors related to the community environment appear to be associated with family formation, contraception, and reproductive health. It has been found that indicators of prosperity and economic opportunity in the community—such as median income, poverty rates, and the proportion of adults who are college graduates—are closely associated with childlessness, the use of female sterilization, breast-feeding, vaginal douching, and cigarette smoking.

These variations often apply to white, black, and Hispanic women separately. Our findings suggest that variations by race/ethnicity or other individual characteristics may be associated in part with variations in exposure to prosperity, economic opportunity, and the community resources and facilities that accompany prosperity.

It is possible for researchers to apply to the NCHS Research Data Center (RDC) in order to use the National Survey of Family Growth Contextual Data File. It is also possible to use the RDC either in person at NCHS (using any software), or via a Remote Access Procedure (using SAS). Because most researchers prefer to use the Remote Access Procedure, which requires SAS, this report used a SAS procedure for the cross-tabulations and all the multivariate analyses. The authors hope that this report will encourage researchers to pursue further studies of these important issues.

# Analyzing Contextual Data Through the NCHS Research Data Center

This section describes how researchers can use contextual data files such as the NSFG Contextual Data File through the NCHS RDC. The RDC allows researchers to use contextual and other data files under conditions that protect the confidentiality of survey respondents.

NCHS is required to protect the confidentiality of NCHS survey respondents. Any data file that could allow the identification of a small geographic area could increase the risk of compromising the confidentiality of those respondents, and cannot be released publicly. The NCHS RDC was established to provide a way for researchers to use contextual and other confidential files while still protecting respondent confidentiality. The procedures for submitting an application to use the RDC are described further on the RDC web page at: www.cdc.gov/nchs/r&d/rdc.htm.

After a researcher's proposal to use the RDC has been reviewed and approved, there are three basic ways to use the RDC. All require the user to pay a fee to help defray some of the costs of maintaining the RDC. First, the RDC staff can do the data analysis for the researcher. This procedure is the most costly of the three. Second, the researcher can come to NCHS and perform the research in the RDC. Third, researchers can use the Remote Access Procedure, in which programs are submitted electronically from the researcher's office; visiting NCHS is not necessary.

The Remote Access Procedure uses SAS, the Statistical Analysis System (42–45), because it is widely available, widely used, and contains a large number of statistical procedures and techniques. Further information about SAS software is available in References 42–45 and at: www.sas.com/support. Most users prefer to use the Remote Access Procedure because it does not require the researcher, or research team, to travel to NCHS. This procedure also allows the researcher to conduct the research over an extended period of time, instead of having to do everything in a few consecutive days. Users of the Remote Access Procedure can use any SAS PROC, except those that could be used to identify an individual respondent. For example, PROCs such as ANOVA (Analysis of Variance), REG (Regression) and LOGISTIC (Logistic Regression) may be used, but procedures that list individual cases, such as FIRSTOBS, FIRST., LAST., and LIST cannot be used remotely. These prohibited PROC's may be used when the researcher is present in the Data Center itself—so that researchers who need to use them can do so, without violating the confidentiality of respondents.

When a researcher submits a SAS program under the Remote Access Procedure, the SAS program is screened to prevent the use of procedures that could cause a breach of confidentiality by listing the contents of individual cases. If a prohibited procedure (such as LIST or FIRSTOBS) is used, the researcher receives an error message. If no prohibited procedure is used, the output is screened for confidentiality and then returned to the researcher electronically.

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**Table 1. Number of women 20–34 years of age by race and Hispanic origin, and percent who have never had a birth as of the date of interview (percent childless), by selected community characteristics: United States, 1995**

| Race, origin, and contextual variable | Number of women in thousands | All women | Contextual (community) characteristic | | |
|---|---|---|---|---|---|
| | | | Low | Middle | High |
| | | Percent | | | |
| **Median income[1]** | | | | | |
| All races[2] | 29,800 | 43.8 | 29.9 | 43.6 | 66.4 |
| Hispanic | 3,613 | 30.7 | 25.0 | 33.8 | 53.1 |
| Non-Hispanic white | 20,627 | 47.3 | 33.2 | 45.6 | 67.1 |
| Non-Hispanic black | 4,130 | 35.7 | 29.4 | 39.7 | 71.5 |
| **Poverty rate (percent below poverty)[1]** | | | | | |
| All races[2] | 29,800 | 43.8 | 57.5 | 44.9 | 33.4 |
| Hispanic | 3,613 | 30.7 | 47.8 | 30.0 | 29.2 |
| Non-Hispanic white | 20,627 | 47.3 | 57.9 | 47.1 | 36.3 |
| Non-Hispanic black | 4,130 | 35.7 | 54.4 | 42.5 | 30.8 |
| **Percent college graduates[1]** | | | | | |
| All races[2] | 29,800 | 43.8 | 32.1 | 40.5 | 61.0 |
| Hispanic | 3,613 | 30.7 | 25.4 | 34.1 | 47.0 |
| Non-Hispanic white | 20,627 | 47.3 | 35.6 | 44.4 | 62.4 |
| Non-Hispanic black | 4,130 | 35.7 | 29.5 | 34.2 | 58.1 |
| **Male unemployment rate[3]** | | | | | |
| All races[2] | 29,800 | 43.8 | 54.3 | 45.1 | 35.8 |
| Hispanic | 3,613 | 30.7 | 45.1 | 33.9 | 28.5 |
| Non-Hispanic white | 20,627 | 47.3 | 55.5 | 46.5 | 41.2 |
| Non-Hispanic black | 4,130 | 35.7 | 44.5 | 40.2 | 32.3 |
| **Percent in professional or managerial jobs[1]** | | | | | |
| All races[2] | 29,800 | 43.8 | 33.3 | 41.3 | 60.0 |
| Hispanic | 3,613 | 30.7 | 26.5 | 37.3 | 42.2 |
| Non-Hispanic white | 20,627 | 47.3 | 36.4 | 43.6 | 61.7 |
| Non-Hispanic black | 4,130 | 35.7 | 29.9 | 34.3 | 53.9 |

[1]In the Block Group.

[2]All races include non-Hispanic other races not shown separately.

[3]In the Census Tract.

**Table 2. Number of women 18–39 years of age by race and Hispanic origin, and percent who are childless but expect to have 1 or more children in the future, by selected community characteristics: United States, 1995**

| Race, origin, and contextual variable | Number of women in thousands | All women | Contextual (community) characteristic | | |
|---|---|---|---|---|---|
| | | | Low | Middle | High |
| | | Percent | | | |
| **Median income[1]** | | | | | |
| All races[2] | 44,519 | 33.7 | 25.7 | 33.0 | 46.4 |
| Hispanic | 5,142 | 27.9 | 24.0 | 31.7 | 45.4 |
| Non-Hispanic white | 31,297 | 35.2 | 27.9 | 33.2 | 45.8 |
| Non-Hispanic black | 6,107 | 29.2 | 24.5 | 32.8 | 48.2 |
| **Poverty rate (percent below poverty)[1]** | | | | | |
| All races[2] | 44,519 | 33.7 | 40.1 | 34.0 | 27.6 |
| Hispanic | 5,142 | 27.9 | 37.7 | 33.6 | 25.0 |
| Non-Hispanic white | 31,297 | 35.2 | 40.1 | 33.8 | 30.1 |
| Non-Hispanic black | 6,107 | 29.2 | 34.8 | 36.2 | 25.0 |
| **Percent college graduates[1]** | | | | | |
| All races[2] | 44,519 | 33.7 | 25.8 | 31.8 | 43.8 |
| Hispanic | 5,142 | 27.9 | 22.9 | 29.9 | 44.4 |
| Non-Hispanic white | 31,297 | 35.2 | 27.4 | 32.3 | 43.6 |
| Non-Hispanic black | 6,107 | 29.2 | 24.7 | 28.4 | 43.0 |
| **Male unemployment rate[3]** | | | | | |
| All races[2] | 44,519 | 33.7 | 38.2 | 34.9 | 28.8 |
| Hispanic | 5,142 | 27.9 | 36.6 | 29.3 | 27.3 |
| Non-Hispanic white | 31,297 | 35.2 | 38.5 | 35.1 | 31.3 |
| Non-Hispanic black | 6,107 | 29.2 | 32.8 | 35.7 | 25.9 |
| **Percent in professional or managerial jobs[1]** | | | | | |
| All races[2] | 44,519 | 33.7 | 25.9 | 33.3 | 42.8 |
| Hispanic | 5,142 | 27.9 | 23.7 | 33.4 | 39.8 |
| Non-Hispanic white | 31,297 | 35.2 | 26.8 | 34.0 | 43.0 |
| Non-Hispanic black | 6,107 | 29.2 | 24.6 | 31.4 | 36.9 |

[1]In the Block Group.

[2]All races include non-Hispanic other races not shown separately.

[3]In the Census Tract.

**Table 3. Multilevel statistical model predicting whether women are childless (have never had a birth), for women 20–34 years of age: United States, 1995**

| Parameter | Estimate | Standard error | *t* value | Pr (*t*) |
|---|---|---|---|---|
| **Null Model** | | | | |
| Fixed effects: | | | | |
| Intercept | –0.5931 | 0.04057 | –14.62 | <0.0001 |
| | Variance | Standard error | *Z* value | Pr (*Z*) |
| Random effects: | | | | |
| Intercept | 0.1690 | 0.04186 | 4.04 | <0.0001 |
| Residual | 0.9694 | 0.02139 | 45.31 | <0.0001 |
| Deviance | | | 5523.0036 | |
| **Random Intercept Model** | | | | |
| | Estimate | Standard error | *t* value | Pr (*t*) |
| Fixed effects: | | | | |
| Intercept | –0.782 | 0.1837 | –4.26 | <0.0001 |
| Level 2 | | | | |
| MEDFINC[1] | 0.03145 | 0.004572 | 6.88 | <0.0001 |
| Level 1 | | | | |
| Race and origin: | | | | |
| Hispanic | –0.9777 | 0.1102 | –8.88 | <0.0001 |
| Non-Hispanic other | –0.2460 | 0.2158 | –1.14 | 0.2543 |
| Non-Hispanic black | –0.6860 | 0.0896 | –7.66 | <0.0001 |
| Income: | | | | |
| $50,000 or more | 0.9305 | 0.09921 | 9.38 | <0.0001 |
| $20,000-$49,000 | 0.4813 | 0.86770 | 5.55 | <0.0001 |
| Age: | | | | |
| 25–29 years | –1.1479 | 0.08713 | –13.17 | <0.0001 |
| 30–34 years | –2.0093 | 0.08979 | –22.38 | <0.0001 |
| | Variance | Standard error | *Z* value | Pr (*Z*) |
| Random effects: | | | | |
| Intercept | 0.07992 | 0.03737 | 2.14 | 0.0162 |
| Residual | 0.98560 | 0.02165 | 45.52 | <0.0001 |
| Deviance | | | 4839.7098 | |

[1]MEDFINC=Median family income in the county.

NOTE: Reference categories are non-Hispanic white, income under $20,000, and 20–24 years of age.

**Table 4. Number of births in the last 5 years to women 15–44 years of age, by race and Hispanic origin, and percent of births that were unwanted, by selected community characteristics: United States, 1995**

| Race, origin, and contextual variable | Number of women in thousands | All women | Contextual (community) characteristic | | |
|---|---|---|---|---|---|
| | | | Low | Middle | High |
| | | Percent | | | |
| **Median income[1]** | | | | | |
| All races[2] | 19,573 | 9.1 | 15.7 | 8.6 | 3.5 |
| Hispanic | 2,994 | 10.4 | 14.6 | 8.8 | 6.5 |
| Non-Hispanic white | 12,883 | 6.7 | 10.7 | 7.2 | 3.2 |
| Non-Hispanic black | 2,800 | 19.1 | 22.4 | 18.9 | * |
| **Poverty rate (percent below poverty)[1]** | | | | | |
| All races[2] | 19,573 | 9.1 | 5.1 | 8.5 | 13.9 |
| Hispanic | 2,994 | 10.4 | 7.9 | 7.6 | 14.1 |
| Non-Hispanic white | 12,883 | 6.7 | 4.5 | 7.7 | 9.6 |
| Non-Hispanic black | 2,800 | 19.1 | 13.5 | 17.3 | 20.8 |
| **Percent college graduates[1]** | | | | | |
| All races[2] | 19,573 | 9.1 | 13.9 | 10.1 | 4.3 |
| Hispanic | 2,994 | 10.4 | 15.0 | 8.3 | 7.0 |
| Non-Hispanic white | 12,883 | 6.7 | 9.9 | 8.9 | 3.1 |
| Non-Hispanic black | 2,800 | 19.1 | 20.6 | 18.9 | 18.0 |
| **Male unemployment rate[3]** | | | | | |
| All races[2] | 19,573 | 9.1 | 6.2 | 7.5 | 14.0 |
| Hispanic | 2,994 | 10.4 | 3.1 | 11.1 | 13.7 |
| Non-Hispanic white | 12,883 | 6.7 | 4.7 | 6.4 | 11.0 |
| Non-Hispanic black | 2,800 | 19.1 | 26.5 | 10.4 | 20.2 |
| **Percent in professional or managerial jobs[1]** | | | | | |
| All races[2] | 19,573 | 9.1 | 12.8 | 10.2 | 4.9 |
| Hispanic | 2,994 | 10.4 | 14.4 | 9.9 | 5.3 |
| Non-Hispanic white | 12,883 | 6.7 | 8.5 | 8.9 | 3.8 |
| Non-Hispanic black | 2,800 | 19.1 | 21.7 | 18.3 | 14.4 |

*Figure does not meet standard of reliability or precision.

[1]In the Block Group.

[2]All races include non-Hispanic other races not shown separately.

[3]In the Census Tract.

**Table 5. Multilevel statistical model predicting whether births in the last 5 years were unwanted: United States, 1995**

| Parameter | Estimate | Standard error | *t* value | Pr (*t*) |
|---|---|---|---|---|
| **Null Model** | | | | |
| Fixed effects: | | | | |
| Intercept | –2.147 | 0.06662 | –32.23 | <0.0001 |
| | Variance | Standard error | *Z* value | Pr (*Z*) |
| Random effects: | | | | |
| Intercept | 0.3521 | 0.09490 | 3.71 | <0.0001 |
| Residual | 0.8591 | 0.02199 | 39.07 | <0.0001 |
| Deviance | | 2110.7526 | | |
| **Random Intercept Model** | | | | |
| | Estimate | Standard error | *t* value | Pr (*t*) |
| Fixed effects: | | | | |
| Intercept | –2.9818 | 0.303 | –9.84 | <0.0001 |
| Level 2 | | | | |
| URTMALE[1] | 5.8079 | 2.6237 | 2.21 | 0.0274 |
| Level 1 | | | | |
| Race and origin: | | | | |
| Hispanic | 0.54240 | 0.1620 | 3.35 | 0.0009 |
| Non-Hispanic other | –0.11960 | 0.4227 | –2.28 | 0.7775 |
| Non-Hispanic black | 1.10090 | 0.1328 | 8.29 | <0.0001 |
| Age at birth: | | | | |
| 20–24 years | –0.12860 | 0.2619 | –0.49 | 0.6234 |
| 25–29 years | –0.13400 | 0.2560 | –0.52 | 0.6008 |
| 30–34 years | –0.06505 | 0.2589 | –0.25 | 0.8016 |
| 35–39 years | 0.19780 | 0.2720 | 0.73 | 0.4671 |
| 40–44 years | 0.95360 | 0.3050 | 3.13 | 0.0018 |
| | Variance | Standard error | *Z* value | Pr (*Z*) |
| Random effects: | | | | |
| Intercept | 0.2412 | 0.09135 | 2.64 | 0.0041 |
| Residual | 0.8719 | 0.02232 | 39.06 | <0.0001 |
| Deviance | | 2064.0281 | | |

[1]URTMALE=Male unemployment rate for the county.

NOTE: Reference categories (not shown) are non-Hispanic white and 15–19 years of age.

**Table 6. Number of unmarried women 15–44 years of age (who have ever had intercourse), by race and Hispanic origin, and percent with 3 or more male sexual partners in the last 12 months, by selected community characteristics: United States, 1995**

| Race, origin, and contextual variable | Number of women in thousands | All women | Contextual (community) characteristic | | |
|---|---|---|---|---|---|
| | | | Low | Middle | High |
| | | Percent | | | |
| **Median income[1]** | | | | | |
| All races[2] | 23,941 | 17.4 | 22.3 | 15.7 | 14.3 |
| Hispanic | 2,709 | 15.6 | 17.5 | 19.8 | 13.5 |
| Non-Hispanic white | 15,034 | 15.6 | 18.8 | 14.4 | 13.5 |
| Non-Hispanic black | 5,393 | 23.6 | 27.2 | 19.7 | 23.3 |
| **Poverty rate (percent below poverty)[1]** | | | | | |
| All races[2] | 23,941 | 17.4 | 15.0 | 15.6 | 20.0 |
| Hispanic | 2,709 | 15.6 | 21.3 | 13.0 | 18.5 |
| Non-Hispanic white | 15,034 | 15.6 | 14.2 | 14.4 | 16.5 |
| Non-Hispanic black | 5,393 | 23.6 | 20.2 | 22.2 | 24.7 |
| **Percent college graduates[1]** | | | | | |
| All races[2] | 23,941 | 17.4 | 20.6 | 16.4 | 14.5 |
| Hispanic | 2,709 | 15.6 | 18.8 | 15.5 | 18.3 |
| Non-Hispanic white | 15,034 | 15.6 | 17.0 | 14.6 | 13.9 |
| Non-Hispanic black | 5,393 | 23.6 | 25.5 | 23.3 | 18.0 |
| **Male unemployment rate[3]** | | | | | |
| All races[2] | 23,941 | 17.4 | 15.5 | 15.9 | 20.0 |
| Hispanic | 2,709 | 15.6 | 18.4 | 16.1 | 18.3 |
| Non-Hispanic white | 15,034 | 15.6 | 14.0 | 14.9 | 16.7 |
| Non-Hispanic black | 5,393 | 23.6 | 23.1 | 25.3 | 23.7 |
| **Percent in professional or managerial jobs[1]** | | | | | |
| All races[2] | 23,941 | 17.4 | 19.8 | 17.4 | 14.1 |
| Hispanic | 2,709 | 15.6 | 17.9 | 17.9 | 16.8 |
| Non-Hispanic white | 15,034 | 15.6 | 15.6 | 16.4 | 13.1 |
| Non-Hispanic black | 5,393 | 23.6 | 25.6 | 21.9 | 19.4 |

[1]In the Block Group.

[2]All races include non-Hispanic other races not shown separately.

[3]In the Census Tract.

**Table 7. Number of women 20–44 years of age by race and Hispanic origin, and percent who are currently married, by selected community characteristics: United States, 1995**

| Race, origin, and contextual variable | Number of women in thousands | All women | Contextual (community) characteristic | | |
|---|---|---|---|---|---|
| | | | Low | Middle | High |
| | | Percent | | | |
| Median income[1] | | | | | |
| All races[2] | 51,240 | 57.2 | 46.3 | 60.9 | 59.8 |
| Non-Hispanic white | 36,560 | 62.5 | 58.2 | 64.8 | 62.4 |
| Non-Hispanic black | 6,818 | 29.8 | 25.3 | 33.4 | 42.1 |
| Poverty rate (percent below poverty)[1] | | | | | |
| All races[2] | 51,240 | 57.2 | 62.9 | 61.0 | 48.0 |
| Non-Hispanic white | 36,560 | 62.5 | 65.2 | 64.0 | 58.7 |
| Non-Hispanic black | 6,818 | 29.8 | 43.3 | 35.1 | 25.4 |
| Percent college graduates[1] | | | | | |
| All races[2] | 51,240 | 57.2 | 53.3 | 59.2 | 59.0 |
| Non-Hispanic white | 36,560 | 62.5 | 63.2 | 64.8 | 61.7 |
| Non-Hispanic black | 6,818 | 29.8 | 27.5 | 30.1 | 35.4 |
| Male unemployment rate[3] | | | | | |
| All races[2] | 51,240 | 57.2 | 62.2 | 61.0 | 48.8 |
| Non-Hispanic white | 36,560 | 62.5 | 64.3 | 64.9 | 59.0 |
| Non-Hispanic black | 6,818 | 29.8 | 40.5 | 34.9 | 25.1 |
| Percent in professional or managerial jobs[1] | | | | | |
| All races[2] | 51,240 | 57.2 | 53.7 | 60.3 | 57.7 |
| Non-Hispanic white | 36,560 | 62.5 | 63.4 | 66.0 | 60.5 |
| Non-Hispanic black | 6,818 | 29.8 | 26.4 | 32.5 | 34.2 |

[1]In the Block Group.

[2]All races include non-Hispanic other races and Hispanic not shown separately.

[3]In the Census Tract.

**Table 8. Number of women 30–44 years of age by race and Hispanic origin, and percent who are currently married, by selected community characteristics: United States, 1995**

| Race, origin, and contextual variable | Number of women in thousands | All women | Contextual (community) characteristic | | |
|---|---|---|---|---|---|
| | | | Low | Middle | High |
| | | Percent | | | |
| **Median income[1]** | | | | | |
| All races[2] | 32,506 | 67.0 | 51.2 | 70.6 | 76.0 |
| Non-Hispanic white | 23,803 | 72.5 | 65.2 | 74.1 | 77.5 |
| Non-Hispanic black | 4,144 | 37.6 | 29.3 | 43.5 | 56.8 |
| **Poverty rate (percent below poverty)[1]** | | | | | |
| All races[2] | 32,506 | 67.0 | 76.5 | 70.9 | 53.9 |
| Non-Hispanic white | 23,803 | 72.5 | 78.4 | 73.5 | 65.0 |
| Non-Hispanic black | 4,144 | 37.6 | 56.5 | 47.0 | 31.0 |
| **Percent college graduates[1]** | | | | | |
| All races[2] | 32,506 | 67.0 | 61.2 | 68.4 | 72.2 |
| Non-Hispanic white | 23,803 | 72.5 | 71.2 | 73.7 | 75.1 |
| Non-Hispanic black | 4,144 | 37.6 | 35.3 | 37.4 | 45.9 |
| **Male unemployment rate[3]** | | | | | |
| All races[2] | 32,506 | 67.0 | 74.0 | 71.7 | 56.3 |
| Non-Hispanic white | 23,803 | 72.5 | 75.6 | 75.3 | 67.9 |
| Non-Hispanic black | 4,144 | 37.6 | 54.5 | 43.2 | 31.3 |
| **Percent in professional or managerial jobs[1]** | | | | | |
| All races[2] | 32,506 | 67.0 | 61.8 | 69.8 | 70.8 |
| Non-Hispanic white | 23,803 | 72.5 | 71.6 | 79.1 | 73.7 |
| Non-Hispanic black | 4,144 | 37.6 | 33.2 | 41.5 | 44.1 |

[1]In the Block Group.

[2]All races include non-Hispanic other races and Hispanic not shown separately.

[3]In the Census Tract.

**Table 9. Number of women 20–44 years of age who were using 1 or more methods of contraception, by race and Hispanic origin, and percent (of contraceptors) who were using female sterilization, by selected community characteristics: United States, 1995**

| Race, origin, and contextual variable | Number of women in thousands | All women | Contextual (community) characteristic | | |
|---|---|---|---|---|---|
| | | | Low | Middle | High |
| | | Percent | | | |
| **Median income[1]** | | | | | |
| All races[2] | 35,994 | 29.8 | 42.2 | 30.6 | 16.8 |
| Hispanic | 3,657 | 39.6 | 51.1 | 35.3 | 19.2 |
| Non-Hispanic white | 26,304 | 26.3 | 35.4 | 29.0 | 16.1 |
| Non-Hispanic black | 4,613 | 44.4 | 47.5 | 39.3 | 32.1 |
| **Poverty rate (percent below poverty)[1]** | | | | | |
| All races[2] | 35,994 | 29.8 | 21.6 | 29.8 | 38.9 |
| Hispanic | 3,657 | 39.6 | 28.6 | 32.2 | 46.8 |
| Non-Hispanic white | 26,304 | 26.3 | 20.7 | 27.9 | 33.7 |
| Non-Hispanic black | 4,613 | 44.4 | 33.9 | 45.9 | 44.2 |
| **Percent college graduates[1]** | | | | | |
| All races[2] | 35,994 | 29.8 | 41.9 | 29.6 | 19.1 |
| Hispanic | 3,657 | 39.6 | 48.8 | 37.6 | 22.0 |
| Non-Hispanic white | 26,304 | 26.3 | 37.6 | 27.6 | 17.7 |
| Non-Hispanic black | 4,613 | 44.4 | 49.8 | 36.1 | 34.2 |
| **Male unemployment rate[3]** | | | | | |
| All races[2] | 35,994 | 29.8 | 23.8 | 27.9 | 38.4 |
| Hispanic | 3,657 | 39.6 | 35.5 | 30.4 | 46.9 |
| Non-Hispanic white | 26,304 | 26.3 | 22.3 | 26.3 | 33.2 |
| Non-Hispanic black | 4,613 | 44.4 | 39.3 | 42.9 | 44.4 |
| **Percent in professional or managerial jobs[1]** | | | | | |
| All races[2] | 35,994 | 29.8 | 40.5 | 29.1 | 20.1 |
| Hispanic | 3,657 | 39.6 | 46.6 | 34.6 | 29.1 |
| Non-Hispanic white | 26,304 | 26.3 | 36.4 | 27.2 | 18.3 |
| Non-Hispanic black | 4,613 | 44.4 | 49.6 | 35.4 | 36.9 |

[1]In the Block Group.
[2]All races include non-Hispanic other races not shown separately.
[3]In the Census Tract.

**Table 10. Multilevel statistical model predicting use of female sterilization, for women 20–44 years of age who were using a contraceptive method: United States, 1995**

| Parameter | Estimate | Standard error | *t* value | Pr (*t*) |
|---|---|---|---|---|
| **Null Model** | | | | |
| Fixed effects: | | | | |
| Intercept | –0.6248 | 0.03932 | –15.89 | <0.0001 |
| | Variance | Standard error | *Z* value | Pr (*Z*) |
| Random effects: | | | | |
| Intercept | 0.2200 | 0.04248 | 5.18 | <0.0001 |
| Residual | 0.9643 | 0.01872 | 51.51 | <0.0001 |
| Deviance | | 6893.5952 | | |
| **Random Intercept Model** | | | | |
| | Estimate | Standard error | *t* value | Pr (*t*) |
| Fixed effects: | | | | |
| Intercept | –0.02999 | 0.1932 | –0.16 | 0.8767 |
| Level 2 | | | | |
| MEDFINC[1] | –0.03287 | 0.004707 | –6.98 | <0.0001 |
| Level 1 | | | | |
| Race and origin: | | | | |
| Hispanic | 0.7091 | 0.09877 | 7.18 | <0.0001 |
| Non-Hispanic other | 0.0308 | 0.20460 | 0.15 | 0.8804 |
| Non-Hispanic black | 0.9707 | 0.08163 | 11.89 | <0.0001 |
| Income: | | | | |
| $50,000 or more | –1.0980 | 0.09155 | –11.99 | <0.0001 |
| $20,000–$49,000 | –0.6026 | 0.08137 | –7.41 | <0.0001 |
| Age: | | | | |
| 20–24 years | –1.6364 | 0.1706 | –9.59 | <0.0001 |
| 30–34 years | 0.7797 | 0.1010 | 7.72 | <0.0001 |
| 35–39 years | 1.3336 | 0.1014 | 13.15 | <0.0001 |
| 40–44 years | 1.9601 | 0.1056 | 18.56 | <0.0001 |
| | Variance | Standard error | *Z* value | Pr (*Z*) |
| Random effects: | | | | |
| Intercept | 0.1829 | 0.04202 | 4.35 | <0.0001 |
| Residual | 0.9329 | 0.01805 | 51.70 | <0.0001 |
| Deviance | | 5778.7347 | | |

[1]MEDFINC=Median family income.

NOTE: Reference categories are non-Hispanic white, income under $20,000, and 25–29 years of age.

**Table 11. Number of women 20–44 years of age who were using 1 or more methods of contraception by race and Hispanic origin, and percent who were using the pill, by selected community characteristics: United States, 1995**

| Race, origin, and contextual variable | Number of women in thousands | All women | Contextual (community) characteristic | | |
|---|---|---|---|---|---|
| | | | Low | Middle | High |
| | | Percent | | | |
| **Median income[1]** | | | | | |
| All races[2] | 35,994 | 25.7 | 22.8 | 24.0 | 29.7 |
| Hispanic | 3,657 | 22.0 | 16.9 | 23.2 | 23.0 |
| Non-Hispanic white | 26,304 | 27.1 | 26.1 | 24.0 | 31.2 |
| Non-Hispanic black | 4,613 | 22.9 | 21.8 | 27.0 | 23.8 |
| **Poverty rate (percent below poverty)[1]** | | | | | |
| All races[2] | 35,994 | 25.7 | 26.7 | 24.2 | 23.9 |
| Hispanic | 3,657 | 22.0 | 27.4 | 12.8 | 21.6 |
| Non-Hispanic white | 26,304 | 27.1 | 26.9 | 25.6 | 25.6 |
| Non-Hispanic black | 4,613 | 22.9 | 25.8 | 24.1 | 23.3 |
| **Percent college graduates[1]** | | | | | |
| All races[2] | 35,994 | 25.7 | 21.2 | 23.9 | 29.4 |
| Hispanic | 3,657 | 22.0 | 18.4 | 22.5 | 23.6 |
| Non-Hispanic white | 26,304 | 27.1 | 22.3 | 23.6 | 30.9 |
| Non-Hispanic black | 4,613 | 22.9 | 20.6 | 28.6 | 25.1 |
| **Male unemployment rate[3]** | | | | | |
| All races[2] | 35,994 | 25.7 | 26.0 | 25.1 | 23.6 |
| Hispanic | 3,657 | 22.0 | 20.0 | 23.7 | 19.4 |
| Non-Hispanic white | 26,304 | 27.1 | 27.0 | 25.5 | 25.4 |
| Non-Hispanic black | 4,613 | 22.9 | 20.6 | 29.8 | 22.7 |
| **Percent in professional or managerial jobs[1]** | | | | | |
| All races[2] | 35,994 | 25.7 | 21.5 | 23.6 | 29.7 |
| Hispanic | 3,657 | 22.0 | 18.4 | 24.9 | 21.3 |
| Non-Hispanic white | 26,304 | 27.1 | 22.9 | 22.7 | 31.5 |
| Non-Hispanic black | 4,613 | 22.9 | 21.2 | 28.6 | 23.3 |

[1]In the Block Group.

[2]All races include non-Hispanic other races not shown separately.

[3]In the Census Tract.

**Table 12. Multilevel statistical model predicting use of the pill, for women 20–44 years of age who were using a contraceptive method: United States, 1995**

| Parameter | Estimate | Standard error | *t* value | Pr (*t*) |
|---|---|---|---|---|
| **Null Model** | | | | |
| Fixed effects: | | | | |
| Intercept | –1.2132 | 0.03627 | –33.45 | <0.0001 |
| | Variance | Standard error | *Z* value | Pr (*Z*) |
| Random effects: | | | | |
| Intercept | 0.0779 | 0.03089 | 2.52 | 0.0058 |
| Residual | 0.9741 | 0.01873 | 52.00 | <0.0001 |
| Deviance | | 6016.8361 | | |
| **Random Intercept Model** | | | | |
| | Estimate | Standard error | *t* value | Pr (*t*) |
| Fixed effects: | | | | |
| Intercept | –0.7389 | 0.1857 | –3.98 | <0.0001 |
| Level 2 | | | | |
| MEDFINC[1] | 0.004772 | 0.004478 | 1.07 | 0.2873 |
| Level 1 | | | | |
| Race and origin: | | | | |
| Hispanic | –0.4438 | 0.10940 | –4.06 | <0.0001 |
| Non-Hispanic other | –0.7066 | 0.24470 | –2.89 | 0.0041 |
| Non-Hispanic black | –0.3645 | 0.08887 | –4.10 | <0.0001 |
| Income: | | | | |
| $50,000 or more | 0.2597 | 0.09869 | 2.63 | 0.0087 |
| $20,000–$49,000 | 0.2676 | 0.08752 | 3.06 | 0.0023 |
| Age: | | | | |
| 20–24 years | 0.4429 | 0.09947 | 4.45 | <0.0001 |
| 30–34 years | –0.4924 | 0.09170 | –5.37 | <0.0001 |
| 35–39 years | –1.5353 | 0.10860 | –14.14 | <0.0001 |
| 40–44 years | –2.4245 | 0.14480 | –16.75 | <0.0001 |
| | Variance | Standard error | *Z* value | Pr (*Z*) |
| Random effects: | | | | |
| Intercept | 0.0715 | 0.03340 | 2.14 | 0.0161 |
| Residual | 0.9850 | 0.01892 | 52.06 | <0.0001 |
| Deviance | | 5270.5258 | | |

[1]MEDFINC=Median family income.

NOTE: Reference categories (not shown) are non-Hispanic white, income under $20,000, and 25–29 years of age.

**Table 13. Number of women 20–44 years of age who were using 1 or more methods of contraception, by race and Hispanic origin, and percent whose partners were using the condom, by selected community characteristics: United States, 1995**

| Race, origin, and contextual variable | Number of women in thousands | All women | Contextual (community) characteristic | | |
|---|---|---|---|---|---|
| | | | Low | Middle | High |
| | | Percent | | | |
| **Median income[1]** | | | | | |
| All races[2] | 35,994 | 21.7 | 17.1 | 20.6 | 25.7 |
| Hispanic | 3,657 | 19.5 | 17.2 | 20.4 | 34.6 |
| Non-Hispanic white | 26,304 | 21.0 | 14.5 | 19.6 | 23.9 |
| Non-Hispanic black | 4,613 | 22.3 | 21.2 | 23.0 | 25.0 |
| **Poverty rate (percent below poverty)[1]** | | | | | |
| All races[2] | 35,994 | 21.7 | 23.4 | 21.0 | 19.2 |
| Hispanic | 3,657 | 19.5 | 25.6 | 26.8 | 15.9 |
| Non-Hispanic white | 26,304 | 21.0 | 22.4 | 19.9 | 18.3 |
| Non-Hispanic black | 4,613 | 22.3 | 23.4 | 21.8 | 22.0 |
| **Percent college graduates[1]** | | | | | |
| All races[2] | 35,994 | 21.7 | 17.4 | 21.3 | 24.8 |
| Hispanic | 3,657 | 19.5 | 14.4 | 21.9 | 32.5 |
| Non-Hispanic white | 26,304 | 21.0 | 17.3 | 20.0 | 23.1 |
| Non-Hispanic black | 4,613 | 22.3 | 19.3 | 25.1 | 26.5 |
| **Male unemployment rate[3]** | | | | | |
| All races[2] | 35,994 | 21.7 | 22.0 | 20.8 | 21.0 |
| Hispanic | 3,657 | 19.5 | 25.3 | 23.7 | 16.7 |
| Non-Hispanic white | 26,304 | 21.0 | 21.1 | 19.5 | 21.2 |
| Non-Hispanic black | 4,613 | 22.3 | 23.3 | 19.0 | 23.0 |
| **Percent in professional or managerial jobs[1]** | | | | | |
| All races[2] | 35,994 | 21.7 | 18.2 | 21.9 | 23.8 |
| Hispanic | 3,657 | 19.5 | 17.4 | 22.6 | 24.8 |
| Non-Hispanic white | 26,304 | 21.0 | 17.5 | 21.0 | 22.4 |
| Non-Hispanic black | 4,613 | 22.3 | 19.4 | 24.9 | 25.7 |

[1]In the Block Group.

[2]All races include non-Hispanic other races not shown separately.

[3]In the Census Tract.

**Table 14. Multilevel statistical model predicting use of the condom, for women 20–44 years of age who were using a contraceptive method: United States, 1995**

| Parameter | Estimate | Standard error | *t* value | Pr (*t*) |
|---|---|---|---|---|
| **Null Model** | | | | |
| Fixed effects: | | | | |
| Intercept | –1.5692 | 0.04423 | –35.48 | <0.0001 |
| | Variance | Standard error | *Z* value | Pr (*Z*) |
| Random effects: | | | | |
| Intercept | 0.2077 | 0.04542 | 4.57 | <0.0001 |
| Residual | 0.9347 | 0.01797 | 52.01 | <0.0001 |
| Deviance | | | 5,117.1743 | |
| **Random Intercept Model** | | | | |
| | Estimate | Standard error | *t* value | Pr (*t*) |
| Fixed effects: | | | | |
| Intercept | –2.5518 | 0.2038 | –12.52 | <0.0001 |
| Level 2 | | | | |
| MEDFINC[1] | 0.02971 | 0.004741 | 6.27 | <0.0001 |
| Level 1 | | | | |
| Race and origin: | | | | |
| Hispanic | 0.06916 | 0.1086 | 0.64 | 0.5244 |
| Non-Hispanic other | 0.69140 | 0.1862 | 3.71 | 0.0002 |
| Non-Hispanic black | –0.07363 | 0.0932 | –0.79 | 0.4299 |
| Income: | | | | |
| $50,000 or more | 0.2578 | 0.10060 | 2.56 | 0.0106 |
| $20,000–$49,000 | 0.1174 | 0.09293 | 1.26 | 0.2068 |
| Age: | | | | |
| 20–24 years | 0.3103 | 0.1126 | 2.76 | 0.0059 |
| 30–34 years | –0.2918 | 0.1056 | –2.76 | 0.0058 |
| 35–39 years | –0.3781 | 0.1073 | –3.52 | 0.0004 |
| 40–44 years | –0.7849 | 0.1187 | –6.61 | <0.0001 |
| | Variance | Standard error | *Z* value | Pr (*Z*) |
| Random effects: | | | | |
| Intercept | 0.1373 | 0.03967 | 3.46 | 0.0003 |
| Residual | 0.9486 | 0.01820 | 52.11 | <0.0001 |
| Deviance | | | 5,035.4048 | |

[1]MEDFINC=Median family income.

NOTE: Reference categories (not shown) are non-Hispanic white, income under $20,000, and 25–29 years of age.

**Table 15. Number of babies born between January 1990 and September 1994, by race and Hispanic origin, and percent who were breast-fed at all, by selected community characteristics: United States, 1995**

| Race, origin, and contextual variable | Number of births in thousands | All women | Contextual (community) characteristic | | |
|---|---|---|---|---|---|
| | | | Low | Middle | High |
| | | Percent | | | |
| **Median income[1]** | | | | | |
| All races[2] | 18,415 | 56.3 | 41.2 | 59.5 | 72.6 |
| Non-Hispanic white | 12,069 | 60.6 | 55.2 | 61.4 | 72.1 |
| Non-Hispanic black | 2,640 | 25.0 | 18.5 | 29.4 | 47.8 |
| **Poverty rate (percent below poverty)[1]** | | | | | |
| All races[2] | 18,415 | 56.3 | 66.1 | 64.3 | 44.0 |
| Non-Hispanic white | 12,069 | 60.6 | 67.1 | 63.3 | 55.5 |
| Non-Hispanic black | 2,640 | 25.0 | 34.1 | 42.3 | 20.2 |
| **Percent college graduates[1]** | | | | | |
| All races[2] | 18,415 | 56.3 | 42.7 | 58.1 | 72.0 |
| Non-Hispanic white | 12,069 | 60.6 | 51.3 | 60.1 | 73.1 |
| Non-Hispanic black | 2,640 | 25.0 | 20.1 | 26.5 | 46.3 |
| **Male unemployment rate[3]** | | | | | |
| All races[2] | 18,415 | 56.3 | 65.5 | 60.1 | 46.8 |
| Non-Hispanic white | 12,069 | 60.6 | 66.8 | 62.3 | 56.1 |
| Non-Hispanic black | 2,640 | 25.0 | 30.2 | 27.8 | 23.7 |
| **Percent in professional or managerial jobs[1]** | | | | | |
| All races[2] | 18,415 | 56.3 | 47.4 | 55.6 | 70.2 |
| Non-Hispanic white | 12,069 | 60.6 | 57.1 | 57.6 | 72.3 |
| Non-Hispanic black | 2,640 | 25.0 | 18.8 | 28.8 | 40.0 |

[1]In the Block Group.

[2]All races include non-Hispanic other races and Hispanic not shown separately.

[3]In the Census Tract.

**Table 16. Multilevel statistical model predicting whether a baby (born between January 1990 and September 1994) was breast-fed at all: United States, 1995**

| Parameter | Estimate | Standard error | *t* value | Pr (*t*) |
|---|---|---|---|---|
| **Null Model** | | | | |
| Fixed effects: | | | | |
| Intercept | 0.03002 | 0.06281 | 0.48 | 0.633 |
| | Variance | Standard error | *Z* value | Pr (*Z*) |
| Random effects: | | | | |
| Intercept | 0.7257 | 0.11130 | 6.52 | <0.0001 |
| Residual | 0.9298 | 0.02517 | 36.95 | <0.0001 |
| Deviance | | 3665.9559 | | |
| **Random Intercept Model** | | | | |
| | Estimate | Standard error | *t* value | Pr (*t*) |
| Fixed effects: | | | | |
| Intercept | –1.6539 | 0.2971 | –5.57 | <0.0001 |
| Level 2 | | | | |
| MANAGER[1] | 4.9453 | 1.065 | 4.64 | <0.0001 |
| Level 1 | | | | |
| Race and origin: | | | | |
| Hispanic | 0.05183 | 0.1320 | 0.39 | 0.6946 |
| Non-Hispanic other | 0.01928 | 0.3056 | 0.06 | 0.9497 |
| Non-Hispanic black | –1.22870 | 0.1241 | –9.90 | <0.0001 |
| Income: | | | | |
| $50,000 or more | 0.3834 | 0.1358 | 2.82 | 0.0048 |
| $20,000–$49,000 | 0.4785 | 0.1068 | 4.48 | <0.0001 |
| Age at birth: | | | | |
| 25–44 years | 0.3409 | 0.1054 | 3.23 | 0.0012 |
| Education: | | | | |
| Below high school | –0.4395 | 0.1147 | –3.83 | 0.0001 |
| Some college | 0.5858 | 0.5812 | 1.01 | 0.3136 |
| | Variance | Standard error | *Z* value | Pr (*Z*) |
| Random effects: | | | | |
| Intercept | 0.4923 | 0.09375 | 5.25 | <0.0001 |
| Residual | 0.9227 | 0.02489 | 37.06 | <0.0001 |
| Deviance | | 2648.1493 | | |

[1]MANAGER=Percent of employed who are professionals or managers.

NOTE: Reference categories are non-Hispanic white, income under $20,000, 15–24 years of age, and high school graduate.

**Table 17. Number of babies born between January 1990 and September 1994, by race and Hispanic origin, and percent who were breast-fed for 12 weeks or more, by selected community characteristics: United States, 1995**

| Race, origin, and contextual variable | Number of births in thousands | Contextual (community) characteristic | | | |
|---|---|---|---|---|---|
| | | All women | Low | Middle | High |
| | | Percent | | | |
| **Median income[1]** | | | | | |
| All races[2] | 18,415 | 37.7 | 24.8 | 39.7 | 55.7 |
| Non-Hispanic white | 12,069 | 40.8 | 32.8 | 41.1 | 56.9 |
| Non-Hispanic black | 2,640 | 15.8 | 9.6 | 19.7 | 29.2 |
| **Poverty rate (percent below poverty)[1]** | | | | | |
| All races[2] | 18,415 | 37.7 | 46.9 | 43.9 | 28.2 |
| Non-Hispanic white | 12,069 | 40.8 | 48.1 | 44.0 | 35.3 |
| Non-Hispanic black | 2,640 | 15.8 | 18.3 | 24.9 | 12.7 |
| **Percent college graduates[1]** | | | | | |
| All races[2] | 18,415 | 37.7 | 26.1 | 39.0 | 53.1 |
| Non-Hispanic white | 12,069 | 40.8 | 29.9 | 41.3 | 54.8 |
| Non-Hispanic black | 2,640 | 15.8 | 13.2 | 13.8 | 28.7 |
| **Male unemployment rate[3]** | | | | | |
| All races[2] | 18,415 | 37.7 | 45.2 | 40.7 | 30.9 |
| Non-Hispanic white | 12,069 | 40.8 | 46.5 | 42.7 | 37.6 |
| Non-Hispanic black | 2,640 | 15.8 | 18.8 | 15.1 | 14.6 |
| **Percent in professional or managerial jobs[1]** | | | | | |
| All races[2] | 18,415 | 37.7 | 30.3 | 35.9 | 52.3 |
| Non-Hispanic white | 12,069 | 40.8 | 36.7 | 36.9 | 55.0 |
| Non-Hispanic black | 2,640 | 15.8 | 11.1 | 19.8 | 21.4 |

[1]In the Block Group.

[2]All races include Non-Hispanic other races and Hispanic not shown separately.

[3]In the Census Tract.

**Table 18. Multilevel statistical model predicting whether a baby (born between January 1990 and September 1994) was breast-fed at least 12 weeks: United States, 1995**

| Parameter | Estimate | Standard error | *t* value | Pr (*t*) |
|---|---|---|---|---|
| **Null Model** | | | | |
| Fixed effects: | | | | |
| Intercept | –0.7153 | 0.06179 | –11.58 | <0.0001 |
| | Variance | Standard error | *Z* value | Pr (*Z*) |
| Random effects: | | | | |
| Intercept | 0.6326 | 0.10930 | 5.79 | <0.0001 |
| Residual | 0.9158 | 0.02482 | 36.89 | <0.0001 |
| Deviance | | 3495.1898 | | |
| **Random Intercept Model** | | | | |
| | Estimate | Standard error | *t* value | Pr (*t*) |
| Fixed effects: | | | | |
| Intercept | –2.5667 | 0.3045 | –8.43 | <0.0001 |
| Level 2 | | | | |
| MANAGER[1] | 4.5203 | 1.0494 | 4.31 | <0.0001 |
| Level 1 | | | | |
| Race and origin: | | | | |
| Hispanic | 0.03275 | 0.1329 | 0.25 | 0.8054 |
| Non-Hispanic other | 0.34850 | 0.2999 | 1.16 | 0.2454 |
| Non-Hispanic black | –1.11110 | 0.1408 | –7.89 | <0.0001 |
| Income: | | | | |
| $50,000 or more | 0.03082 | 0.1445 | 0.21 | 0.8311 |
| $20,000–$49,000 | 0.19850 | 0.1152 | 1.72 | 0.0849 |
| Age at birth: | | | | |
| 25–44 years | 0.7417 | 0.1213 | 6.12 | <0.0001 |
| Education: | | | | |
| Below high school | –0.2336 | 0.1245 | –1.88 | 0.0609 |
| Some college | 0.6494 | 0.5320 | 1.22 | 0.2224 |
| | Variance | Standard error | *Z* value | Pr (*Z*) |
| Random effects: | | | | |
| Intercept | 0.3405 | 0.09281 | 3.67 | 0.0001 |
| Residual | 0.9173 | 0.02797 | 32.79 | <0.0001 |
| Deviance | | 2422.2884 | | |

[1]MANAGER=Percent of employed who are professionals or managers.

NOTE: Reference categories are non-Hispanic white, income under $20,000, 15–24 years of age, and high school graduate.

**Table 19. Number of women 15–44 years of age by race and Hispanic origin, and percent who douche regularly, by selected community characteristics: United States, 1995**

| Race, origin, and contextual variable | Number of women in thousands | All women | Contextual (community) characteristic | | |
|---|---|---|---|---|---|
| | | | Low | Middle | High |
| | | | Percent | | |
| **Median income[1]** | | | | | |
| All races[2] | 60,004 | 26.9 | 42.6 | 24.0 | 14.1 |
| Hispanic | 6,675 | 33.4 | 39.9 | 30.8 | 23.3 |
| Non-Hispanic white | 42,428 | 20.8 | 31.2 | 19.4 | 12.7 |
| Non-Hispanic black | 8,165 | 55.4 | 61.2 | 52.6 | 31.8 |
| **Poverty rate (percent below poverty)[1]** | | | | | |
| All races[2] | 60,004 | 26.9 | 17.3 | 23.1 | 38.5 |
| Hispanic | 6,675 | 33.4 | 26.1 | 27.9 | 39.3 |
| Non-Hispanic white | 42,428 | 20.8 | 15.0 | 19.4 | 27.2 |
| Non-Hispanic black | 8,165 | 55.4 | 47.5 | 49.2 | 59.6 |
| **Percent college graduates[1]** | | | | | |
| All races[2] | 60,004 | 26.9 | 39.1 | 25.0 | 15.7 |
| Hispanic | 6,675 | 33.4 | 39.2 | 34.0 | 21.8 |
| Non-Hispanic white | 42,428 | 20.8 | 29.2 | 19.7 | 13.1 |
| Non-Hispanic black | 8,165 | 55.4 | 60.9 | 52.0 | 44.6 |
| **Male unemployment rate[3]** | | | | | |
| All races[2] | 60,004 | 26.9 | 18.1 | 23.5 | 37.2 |
| Hispanic | 6,675 | 33.4 | 22.4 | 34.0 | 37.1 |
| Non-Hispanic white | 42,428 | 20.8 | 15.0 | 20.1 | 26.3 |
| Non-Hispanic black | 8,165 | 55.4 | 49.5 | 50.9 | 58.8 |
| **Percent in professional or managerial jobs[1]** | | | | | |
| All races[2] | 60,004 | 26.9 | 36.8 | 24.6 | 17.5 |
| Hispanic | 6,675 | 33.4 | 37.5 | 32.6 | 26.7 |
| Non-Hispanic white | 42,428 | 20.8 | 27.9 | 19.0 | 14.0 |
| Non-Hispanic black | 8,165 | 55.4 | 59.4 | 53.0 | 49.9 |

[1]In the Block Group.

[2]All races include non-Hispanic other races not shown separately.

[3]In the Census Tract.

**Table 20. Multilevel statistical model predicting whether or not a woman douches regularly: United States, 1995**

| Parameter | Estimate | Standard error | *t* value | Pr (*t*) |
|---|---|---|---|---|
| **Null Model** | | | | |
| Fixed effects: | | | | |
| Intercept | –0.8388 | –0.04362 | –19.23 | <0.0001 |
| | Variance | Standard error | *Z* value | Pr (*Z*) |
| Random effects: | | | | |
| Intercept | 0.4651 | 0.05766 | 8.07 | <0.0001 |
| Residual | 0.9510 | 0.01439 | 66.06 | <0.0001 |
| Deviance | | 10483.8021 | | |
| **Random Intercept Model** | | | | |
| | Estimate | Standard error | *t* value | Pr (*t*) |
| Fixed effects: | | | | |
| Intercept | –1.2612 | 0.2189 | –5.76 | <.0001 |
| Level 2 | | | | |
| MANAGER[1] | –2.3379 | 0.6752 | –3.46 | 0.0005 |
| BELOWPOV[2] | 2.1514 | 0.7227 | 2.98 | 0.0029 |
| Level 1 | | | | |
| Race and origin: | | | | |
| Hispanic | 0.6021 | 0.08381 | 7.18 | <.0001 |
| Non-Hispanic other | 0.4417 | 0.16940 | 2.61 | 0.0091 |
| Non-Hispanic black | 1.5069 | 0.06807 | 22.14 | <.0001 |
| Age: | | | | |
| 20–24 years | 0.8542 | 0.08685 | 9.84 | <0.0001 |
| 30–34 years | 0.7525 | 0.07956 | 9.46 | <0.0001 |
| 35–39 years | 0.6472 | 0.08060 | 8.03 | <0.0001 |
| 40–44 years | 0.5497 | 0.08396 | 6.55 | <0.0001 |
| Education: | | | | |
| Below high school | 0.1795 | 0.06348 | 2.83 | 0.0047 |
| Some college | –0.4635 | 0.34720 | –1.34 | 0.1819 |
| | Variance | Standard error | *Z* value | Pr (*Z*) |
| Random effects: | | | | |
| Intercept | 0.1967 | 0.03905 | 5.04 | <0.0001 |
| Residual | 0.9583 | 0.01659 | 57.75 | <0.0001 |
| Deviance | | 7932.0509 | | |

[1]MANAGER=Percent of employed who are professionals or managers.

[2]BELOWPOV=Percent below poverty in the county.

NOTE: Reference categories are non-Hispanic white, 15–24 years of age, and high school graduate.

**Table 21. Number of women 15–44 years of age by race and Hispanic origin, and percent who currently smoke cigarettes, by selected community characteristics: United States, 1995**

| Race, origin, and contextual variable | Number of women in thousands | All women | Contextual (community) characteristic | | |
|---|---|---|---|---|---|
| | | | Low | Middle | High |
| | | | Percent | | |
| **Median income[1]** | | | | | |
| All races[2] | 60,201 | 26.1 | 28.4 | 26.2 | 18.3 |
| Hispanic | 6,702 | 15.8 | 16.5 | 14.8 | 21.5 |
| Non-Hispanic white | 42,522 | 28.9 | 35.1 | 28.9 | 18.6 |
| Non-Hispanic black | 8,210 | 23.1 | 26.8 | 19.7 | 15.8 |
| **Poverty rate (percent below poverty)[1]** | | | | | |
| All races[2] | 60,201 | 26.1 | 20.7 | 26.8 | 27.9 |
| Hispanic | 6,702 | 15.8 | 18.2 | 14.1 | 16.4 |
| Non-Hispanic white | 42,522 | 28.9 | 21.2 | 29.5 | 34.0 |
| Non-Hispanic black | 8,210 | 23.1 | 16.3 | 21.3 | 25.3 |
| **Percent college graduates[1]** | | | | | |
| All races[2] | 60,201 | 26.1 | 30.2 | 26.0 | 19.4 |
| Hispanic | 6,702 | 15.8 | 15.1 | 16.0 | 18.9 |
| Non-Hispanic white | 42,522 | 28.9 | 36.6 | 28.7 | 20.1 |
| Non-Hispanic black | 8,210 | 23.1 | 26.5 | 21.5 | 14.7 |
| **Male unemployment rate[3]** | | | | | |
| All races[2] | 60,201 | 26.1 | 22.4 | 26.0 | 27.2 |
| Hispanic | 6,702 | 15.8 | 20.2 | 16.5 | 14.9 |
| Non-Hispanic white | 42,522 | 28.9 | 23.4 | 27.8 | 33.1 |
| Non-Hispanic black | 8,210 | 23.1 | 17.3 | 20.6 | 25.4 |
| **Percent in professional or managerial jobs[1]** | | | | | |
| All races[2] | 60,201 | 26.1 | 29.4 | 26.7 | 19.3 |
| Hispanic | 6,702 | 15.8 | 15.3 | 15.7 | 19.3 |
| Non-Hispanic white | 42,522 | 28.9 | 35.8 | 28.7 | 20.2 |
| Non-Hispanic black | 8,210 | 23.1 | 24.9 | 24.6 | 15.4 |

[1]In the Block Group.
[2]All races include non-Hispanic other races not shown separately.
[3]In the Census Tract.

**Table 22. Multilevel statistical model predicting current cigarette smoking: United States, 1995**

| Parameter | Estimate | Standard error | *t* value | Pr (*t*) |
|---|---|---|---|---|
| **Null Model** | | | | |
| Fixed effects: | | | | |
| Intercept | –1.0102 | 0.03344 | –30.21 | <0.0001 |
| | Variance | Standard error | *Z* value | Pr (*Z*) |
| Random effects: | | | | |
| Intercept | 0.1664 | 0.02962 | 5.62 | <0.0001 |
| Residual | 0.9646 | 0.01449 | 66.56 | <0.0001 |
| Deviance | | 10016.0143 | | |
| **Random Intercept Model** | | | | |
| | Estimate | Standard error | *t* value | Pr (*t*) |
| Fixed effects: | | | | |
| Intercept | –0.8902 | 0.205 | –4.34 | <0.0001 |
| Level 2 | | | | |
| ABGRAD[1] | –1.2173 | 0.3573 | –3.41 | 0.0007 |
| Level 1 | | | | |
| Race and origin: | | | | |
| Hispanic | –0.2178 | 0.1854 | –1.17 | 0.2402 |
| Non-Hispanic other | 0.6464 | 0.1700 | 3.80 | 0.0001 |
| Non-Hispanic black | 0.2540 | 0.1754 | 1.45 | 0.1476 |
| Income: | | | | |
| $50,000 or more | –0.9199 | 0.07102 | –12.95 | <0.0001 |
| $20,000–$49,000 | –0.4463 | 0.06101 | –7.32 | <0.0001 |
| Age: | | | | |
| 15–19 years | –0.4652 | 0.10540 | –4.41 | <0.0001 |
| 25–29 years | 0.1887 | 0.09339 | 2.02 | 0.0434 |
| 30–34 years | 0.3269 | 0.08753 | 3.74 | 0.0002 |
| 35–39 years | 0.4679 | 0.08712 | 5.37 | <0.0001 |
| 40–44 years | 0.2751 | 0.09081 | 3.03 | 0.0025 |
| | Variance | Standard error | *Z* value | Pr (*Z*) |
| Random effects: | | | | |
| Intercept | 0.0981 | 0.02483 | 3.95 | <0.0001 |
| Residual | 0.9846 | 0.01479 | 66.59 | <0.0001 |
| Deviance | | 9765.3773 | | |

[1]ABGRAD=Percent of persons with college education.

NOTE: Reference categories are non-Hispanic white, income under $20,000, and 20–24 years of age.

# Appendix I

## Definitions of Terms

NOTE: Further details defining the statistical terms in this report may be found in the text of this report and in references by Raudenbush and Bryk (36), Snijders and Bosker (37), and Kreft and de Leeuw (38).

***Block group*—**A geographic unit defined by the U.S. Census Bureau, which contains an average of about 1,100 people.

***Census tract***—A geographic unit defined by the U.S. Census Bureau, which defines a neighborhood and contains an average of about 3,000–4,000 people.

***Community***—In this report, a general term used to refer to the local area in which a survey respondent lives. In the cross-tabulations in this report, ''community'' is measured by the block group. The unemployment rate is calculated for census tracts. In the multivariate models, all community-level variables are measured at the county level for the statistical reasons explained in the text.

***Contextual data***—In this report, data that measure characteristics of the neighborhood or community environment, the ''context,'' in which a person lives. Examples of contextual data include the median family income, the percent with incomes below the poverty level, the percent of adults with college degrees, the male unemployment rate, and the percent of employed persons who are professionals and managers within a geographical area (for example, block group, census tract, or county). Additional examples are given in the text.

***Contextual models***—For this report, the term ''contextual models'' refers to regression-based models that contain both individual-level variables (characteristics of individuals) and characteristics of communities or other higher-level units.

***Fixed effect versus random effect***—In a two-level Random Intercept Model, two sets of coefficients (intercepts and/or slopes) are estimated. In this report, one set of coefficients is estimated at the individual level (or Level 1) and another set at the county level (Level 2). A Level 1 coefficient is treated as a random distribution of coefficient values derived from separate regressions of the outcome (dependent) variable for each county. (For example, the percent of women 20–34 who are childless, measured at the county level.) Regressing each Level 1 random coefficient using all the counties as observations produces the county-level coefficients.

The county-level regression of a Level 1 random coefficient produces two parts: the first part is an average value (for a given variable) that is estimated over all individuals in the sample regardless of the group (County) in which they live. The second part represents a county's deviation from the overall average.

The first part, the estimated overall average, is not group-dependent and is therefore constant for all individuals in the sample. This is the fixed effect. The second part is group-dependent, that is, it depends on the group's value on the variable and therefore may vary across counties. This estimated variance for this second part represents the random effect. When there is no random effect for a given variable, only the fixed effect needs to be estimated in a multilevel model (38).

***Intra-class correlation***—Intra-class correlations for the data in this report are shown in text table A. According to Kreft and de Leeuw (38), the intra-class correlation is a measure of the proportion of the total variance that is between groups—in this report, the proportion that is between counties. It is a measure of the extent to which the individuals in the sample that are in the same county are more similar to each other than the individuals across counties. If the intra-class correlation is zero, then the community-level variables do not need to be used, and only individual-level variables need to be used in the analysis. In this report, however, most of the variables have significant intra-class correlations, and therefore have been analyzed with hierarchical linear (or multilevel) models.

***Multilevel model***—A statistical model in which variables are measured at more than one level. In this report, those levels are the individual woman (Level 1) and her community (Level 2, county) (38).

***Race and Hispanic origin***—In this report, race and Hispanic origin were classified into four categories: Hispanic, non-Hispanic white, non-Hispanic black, and non-Hispanic others. Each woman in the survey was asked: ''Are you of Hispanic or Spanish origin?'' If she answered ''yes,'' she was classified as Hispanic. Women were also asked, ''Which of the groups best describes your racial background?'' The response list was: Alaskan Native or American Indian, Asian or Pacific Islander, black, or white. Small sample sizes preclude showing data for American Indian, Asian, or Pacific Islander women as separate categories. Instead, these groups are combined and shown as a ''Non-Hispanic other'' races category.

***Random effect***—See ''Fixed effect versus random effect.''

***Remote access procedure***—The remote access procedure is one way to obtain access to the NSFG and other NCHS Contextual Data files. After a proposal is approved and access is granted, the researcher can submit SAS programs to the NCHS Research Data Center electronically from his or her own office. The SAS program is scanned for confidentiality. If it uses procedures that can list individual cases, the program is rejected and the researcher receives an error message. If the program does not use prohibited procedures, the researcher receives the output back electronically. The procedure is described further in ''Analyzing Contextual Data Through the NCHS Research Data Center'' in this report.

***Research Data Center***—An office at the National Center for Health Statistics that is set up to allow researchers access to data that cannot be released on public-use files. The Research Data Center is described further in the text of this report and at: www.cdc.gov/nchs/r&d/rdc.htm.

***Statistical Analysis System (SAS)***—A general-purpose computer software program that allows a user to manipulate, manage, and analyze data. SAS contains a large number of statistical procedures, called SAS PROCs, which allow the user to perform a wide range of statistical analyses. Further information is found in the references and at: www.sas.com/support.

For sample programs and further information on the GLIMMIX procedure used in this report, visit http://ftp.sas.com/techsup/download/stat, and scroll down to glmm800 for information on GLIMMIX in SAS Version 8, and glmm800e for examples of GLIMMIX in Version 8. Examples for Versions 6 and 7 are also available in the same location. Sample programs for many SAS problems can be found at http://support.sas.com/techsup/sample/sample_library.html

***SUDAAN***—SUDAAN is an acronym formed from the first two letters of each word in the phrase ''survey data analysis.'' SUDAAN was developed by the Research Triangle Institute (RTI) specifically to produce accurate estimates of sampling errors for survey data that are not from simple random samples. While most software packages are able to compute standard errors for estimates based on simple random samples, SUDAAN is able to account for clustering and other effects of complex multistage sample designs. The percentages or other statistics (''point estimates'') calculated in SAS and SUDAAN are identical, but the standard error estimates calculated by SUDAAN are typically larger than those calculated by SAS, because the standard errors from clustered samples are typically larger than from non-clustered samples of the same size. As a result, estimates based on SUDAAN are more conservative because there is a lower probability of type-1 error (rejecting the null hypothesis when it is true, or falsely detecting a significant difference when there is no true difference). In this report, SUDAAN was used to estimate the standard errors shown in Appendix III, tables I–XIII. Additional information about SUDAAN software, manuals, and training courses can be found at www.rti.org/sudaan/.

# Appendix II

## Subject Index for the NSFG Contextual Data File

The SUBJECT INDEX lists available measures by subject. Variable numbers associated with each measure are listed. Measures may be listed multiple times under different subjects.

## SEX RATIOS



## SEXUALLY TRANSMITTED INFECTIONS



## SOCIAL WELFARE PROGRAMS



## UNEMPLOYMENT



## UNEMPLOYMENT INSURANCE



## URBAN

# Appendix III

## Standard Errors for the Cross-Tabulations in This Report

Tables I–XIII of this appendix show standard errors for the cross-tabulations shown in this report. For example, appendix table I shows standard errors for table 1; appendix table II shows standard errors for table 2; and appendix table XIII shows standard errors for table 21. These standard errors were estimated using the software package called SUDAAN, which takes into account the complex sample design of the National Survey of Family Growth (NSFG).

Example of use of these tables: In table 1 of this report, it is shown that 29.9 percent of women 20–34 years of age who were living in low-income areas had never had a birth. Table I in Appendix III shows the standard errors for the data in table 1.

Appendix table I shows that the standard error of that 29.9 percent estimate is 1.45 percent.

To create a 95-percent confidence interval for the estimate, multiply 29.9 plus or minus (1.96) (1.45), or 29.9, plus or minus 2.84, or 27.06 to 32.74. In other words, the chances are 95% that the true percentage in the population is 27.06 to 32.74. One simple but conservative way to compare two percentages in the tables is to see if their confidence intervals overlap: if they do overlap, the difference is interpreted as not statistically significant. If the confidence intervals do not overlap, the difference is interpreted as statistically significant at the 5 percent level.

**Table I. SUDAAN standard errors for the percent of women 20–34 years of age who have never had a birth (for the estimates in table 1)**

| Race, origin, and contextual variable | Number of women in thousands | All women | Contextual (community) characteristic | | |
|---|---|---|---|---|---|
| | | | Low | Middle | High |
| | | Percent | | | |
| Median income[1] | | | | | |
| All races[2] | 29,800 | 0.94 | 1.45 | 1.43 | 2.03 |
| Hispanic | 3,613 | 1.48 | 2.51 | 3.08 | 6.13 |
| Non-Hispanic white | 20,627 | 1.15 | 2.81 | 1.63 | 2.26 |
| Non-Hispanic black | 4,130 | 1.65 | 2.95 | 3.18 | 7.49 |
| Poverty rate (percent below poverty)[1] | | | | | |
| All races[2] | 29,800 | 0.94 | 1.67 | 1.88 | 1.31 |
| Hispanic | 3,613 | 1.48 | 5.05 | 4.34 | 2.33 |
| Non-Hispanic white | 20,627 | 1.15 | 1.85 | 2.12 | 2.15 |
| Non-Hispanic black | 4,130 | 1.65 | 5.22 | 4.96 | 2.17 |
| Percent college graduates[1] | | | | | |
| All races[2] | 29,800 | 0.94 | 1.51 | 1.69 | 1.52 |
| Hispanic | 3,613 | 1.48 | 2.71 | 3.78 | 4.85 |
| Non-Hispanic white | 20,627 | 1.15 | 2.30 | 1.94 | 1.81 |
| Non-Hispanic black | 4,130 | 1.65 | 2.55 | 3.52 | 5.09 |
| Male unemployment rate[3] | | | | | |
| All races[2] | 29,800 | 0.94 | 1.66 | 1.73 | 1.53 |
| Hispanic | 3,613 | 1.48 | 5.25 | 3.50 | 2.11 |
| Non-Hispanic white | 20,627 | 1.15 | 1.91 | 1.94 | 2.26 |
| Non-Hispanic black | 4,130 | 1.65 | 5.56 | 3.97 | 2.28 |
| Percent in professional or managerial jobs[1] | | | | | |
| All races[2] | 29,800 | 0.94 | 1.55 | 1.56 | 1.63 |
| Hispanic | 3,613 | 1.48 | 2.54 | 3.17 | 5.55 |
| Non-Hispanic white | 20,627 | 1.15 | 2.30 | 2.00 | 1.90 |
| Non-Hispanic black | 4,130 | 1.65 | 2.73 | 3.29 | 5.41 |

[1]In the Block Group.
[2]All races include non-Hispanic other races not shown separately.
[3]In the Census Tract.

**Table II. SUDAAN standard errors for the percent of women 18–39 years of age who are childless but expect 1 or more children (for the estimates in table 2)**

| Race, origin, and contextual variable | Number of women in thousands | All women | Contextual (community) characteristic | | |
|---|---|---|---|---|---|
| | | | Low | Middle | High |
| | | Percent | | | |
| **Median income[1]** | | | | | |
| All races[2] | 44,519 | 0.71 | 1.30 | 1.06 | 1.84 |
| Hispanic | 5,142 | 1.23 | 2.25 | 2.60 | 6.13 |
| Non-Hispanic white | 31,297 | 0.86 | 2.30 | 1.26 | 2.01 |
| Non-Hispanic black | 6,107 | 1.35 | 2.30 | 2.24 | 6.69 |
| **Poverty rate (percent below poverty)[1]** | | | | | |
| All races[2] | 44,519 | 0.71 | 1.32 | 1.37 | 1.14 |
| Hispanic | 5,142 | 1.23 | 4.69 | 3.79 | 1.62 |
| Non-Hispanic white | 31,297 | 0.86 | 1.44 | 1.50 | 1.81 |
| Non-Hispanic black | 6,107 | 1.35 | 3.85 | 3.51 | 1.77 |
| **Percent college graduates[1]** | | | | | |
| All races[2] | 44,519 | 0.71 | 1.22 | 1.17 | 1.39 |
| Hispanic | 5,142 | 1.23 | 2.25 | 3.46 | 4.63 |
| Non-Hispanic white | 31,297 | 0.86 | 1.77 | 1.35 | 1.57 |
| Non-Hispanic black | 6,107 | 1.35 | 2.15 | 2.75 | 3.99 |
| **Male unemployment rate[3]** | | | | | |
| All races[2] | 44,519 | 0.71 | 1.29 | 1.32 | 1.18 |
| Hispanic | 5,142 | 1.23 | 4.89 | 3.20 | 1.81 |
| Non-Hispanic white | 31,297 | 0.86 | 1.38 | 1.47 | 1.74 |
| Non-Hispanic black | 6,107 | 1.35 | 4.52 | 3.38 | 1.79 |
| **Percent in professional or managerial jobs[1]** | | | | | |
| All races[2] | 44,519 | 0.71 | 1.20 | 1.23 | 1.48 |
| Hispanic | 5,142 | 1.23 | 2.09 | 2.75 | 5.01 |
| Non-Hispanic white | 31,297 | 0.86 | 1.69 | 1.55 | 1.65 |
| Non-Hispanic black | 6,107 | 1.35 | 2.16 | 2.63 | 4.01 |

[1]In the Block Group.
[2]All races include non-Hispanic other races not shown separately.
[3]In the Census Tract.

**Table III. SUDAAN standard errors for the percent of births in the last 5 years to women 15–44 years of age that were unwanted (for the estimates in table 4)**

| Race, origin, and contextual variable | Number of women in thousands | All women | Contextual (community) characteristic | | |
|---|---|---|---|---|---|
| | | | Low | Middle | High |
| | | Percent | | | |
| **Median income[1]** | | | | | |
| All races[2] | 19,573 | 0.49 | 1.57 | 0.92 | 0.92 |
| Hispanic | 2,994 | 1.34 | 3.23 | 2.75 | 4.06 |
| Non-Hispanic white | 12,883 | 0.60 | 2.24 | 1.11 | 1.13 |
| Non-Hispanic black | 2,800 | 1.73 | 2.89 | 3.65 | 4.69 |
| **Poverty rate (percent below poverty)[1]** | | | | | |
| All races[2] | 19,573 | 0.49 | 0.81 | 1.25 | 1.18 |
| Hispanic | 2,994 | 1.34 | 3.03 | 3.44 | 2.43 |
| Non-Hispanic white | 12,883 | 0.60 | 0.89 | 1.41 | 1.47 |
| Non-Hispanic black | 2,800 | 1.73 | 5.65 | 4.78 | 2.59 |
| **Percent college graduates[1]** | | | | | |
| All races[2] | 19,573 | 0.49 | 1.24 | 1.18 | 0.76 |
| Hispanic | 2,994 | 1.34 | 2.76 | 3.61 | 3.42 |
| Non-Hispanic white | 12,883 | 0.60 | 1.64 | 1.26 | 0.78 |
| Non-Hispanic black | 2,800 | 1.73 | 2.53 | 3.89 | 5.16 |
| **Male unemployment rate[3]** | | | | | |
| All races[2] | 19,573 | 0.49 | 1.05 | 1.03 | 1.17 |
| Hispanic | 2,994 | 1.34 | 1.89 | 3.08 | 2.52 |
| Non-Hispanic white | 12,883 | 0.60 | 1.00 | 1.19 | 1.66 |
| Non-Hispanic black | 2,800 | 1.73 | 5.80 | 3.05 | 2.74 |
| **Percent in professional or managerial jobs[1]** | | | | | |
| All races[2] | 19,573 | 0.49 | 1.19 | 1.23 | 0.97 |
| Hispanic | 2,994 | 1.34 | 2.49 | 2.97 | 2.96 |
| Non-Hispanic white | 12,883 | 0.60 | 1.54 | 1.41 | 0.95 |
| Non-Hispanic black | 2,800 | 1.73 | 2.93 | 3.38 | 5.06 |

[1]In the Block Group.

[2]All races include non-Hispanic other races not shown separately.

[3]In the Census Tract.

**Table IV. SUDAAN standard errors for the percent of unmarried women 15–44 years of age (who have ever had intercourse) with 3 or more sexual partners in the last 12 months (for the estimates in table 6)**

| Race, origin, and contextual variable | Number of women in thousands | All women | Contextual (community) characteristic | | |
|---|---|---|---|---|---|
| | | | Low | Middle | High |
| | | Percent | | | |
| **Median income[1]** | | | | | |
| All races[2] | 23,941 | 0.68 | 1.68 | 0.97 | 1.79 |
| Hispanic | 2,709 | 1.68 | 3.75 | 3.23 | 5.68 |
| Non-Hispanic white | 15,034 | 0.86 | 2.69 | 1.25 | 1.85 |
| Non-Hispanic black | 5,393 | 1.41 | 2.61 | 2.37 | 7.05 |
| **Poverty rate (percent below poverty)[1]** | | | | | |
| All races[2] | 23,941 | 0.68 | 1.34 | 1.39 | 1.27 |
| Hispanic | 2,709 | 1.68 | 5.27 | 4.21 | 3.39 |
| Non-Hispanic white | 15,034 | 0.86 | 1.43 | 1.53 | 1.85 |
| Non-Hispanic black | 5,393 | 1.41 | 4.27 | 4.16 | 1.93 |
| **Percent college graduates[1]** | | | | | |
| All races[2] | 23,941 | 0.68 | 1.35 | 1.19 | 1.27 |
| Hispanic | 2,709 | 1.68 | 2.83 | 3.52 | 4.97 |
| Non-Hispanic white | 15,034 | 0.86 | 2.01 | 1.60 | 1.47 |
| Non-Hispanic black | 5,393 | 1.41 | 2.20 | 3.00 | 3.62 |
| **Male unemployment rate[3]** | | | | | |
| All races[2] | 23,941 | 0.68 | 1.41 | 1.12 | 1.23 |
| Hispanic | 2,709 | 1.68 | 5.56 | 3.39 | 2.67 |
| Non-Hispanic white | 15,034 | 0.86 | 1.57 | 1.51 | 1.92 |
| Non-Hispanic black | 5,393 | 1.41 | 4.14 | 3.93 | 1.72 |
| **Percent in professional or managerial jobs[1]** | | | | | |
| All races[2] | 23,941 | 0.68 | 1.25 | 1.10 | 1.21 |
| Hispanic | 2,709 | 1.68 | 2.43 | 4.21 | 4.95 |
| Non-Hispanic white | 15,034 | 0.86 | 1.98 | 1.57 | 1.35 |
| Non-Hispanic black | 5,393 | 1.41 | 2.13 | 2.50 | 3.89 |

[1]In the Block Group.
[2]All races include non-Hispanic other races not shown separately.
[3]In the Census Tract.

**Table V. SUDAAN standard errors for the percent of women 20–44 years of age who are currently married (for the estimates in table 7)**

| Race, origin, and contextual variable | Number of women in thousands | All women | Contextual (community) characteristic | | |
|---|---|---|---|---|---|
| | | | Low | Middle | High |
| | | Percent | | | |
| Median income[1] | | | | | |
| All races[2] | 51,240 | 0.63 | 1.59 | 0.95 | 1.57 |
| Non-Hispanic white | 36,560 | 0.70 | 2.51 | 1.08 | 1.68 |
| Non-Hispanic black | 6,818 | 1.14 | 1.82 | 2.34 | 5.85 |
| Poverty rate (percent below poverty)[1] | | | | | |
| All races[2] | 51,240 | 0.63 | 1.20 | 1.28 | 1.19 |
| Non-Hispanic white | 36,560 | 0.70 | 1.22 | 1.45 | 1.60 |
| Non-Hispanic black | 6,818 | 1.14 | 3.88 | 3.21 | 1.48 |
| Percent college graduates[1] | | | | | |
| All races[2] | 51,240 | 0.63 | 1.26 | 1.14 | 1.15 |
| Non-Hispanic white | 36,560 | 0.70 | 1.63 | 1.28 | 1.17 |
| Non-Hispanic black | 6,818 | 1.14 | 1.81 | 2.29 | 3.63 |
| Male unemployment rate[3] | | | | | |
| All races[2] | 51,240 | 0.63 | 1.18 | 1.19 | 1.10 |
| Non-Hispanic white | 36,560 | 0.70 | 1.22 | 1.26 | 1.56 |
| Non-Hispanic black | 6,818 | 1.14 | 3.90 | 2.92 | 1.52 |
| Percent in professional or managerial jobs[1] | | | | | |
| All races[2] | 51,240 | 0.63 | 1.22 | 1.22 | 1.32 |
| Non-Hispanic white | 36,560 | 0.70 | 1.58 | 1.39 | 1.32 |
| Non-Hispanic black | 6,818 | 1.14 | 1.81 | 2.63 | 3.97 |

[1]In the Block Group.
[2]All races include non-Hispanic other races and Hispanic, not shown separately.
[3]In the Census Tract.

**Table VI. SUDAAN standard errors for the percent of women 30–44 years of age who are currently married (for the estimates in table 8)**

| Race, origin, and contextual variable | Number of women in thousands | All women | Contextual (community) characteristic | | |
|---|---|---|---|---|---|
| | | | Low | Middle | High |
| | | Percent | | | |
| **Median income[1]** | | | | | |
| All races[2] | 32,506 | 0.62 | 2.08 | 0.99 | 1.38 |
| Non-Hispanic white | 23,803 | 0.71 | 3.19 | 1.11 | 1.41 |
| Non-Hispanic black | 4,144 | 1.54 | 2.79 | 2.93 | 6.24 |
| **Poverty rate (percent below poverty)[1]** | | | | | |
| All races[2] | 32,506 | 0.62 | 1.11 | 1.30 | 1.49 |
| Non-Hispanic white | 23,803 | 0.71 | 1.19 | 1.52 | 1.95 |
| Non-Hispanic black | 4,144 | 1.54 | 4.71 | 3.83 | 2.16 |
| **Percent college graduates[1]** | | | | | |
| All races[2] | 32,506 | 0.62 | 1.38 | 1.23 | 1.18 |
| Non-Hispanic white | 23,803 | 0.71 | 1.70 | 1.48 | 1.28 |
| Non-Hispanic black | 4,144 | 1.54 | 2.61 | 2.96 | 4.12 |
| **Male unemployment rate[3]** | | | | | |
| All races[2] | 32,506 | 0.62 | 1.19 | 1.24 | 1.33 |
| Non-Hispanic white | 23,803 | 0.71 | 1.30 | 1.34 | 1.85 |
| Non-Hispanic black | 4,144 | 1.54 | 3.93 | 3.88 | 2.22 |
| **Percent in professional or managerial jobs[1]** | | | | | |
| All races[2] | 32,506 | 0.62 | 1.45 | 1.23 | 1.25 |
| Non-Hispanic white | 23,803 | 0.71 | 1.71 | 1.36 | 1.33 |
| Non-Hispanic black | 4,144 | 1.54 | 2.54 | 3.41 | 4.28 |

[1]In the Block Group.
[2]All races include non-Hispanic other races and Hispanic, not shown separately.
[3]In the Census Tract.

**Table VII. SUDAAN standard errors for the percent of women 20–44 years of age using 1 or more methods of contraception who were using female sterilization (for the estimates in table 9)**

| Race, origin, and contextual variable | Number of women in thousands | All women | Contextual (community) characteristic | | |
|---|---|---|---|---|---|
| | | | Low | Middle | High |
| | | Percent | | | |
| Median income[1] | | | | | |
| All races[2] | 35,994 | 0.64 | 1.74 | 1.01 | 1.45 |
| Hispanic | 3,657 | 1.93 | 3.91 | 2.50 | 5.43 |
| Non-Hispanic white | 26,304 | 0.75 | 2.70 | 1.21 | 1.44 |
| Non-Hispanic black | 4,613 | 1.87 | 2.34 | 3.21 | 7.37 |
| Poverty rate (percent below poverty)[1] | | | | | |
| All races[2] | 35,994 | 0.64 | 1.05 | 1.24 | 1.16 |
| Hispanic | 3,657 | 1.93 | 4.76 | 3.63 | 2.72 |
| Non-Hispanic white | 26,304 | 0.75 | 1.13 | 1.44 | 1.73 |
| Non-Hispanic black | 4,613 | 1.87 | 5.17 | 4.44 | 1.91 |
| Percent college graduates[1] | | | | | |
| All races[2] | 35,994 | 0.64 | 1.32 | 1.17 | 1.15 |
| Hispanic | 3,657 | 1.93 | 2.99 | 3.96 | 3.76 |
| Non-Hispanic white | 26,304 | 0.75 | 1.77 | 1.33 | 1.19 |
| Non-Hispanic black | 4,613 | 1.87 | 2.35 | 3.19 | 4.42 |
| Male unemployment rate[3] | | | | | |
| All races[2] | 35,994 | 0.64 | 1.16 | 1.29 | 1.28 |
| Hispanic | 3,657 | 1.93 | 5.53 | 3.58 | 2.83 |
| Non-Hispanic white | 26,304 | 0.75 | 1.23 | 1.45 | 1.87 |
| Non-Hispanic black | 4,613 | 1.87 | 4.32 | 4.53 | 2.04 |
| Percent in professional or managerial jobs[1] | | | | | |
| All races[2] | 35,994 | 0.64 | 1.28 | 1.22 | 1.14 |
| Hispanic | 3,657 | 1.93 | 3.20 | 3.86 | 4.86 |
| Non-Hispanic white | 26,304 | 0.75 | 1.72 | 1.40 | 1.26 |
| Non-Hispanic black | 4,613 | 1.87 | 2.39 | 3.37 | 4.51 |

[1]In the Block Group.

[2]All races include non-Hispanic other races not shown separately.

[3]In the Census Tract.

**Table VIII. SUDAAN standard errors for the percent of women 20–44 years of age using 1 or more methods of contraception who were using the pill (for the estimates in table 11)**

| Race, origin, and contextual variable | Number of women in thousands | All women | Contextual (community) characteristic | | |
|---|---|---|---|---|---|
| | | | Low | Middle | High |
| | | Percent | | | |
| **Median income[1]** | | | | | |
| All races[2] | 35,994 | 0.64 | 1.49 | 0.81 | 1.91 |
| Hispanic | 3,657 | 1.48 | 2.36 | 3.19 | 5.39 |
| Non-Hispanic white | 26,304 | 0.82 | 2.61 | 0.97 | 2.08 |
| Non-Hispanic black | 4,613 | 1.29 | 1.77 | 2.56 | 5.35 |
| **Poverty rate (percent below poverty)[1]** | | | | | |
| All races[2] | 35,994 | 0.64 | 1.17 | 1.22 | 1.29 |
| Hispanic | 3,657 | 1.48 | 4.05 | 2.99 | 2.29 |
| Non-Hispanic white | 26,304 | 0.82 | 1.29 | 1.45 | 1.90 |
| Non-Hispanic black | 4,613 | 1.29 | 4.59 | 3.57 | 1.68 |
| **Percent college graduates[1]** | | | | | |
| All races[2] | 35,994 | 0.64 | 1.00 | 1.10 | 1.28 |
| Hispanic | 3,657 | 1.48 | 2.16 | 2.66 | 4.66 |
| Non-Hispanic white | 26,304 | 0.82 | 1.54 | 1.27 | 1.45 |
| Non-Hispanic black | 4,613 | 1.29 | 1.61 | 2.74 | 3.67 |
| **Male unemployment rate[3]** | | | | | |
| All races[2] | 35,994 | 0.64 | 1.20 | 1.15 | 1.07 |
| Hispanic | 3,657 | 1.48 | 4.19 | 4.11 | 2.29 |
| Non-Hispanic white | 26,304 | 0.82 | 1.39 | 1.34 | 1.74 |
| Non-Hispanic black | 4,613 | 1.29 | 3.41 | 3.69 | 1.49 |
| **Percent in professional or managerial jobs[1]** | | | | | |
| All races[2] | 35,994 | 0.64 | 1.04 | 1.01 | 1.20 |
| Hispanic | 3,657 | 1.48 | 2.07 | 2.55 | 4.01 |
| Non-Hispanic white | 26,304 | 0.82 | 1.56 | 1.20 | 1.41 |
| Non-Hispanic black | 4,613 | 1.29 | 1.74 | 3.04 | 3.32 |

[1]In the Block Group.
[2]All races include non-Hispanic other races not shown separately.
[3]In the Census Tract.

**Table IX. SUDAAN standard errors for the percent of women 20–44 years of age using 1 or more methods of contraception whose partners were using the condom (for the estimates in table 13)**

| Race, origin, and contextual variable | Number of women in thousands | All women | Contextual (community) characteristic | | |
|---|---|---|---|---|---|
| | | | Low | Middle | High |
| | | Percent | | | |
| **Median income[1]** | | | | | |
| All races[2] | 35,994 | 0.52 | 1.43 | 0.82 | 1.66 |
| Hispanic | 3,657 | 1.68 | 2.35 | 2.36 | 7.10 |
| Non-Hispanic white | 26,304 | 0.66 | 1.94 | 0.97 | 1.69 |
| Non-Hispanic black | 4,613 | 1.53 | 2.50 | 2.51 | 6.21 |
| **Poverty rate (percent below poverty)[1]** | | | | | |
| All races[2] | 35,994 | 0.52 | 1.10 | 1.20 | 1.05 |
| Hispanic | 3,657 | 1.68 | 5.05 | 4.22 | 2.06 |
| Non-Hispanic white | 26,304 | 0.66 | 1.17 | 1.32 | 1.41 |
| Non-Hispanic black | 4,613 | 1.53 | 4.48 | 3.52 | 1.93 |
| **Percent college graduates[1]** | | | | | |
| All races[2] | 35,994 | 0.52 | 1.05 | 1.00 | 1.16 |
| Hispanic | 3,657 | 1.68 | 1.72 | 3.74 | 5.17 |
| Non-Hispanic white | 26,304 | 0.66 | 1.37 | 1.30 | 1.26 |
| Non-Hispanic black | 4,613 | 1.53 | 2.03 | 3.16 | 3.90 |
| **Male unemployment rate[3]** | | | | | |
| All races[2] | 35,994 | 0.52 | 1.04 | 1.04 | 0.98 |
| Hispanic | 3,657 | 1.68 | 5.21 | 3.78 | 1.87 |
| Non-Hispanic white | 26,304 | 0.66 | 1.07 | 1.25 | 1.49 |
| Non-Hispanic black | 4,613 | 1.53 | 4.13 | 3.47 | 1.96 |
| **Percent in professional or managerial jobs[1]** | | | | | |
| All races[2] | 35,994 | 0.52 | 1.04 | 1.07 | 1.16 |
| Hispanic | 3,657 | 1.68 | 2.01 | 3.62 | 4.69 |
| Non-Hispanic white | 26,304 | 0.66 | 1.45 | 1.24 | 1.28 |
| Non-Hispanic black | 4,613 | 1.53 | 1.98 | 2.83 | 4.09 |

[1]In the Block Group.

[2]All races include non-Hispanic other races not shown separately.

[3]In the Census Tract.

**Table X. SUDAAN standard errors for the percent of babies born between January 1990 and September 1994 who were breast-fed at all (for the estimates in table 15)**

| Race, origin, and contextual variable | Number of women in thousands | All women | Contextual (community) characteristic | | |
|---|---|---|---|---|---|
| | | | Low | Middle | High |
| | | Percent breast-fed | | | |
| Median income[1] | | | | | |
| All races[2] | 18,415 | 1.04 | 2.20 | 1.63 | 2.72 |
| Non-Hispanic white | 12,069 | 1.40 | 4.29 | 1.97 | 3.11 |
| Non-Hispanic black | 2,640 | 1.97 | 3.12 | 3.59 | 13.26 |
| Poverty rate (percent below poverty)[1] | | | | | |
| All races[2] | 18,415 | 1.04 | 2.41 | 2.09 | 1.94 |
| Non-Hispanic white | 12,069 | 1.40 | 2.87 | 2.51 | 2.81 |
| Non-Hispanic black | 2,640 | 1.97 | 8.09 | 6.94 | 2.59 |
| Percent college graduates[1] | | | | | |
| All races[2] | 18,415 | 1.04 | 2.04 | 2.37 | 1.96 |
| Non-Hispanic white | 12,069 | 1.40 | 2.84 | 2.70 | 2.42 |
| Non-Hispanic black | 2,640 | 1.97 | 3.08 | 4.69 | 6.85 |
| Male unemployment rate[3] | | | | | |
| All races[2] | 18,415 | 1.04 | 2.25 | 2.11 | 1.99 |
| Non-Hispanic white | 12,069 | 1.40 | 2.57 | 2.44 | 2.92 |
| Non-Hispanic black | 2,640 | 1.97 | 5.96 | 5.85 | 2.70 |
| Percent in professional or managerial jobs[1] | | | | | |
| All races[2] | 18,415 | 1.04 | 1.89 | 2.30 | 2.14 |
| Non-Hispanic white | 12,069 | 1.40 | 2.82 | 2.78 | 2.34 |
| Non-Hispanic black | 2,640 | 1.97 | 2.53 | 5.17 | 6.34 |

[1]In the Block Group.

[2]All races include non-Hispanic other races and Hispanic not shown separately.

[3]In the Census Tract.

**Table XI. SUDAAN standard errors for the percent of babies born between January 1990 and September 1994 who were breast-fed for 3 months or more (for the estimates in table 17)**

| Race, origin, and contextual variable | Number of women in thousands | All women | Contextual (community) characteristic | | |
|---|---|---|---|---|---|
| | | | Low | Middle | High |
| | | Percent | | | |
| Median income[1] | | | | | |
| All races[2] | 18,415 | 1.10 | 2.25 | 1.69 | 3.23 |
| Non-Hispanic white | 12,069 | 1.49 | 4.16 | 2.06 | 3.46 |
| Non-Hispanic black | 2,640 | 1.66 | 2.36 | 3.06 | 12.96 |
| Poverty rate (percent below poverty)[1] | | | | | |
| All races[2] | 18,415 | 1.10 | 2.44 | 2.14 | 2.02 |
| Non-Hispanic white | 12,069 | 1.49 | 2.85 | 2.51 | 2.66 |
| Non-Hispanic black | 2,640 | 1.66 | 5.96 | 5.28 | 2.10 |
| Percent college graduates[1] | | | | | |
| All races[2] | 18,415 | 1.10 | 2.00 | 2.39 | 2.42 |
| Non-Hispanic white | 12,069 | 1.49 | 3.07 | 2.70 | 2.86 |
| Non-Hispanic black | 2,640 | 1.66 | 2.37 | 3.21 | 6.58 |
| Male unemployment rate[3] | | | | | |
| All races[2] | 18,415 | 1.10 | 2.47 | 2.21 | 2.05 |
| Non-Hispanic white | 12,069 | 1.49 | 2.81 | 2.42 | 2.72 |
| Non-Hispanic black | 2,640 | 1.66 | 5.60 | 4.82 | 2.25 |
| Percent in professional or managerial jobs[1] | | | | | |
| All races[2] | 18,415 | 1.10 | 1.97 | 2.10 | 2.32 |
| Non-Hispanic white | 12,069 | 1.49 | 3.14 | 2.48 | 2.60 |
| Non-Hispanic black | 2,640 | 1.66 | 1.75 | 4.78 | 4.63 |

[1]In the Block Group.

[2]All races include Non-Hispanic other races and Hispanic not shown separately.

[3]In the Census Tract.

**Table XII. SUDAAN standard errors for the percent of women 15–44 years of age who douche regularly (for the estimates in table 19)**

| Race, origin, and contextual variable | Number of women in thousands | All women | Contextual (community) characteristic | | |
|---|---|---|---|---|---|
| | | | Low | Middle | High |
| | | Percent | | | |
| **Median income[1]** | | | | | |
| All races[2] | 60,004 | 0.63 | 1.82 | 0.73 | 1.19 |
| Hispanic | 6,675 | 1.53 | 4.17 | 2.24 | 4.10 |
| Non-Hispanic white | 42,428 | 0.69 | 2.34 | 0.84 | 1.26 |
| Non-Hispanic black | 8,165 | 1.47 | 2.77 | 2.33 | 5.35 |
| **Poverty rate (percent below poverty)[1]** | | | | | |
| All races[2] | 60,004 | 0.63 | 0.92 | 1.02 | 1.26 |
| Hispanic | 6,675 | 1.53 | 3.33 | 2.83 | 2.87 |
| Non-Hispanic white | 42,428 | 0.69 | 0.96 | 1.11 | 1.54 |
| Non-Hispanic black | 8,165 | 1.47 | 4.13 | 3.06 | 2.02 |
| **Percent college graduates[1]** | | | | | |
| All races[2] | 60,004 | 0.63 | 1.18 | 0.94 | 0.89 |
| Hispanic | 6,675 | 1.53 | 2.79 | 3.03 | 3.05 |
| Non-Hispanic white | 42,428 | 0.69 | 1.44 | 0.97 | 0.95 |
| Non-Hispanic black | 8,165 | 1.47 | 2.40 | 2.71 | 3.78 |
| **Male unemployment rate[3]** | | | | | |
| All races[2] | 60,004 | 0.63 | 0.96 | 0.91 | 1.17 |
| Hispanic | 6,675 | 1.53 | 3.93 | 2.85 | 2.65 |
| Non-Hispanic white | 42,428 | 0.69 | 0.95 | 0.99 | 1.46 |
| Non-Hispanic black | 8,165 | 1.47 | 3.74 | 2.87 | 1.80 |
| **Percent in professional or managerial jobs[1]** | | | | | |
| All races[2] | 60,004 | 0.63 | 1.26 | 1.01 | 1.00 |
| Hispanic | 6,675 | 1.53 | 2.60 | 2.73 | 2.77 |
| Non-Hispanic white | 42,428 | 0.69 | 1.51 | 1.08 | 1.03 |
| Non-Hispanic black | 8,165 | 1.47 | 2.35 | 2.57 | 4.03 |

[1]In the Block Group.
[2]All races include non-Hispanic other races not shown separately.
[3]In the Census Tract.

**Table XIII. SUDAAN standard errors for the percent of women 15–44 years of age who currently smoke cigarettes (for the estimates in table 21)**

| Race, origin, and contextual variable | Number of women in thousands | All women | Contextual (community) characteristic | | |
|---|---|---|---|---|---|
| | | | Low | Middle | High |
| | | Percent | | | |
| Median income[1] | | | | | |
| All races[2] | 60,201 | 0.59 | 1.42 | 0.85 | 1.24 |
| Hispanic | 6,702 | 1.23 | 3.38 | 2.06 | 6.62 |
| Non-Hispanic white | 42,522 | 0.72 | 2.15 | 1.05 | 1.24 |
| Non-Hispanic black | 8,210 | 1.06 | 1.61 | 1.63 | 5.62 |
| Poverty rate (percent below poverty)[1] | | | | | |
| All races[2] | 60,201 | 0.59 | 0.98 | 0.96 | 1.03 |
| Hispanic | 6,702 | 1.23 | 4.16 | 2.16 | 2.51 |
| Non-Hispanic white | 42,522 | 0.72 | 1.03 | 1.12 | 1.47 |
| Non-Hispanic black | 8,210 | 1.06 | 3.16 | 2.33 | 1.34 |
| Percent college graduates[1] | | | | | |
| All races[2] | 60,201 | 0.59 | 1.11 | 1.05 | 0.86 |
| Hispanic | 6,702 | 1.23 | 2.46 | 2.44 | 3.49 |
| Non-Hispanic white | 42,522 | 0.72 | 1.52 | 1.25 | 0.96 |
| Non-Hispanic black | 8,210 | 1.06 | 1.53 | 2.39 | 2.71 |
| Male unemployment rate[3] | | | | | |
| All races[2] | 60,201 | 0.59 | 1.01 | 1.06 | 1.00 |
| Hispanic | 6,702 | 1.23 | 4.49 | 2.28 | 2.28 |
| Non-Hispanic white | 42,522 | 0.72 | 1.08 | 1.22 | 1.32 |
| Non-Hispanic black | 8,210 | 1.06 | 2.86 | 2.25 | 1.24 |
| Percent in professional or managerial jobs[1] | | | | | |
| All races[2] | 60,201 | 0.59 | 1.08 | 0.98 | 0.95 |
| Hispanic | 6,702 | 1.23 | 2.51 | 2.46 | 3.79 |
| Non-Hispanic white | 42,522 | 0.72 | 1.58 | 1.13 | 1.06 |
| Non-Hispanic black | 8,210 | 1.06 | 1.55 | 2.00 | 2.76 |

[1]In the Block Group.

[2]All races include non-Hispanic other races not shown separately.

[3]In the Census Tract.

# Appendix IV

## Sample SAS Programs to Fit Multilevel Models

This brief appendix cites some reasons why SAS PROC MIXED and SAS GLIMMIX were used in this report, and shows some sample programs for Multilevel Models for Continuous Dependent Variables (sample program 1, showing PROC MIXED), Multilevel Models for dichotomous dependent variables (GLIMMIX, sample programs 2 and 3), and an ordinary least- squares regression model (PROC REG, sample program 4), which may be an appropriate way (36–38) to choose variables at the individual level for use in the multilevel model. Further details and example programs may be found at www.sas.com/support and in the sources of SAS information cited in this report (42–45).

SAS PROC MIXED, first introduced in 1992, is now a viable alternative to special software for fitting multilevel models. Its flexibility has increased significantly since its introduction with the addition of more options for modifying certain aspects of the procedure. It can be used to fit a variety of multilevel models including Hierarchical Linear Models (HLM) that are now often used by behavioral scientists and other statistical researchers.

SAS PROC MIXED and some of its variants (such as GLIMMIX) may be a good choice for some researchers for several reasons. First, SAS is already widely used; many current SAS users therefore do not have to learn and acquire new software to use PROC MIXED. Second, SAS has the ability to do data management, data reduction, and data analysis, all in the same package. Third, by using SAS PROC MIXED, researchers who want to use multilevel modeling on data in the NCHS Research Data Center can use it with the Remote Access Procedure, without having to travel to NCHS. Researchers can use other software, such as STATA, MLn, and HLM in the Research Data Center, but using SAS allows them to use the data remotely. Very often, social and behavioral researchers deal with outcome variables that are not continuous. PROC MIXED, however, is designed for continuous outcome variables. SAS accommodates the regression of outcome variables that are nonnormal and noncontinuous (for example, count data or dichotomous variables) with a macro file called GLIMMIX. This macro can be downloaded at no cost from the SAS Web site at: http://ftp.sas.com/techsup/download/stat. The multilevel models presented in this report were produced using GLIMMIX.

To fit Hierarchical Linear Models, it is very helpful to be thoroughly familiar with the data first. Knowledge of the subject matter, relevant theory, and knowledge of the assumptions made in multilevel modeling, will make the modeling process go more smoothly (36–38).

To run PROC MIXED, a single equation is specified in SAS statements, as shown in the examples below. Like other SAS modeling procedures, PROC MIXED uses a MODEL statement with the dependent or outcome variable on the left of the equal sign, and the independent or predictor variables on the right. PROC MIXED further allows for defining in a RANDOM statement which variables, including the intercept, are specified to vary randomly. A cross-level interaction can simply be entered as a multiplicative term between a Level 1 and a Level 2 variable.

To avoid confusion, it is good practice to write down the equations at each level (for example, Level 1 and Level 2 in a two-level model), and then by substitution derive a final single equation (Combined Model). Clearly documenting which of the parameter estimates at Level 1 are declared as random at Level 2 facilitates the translation of the model into SAS statements. It also lessens the chances for error in entering the variables as the researcher can easily visualize the terms used in the final equation, particularly specified interactions. An illustration of a 2-level model with two predictor variables at Level 1 ($X_{1ij}$ and $X_{2ij}$) and one at Level 2 ($Z_i$) is shown in Example equations. The intercept and one of the two coefficients estimated at Level 1 are defined (presumably based on existing theory or substantive knowledge) to be random at Level 2. The contextual variable ($Z_j$) affects both the intercept and the slope of the first Level 1 predictor. The latter is expressed as a cross-level interaction in the final equation ($Z_j X_{1ij}$). Note that the fixed part of the model is inside the curved brackets and the random part in regular brackets. The point for this illustration is to guide the beginner in PROC MIXED or GLIMMIX to correctly identify the terms in the equation and then write the proper syntax for the right input in SAS.

Sample program 1 is a PROC MIXED model with parity (the number of children a woman has had) as the dependent variable (parity has a range of 0 to about 12 in this sample). (PROC MIXED is designed for continuous dependent variables. While parity is, strictly speaking, count data, for this purpose it will be treated as continuous.) A model is run in which the Level 2 variable is at the county level (CTY), and individual-level income and race are independent variables. The dependent variable (DV) is a function of individual level variable 1 (race/ethnicity), individual level variable 2 (household income), and a contextual variable; the intercept and slope are declared to be random.

Sample program 2 shows how a similar program is run when the dependent variable has been changed to a dichotomous outcome (no births versus one or more births) for women 20–34 years of age. This time, the GLIMMIX procedure is used instead of PROC MIXED because the outcome variable is dichotomous. In this step, a random analysis of variance (ANOVA) model is run to compute the Null Model.

In sample program 3, the random intercept model (similar to the "RANDOM INTERCEPT" part of table 3 in this report) is estimated for women 20–34 years of age, where "NOBIRTH"—that is, childlessness—is the dichotomous dependent variable. The Random intercept part of the model shows that the dependent variable NOBIRTH is a function of county-level

median family income (MEDFINC), and three individual-level variables: family or household income, race (BLACK, HISPANIC, WHITE), and age. The intercept is allowed to be random.

Sample program 4 shows a SAS program for ordinary least-squares regression, using parity as a continuous dependent variable. The predictor variables used are high household income (INCHI, more than $50,000), medium income (INCMED, $20,000–49,000), with income less than $20,000 as the reference category; 5-year age groups with 20–24 as the reference category; and variables indicating black or Hispanic origin, with non-Hispanic white as the reference category. In the output (not shown here), all of these variables have strong, significant effects. But the results of table 3 suggest that this PROC REG would be a misspecified model, because it does not control for the median family income of the county. (County median family income was shown in table 3 to be an important predictor of the dichotomous version of parity, ''NOBIRTH.'')

Example equations:

Level 1:

$$Y_{ij} = \beta_{0j} + \beta_{1j} X_{1ij} + \beta_{2j} X_{2ij} + \varepsilon_{ij}$$

Level 2:

$$\beta_{0j} = \gamma_{00} + \gamma_{01} Z_j + \mu_{0j}$$

$$\beta_{1j} = \gamma_{10} + \gamma_{11} Z_j + \mu_{1j}$$

$$\beta_{2j} = \gamma_{20}$$

Combined model:

$$Y_{ij} = \{\gamma_{00} + \gamma_{10} X_{1ij} + \gamma_{20} X_{2ij} + \gamma_{01} Z_j + \gamma_{11} Z_j X_{1ij}\} + [\mu_{0j} + \mu_{1j} X_{1ij} + \varepsilon_{ij}]$$

Sample Program 1, Using Proc Mixed: Random Intercept

```
Libname IN 'D:\My Documents\My SAS Files\V8\NSFG\SAS Data Sets';
Libname library 'D:\My Documents\My SAS Files\V8\NSFG\Formtcat';
Data a;Set in.a;
/*Data manipulation or data management procedures can be done here as illustrated in the next SAS statement */
Xlevel1=Leve1Var1*Context1;
Run;
 ********************************************************************* ;
Proc Mixed;
   class CTY90IDS income race;
   model DV=Lev1Var1 Lev1Var2 Context1 Xlevel1 /S ;
   random intercept Xlevel1 / sub=Groups type=un G;
Run;
 ********************************************************************* ;
```

Sample Program 2: Using GLIMMIX: Null Model

```
Libname IN 'D:\My Documents\My SAS Files\V8\NSFG\SAS Data Sets';
Libname library 'D:\My Documents\My SAS Files\V8\NSFG\Formtcat';
%Include 'D:\My Documents\My SAS Files\V8\NSFG\SASMacros\
            glmxc1m1.sas';
Run;
Data rcm1;Set in.cntyrcm1b;
If 20<=agap12dg<=34;
If NOBIRTH=2 then NOBIRTH=0;
Run;
 ********************************************************************* ;
%glmxc1m1;
Run;
 ********************************************************************* ;
Title ''Random ANOVA'';
%glimmix (data=RCM1,
  stmts=%str(class CTY90IDS;
    model NOBIRTH=/S ddfm=bw ;
    random intercept / sub=CTY90IDS G;)
  error=binomial);
Run;
Title;
Run;
```

Sample Program 3: Using GLIMMIX: Random Intercept

```
Libname IN 'D:\My Documents\My SAS Files\V8\NSFG\SAS Data Sets';
Libname library 'D:\My Documents\My SAS Files\V8\NSFG\Formtcat';
%Include 'D:\My Documents\My SAS Files\V8\NSFG\SASMacros\
          glmxc1m1.sas';
Run;
Data rcm1;Set in.cntyrcm1b;
If 20<=agap12dg<=34;
If NOBIRTH=2 then NOBIRTH=0;
MEDFINC=CST90257;
Run;
 ********************************************************************** ;
%glmxc1m1;
Run;
 ********************************************************************** ;
Title ''Random Intercept'';
%glimmix (data=RCM1,
  stmts=%str(class CTY90IDS income race;
   model NOBIRTH=income race a25_29 a30_34 medfinc/S ddfm=bw ;
   random intercept / sub=CTY90IDS G;),
   error=binomial);
Run;
Title;
Run;
```

Sample Program 4: PROC REG, ordinary regression with a continuous dependent variable

```
proc reg;
model parity = inchi incmed age2529 age3034 black hisp;
weight post_wt;
run;
```

# Appendix V

## Alternative Procedures for Mixed Modeling

The dependent variables examined in this report are all dichotomous variables, with values of 0 or 1 indicating the absence or presence of a particular characteristic. The analyses of these dependent variables were performed using GLIMMIX, a macro that adapts the SAS procedure PROC MIXED for use with dichotomous dependent variables. However, this is not the only possible method of examining these outcomes.

For example, the first GLIMMIX model that was presented in table 3 analyzed the percent of women ages 20–34 who had had no children. This measure of childlessness was coded as 0 if the woman had ever had any children (absence of childlessness) and 1 if the woman was childless. This dependent variable could have been measured as parity—the exact number of children that the woman had ever had. The measure of childlessness in this report was dichotomized because the difference between no children and any children was the focus of the analysis, but a similar analysis of the total number of children is possible.

If the focus were on the number of children ever born, the appropriate SAS procedure would be PROC MIXED, which is designed for mixed modeling of continuous (or count) dependent variables. The PROC MIXED SAS code to model the number of children ever born, using the same model as was presented for childlessness in table 3, is as follows:

```
PROC MIXED covtest; class
CTY90IDS;
model PARITY = INCOMHI INCOMMED
AGE20_29 AGE30_34 BLACK
HISPANIC
MEDFINC / solution;
random intercept / sub=CTY90IDS
type=un G;
run;
```

where:

CTY90IDS identifies the county in 1990 (the clustering variable); PARITY is the continuous dependent variable measuring the number of children ever born; INCOMHI and INCOMMED are dichotomous variables indicating high or medium income; AGE25–29 and AGE30–34 are dichotomous variables indicating ages 25–29 and 30–34; BLACK and HISPANIC are dichotomous variables indicating black or Hispanic race/ethnicity; MEDFINC is a county-level variable indicating the median family income in the county; low-income, ages 20–24 and non-Hispanic white and other race/ethnicity are omitted as reference categories (table 4). Non-Hispanic other women did not differ significantly from non-Hispanic white women, so there is no need to include a separate indicator variable for them.

The results of this model are presented in table A1. The estimates for the fixed-effects solution suggest that the higher the median family income in a county, the lower the average parity of the women in the county. Within counties, an individual woman's parity is predicted to be lower if her family income is higher and her parity is predicted to be higher if she is older, Hispanic, or black. These results closely agree with the findings based on the GLIMMIX model of childlessness presented in table 3: that childlessness is more prevalent in higher-income communities and that the probability of childlessness is higher for women with more family income, and lower for older women, Hispanic women, and black women.

The GLIMMIX macro and PROC MIXED are not the only options for multilevel modeling in SAS. A third procedure, PROC NLMIXED, is available for analysis of nonlinear outcomes. This procedure is very flexible, allowing any nonlinear equation that the researcher specifies with SAS programming statements. All SAS modeling procedures are available in the Research Data Center via the Remote Access Procedure described previously.

In addition, for researchers who choose to use software other than SAS, virtually any software program can be used as long as the researcher is able to travel to NCHS in person to conduct the analysis. Advance notice is also necessary so that the appropriate software can be obtained and set up in advance if it is not already supported by Research Data Center staff.

**Table A1. Multilevel mixed model predicting parity for women 20–34 years of age: United States, 1995**

| Parameter | Estimate | Standard error | *t* value | Pr (t) |
|---|---|---|---|---|
| **Null Model** | | | | |
| Fixed effects: | | | | |
| Intercept | 1.1555 | 0.02559 | 45.15 | <0.0001 |
| | Variance components | Standard error | *Z* value | Pr (*Z*) |
| Fixed effects: | | | | |
| Intercept | 0.08955 | 0.01754 | 5.11 | <0.0001 |
| Residual | 7.91180 | 0.1753 | 45.12 | <0.0001 |
| AIC | | 15088.1 | | |
| **Random Intercept Model** | | | | |
| | Estimate | Standard error | *t* value | Pr (*t*) |
| Fixed effects: | | | | |
| Intercept | 1.2917 | 0.09195 | 14.05 | <0.0001 |
| Level 2 | | | | |
| MEDFINC[1] | –0.01675 | 0.002279 | –7.35 | <0.0001 |
| Level 1 | | | | |
| Race and origin: | | | | |
| Hispanic | 0.5468 | 0.05526 | 9.89 | <0.0001 |
| Non-Hispanic black | 0.3612 | 0.05011 | 7.21 | <0.0001 |
| Income: | | | | |
| $50,000 or more | –0.4881 | 0.0476 | –10.25 | <0.0001 |
| $20,000-$49,000 | –0.2845 | 0.04186 | –6.80 | <0.0001 |
| Age: | | | | |
| 25–29 years | 0.5784 | 0.04336 | 13.34 | <0.0001 |
| 30–34 years | 1.1248 | 0.04158 | 27.05 | <0.0001 |
| | Variance components | Standard error | *Z* value | Pr (*Z*) |
| Random effects: | | | | |
| Intercept | 0.02896 | 0.01083 | 2.67 | 0.0037 |
| Residual | 6.58130 | 0.14600 | 45.09 | <0.0001 |
| AIC | | 14208.1 | | |

[1]MEDFINC=Median family income.

NOTE: Reference categories are non-Hispanic white and other, income under $20,000, and 20–24 years of age.

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For answers to questions about this report or for a list of reports published in these series, contact:

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