NBER WORKING PAPERS SERIES

DOES PARTICIPATION IN TRANSFER PROGRAMS DURING PREGNANCY IMPROVE BIRTH WEIGHT?

Janet Currie

Nancy Cole

Working Paper No. 3832

NATIONAL BUREAU OF ECONOMIC RESEARCH
1050 Massachusetts Avenue
Cambridge, MA 02138
September 1991

February, 1991; revised August, 1991. We would like to thank Rebecca Blank, Joseph Hotz, Sheena McConnell, Duncan Thomas, John Strauss and seminar participants at Harvard, the Graduate School of Business at the University of Chicago, MIT, and UCLA for many helpful comments. Any errors are our own. This paper is part of NBER's research programs in Health Economics and Labor Studies. Any opinions expressed are those of the authors and not those of the National Bureau of Economic Research.

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ABSTRACT

A primary goal of transfer programs to the non-aged, non-disabled poor in the United States is to improve the well-being of children in poor families. Thus it is surprising that most of the considerable research which has been devoted to the study of transfer programs focuses on the incentive effects of the programs for parents rather than on the question of whether parental participation in such programs measurably benefits children. This paper begins to fill this gap in the literature by examining the relationship between a mother's participation during pregnancy in Aid to Families with Dependent Children, the Food Stamp Program, or housing assistance, and one of the least controversial measures of child welfare: the birth weight.

We do not find any statistically significant relationship between a mother's participation in these programs during pregnancy and the birth weight of her child. However, it should be kept in mind that birth weight is only one measure of child welfare and that these entitlement programs may well have positive impacts on the health and development of children once they are born.

Janet Currie
Department of Economics
M.I.T.
77 Massachusetts Avenue
Cambridge, MA 02139
and NBER

Nancy Cole
Department of Economics
UCLA
405 Hilgard Avenue
Los Angeles, CA 90024

I. Introduction

Aid to Families with Dependent Children (AFDC) was introduced in 1935 as a way to protect children against poverty. Additional in-kind transfer programs including the Food Stamps Program, Medicaid, public housing, rent subsidies, and most recently the Special Supplemental Feeding Program for Women Infants and Children (WIC), have been introduced since 1960. Although some of these programs are available to households without children, the primary goal of transfer programs to the non-aged, non-disabled poor in the United States is to improve the well-being of children in poor families. Thus it is surprising that most of the considerable research which has been devoted to the study of transfer programs focuses on the incentive effects of the programs for parents[1], and especially for mothers, rather than on the question of whether parental participation in such programs measurably benefits children.

Recent efforts to evaluate WIC, a program that targets pregnant women and children at "nutritional risk" are an exception.[2] Many of these evaluations focus on birth weight as a measure of an infant's well-being. This emphasis is appropriate as bio-medical studies have shown that low birth weight is the single most important predictor of infant mortality, and that it is also associated with health problems in infancy and with learning disabilities in later life.[3] Devaney *et al.* (1991) provide an excellent survey of the WIC evaluation literature as part of their recent study and conclude that even controlling for selection into the program (WIC is not an entitlement program), participation in WIC increases birth weights between 1 and 4 ounces.[4] These effects are large enough to imply that WIC pays for itself by reducing the need for costly neonatal care.

This paper extends this line of research by examining the relationship between the birth weight and a mother's participation in transfer programs during pregnancy. We focus on AFDC, the Food Stamps Program, and housing assistance defined as either receipt of rent subsidies or public housing. Together with Medicaid, these programs account for the majority of transfer payments made to the non-elderly, non-disabled population in the United States (Moffitt, 1990), and over our sample period Medicaid eligibility was closely tied to the AFDC program.[5] Controversy about the relationship between these programs and the well-being of infants is reflected in the fact that since 1981, six states have adopted laws allowing pregnant women without other eligible children to receive AFDC benefits while five states have rescinded such laws.[6]

The costliness of these programs suggests that their direct effects on children should be assessed. And the WIC evaluation literature suggests that birth weight is a natural starting point, although since the older entitlement programs we examine are not directly targeted at pregnant women, one might expect estimates from the WIC studies to provide an upper bound on the effects of these programs.

The next section describes the conceptual model underlying our empirical work. It is followed by a description of the data, a discussion of the results, and our conclusions.

II. Conceptual Model[7]

In the tradition of Becker (1965, 1981), Becker and Lewis (1974), and Becker and Tomes (1976) we assume that household utility depends on consumption, leisure, and on the quantity and quality of children. Birth weight is an index

of child quality and is "produced" by combining inputs in the manner implied by a birth weight production function. Many inputs such as nutritional intake, prenatal care, cigarette consumption, and alcohol consumption are chosen directly by the parents. Parental and neighborhood characteristics such as healthiness, height, education, and availability of medical care are likely to affect the way such inputs are chosen as well as the efficiency with which they are used. The child's own characteristics such as gender and genetic endowment, will also affect the shape of the production function.

We ignore issues of bargaining within the household, and assume that parents maximize utility subject to the household budget constraint and the birth weight production function. We assume further that parental wages and the household's endowment of unearned income depend on the exogenously determined characteristics of the household and neighborhood. Solving this maximization problem yields a reduced form equation:

$$BW = f(x_h, x_n, x_c, p, e)$$

where birth weight depends on household, neighborhood, and child characteristics, prices (excluding own wages), and a child-specific error term which reflects unobservable factors. Alternatively the model can be solved to yield input demand functions which depend on the same set of variables.

The household characteristic that is the main focus of our attention is whether or not the household participates in a welfare program. Clearly, participation in welfare programs during pregnancy is properly treated as being jointly determined with birth weight. Following Pollak (1969) we estimate birth weight production functions conditional on this endogenously determined variable. We use instrumental variables techniques (which are discussed in detail below)

to purge the estimates of simultaneity bias. These regressions identify the "total" effect of welfare participation. They tell us whether, other things being equal, households that receive welfare during pregnancy have babies of higher birth weight They do not tell us *how* welfare participation effects birth weight.

Assuming that receipt of welfare does not itself alter preferences, it can be expected to effect birth weight through two channels. First, receipt of a cash transfer such as AFDC increases the unearned income of the household. Some of this unearned income might be spent on inputs which increase birth weight such as nutritious food. Alternatively, additional income could be spent on consumption of products such as cigarettes, drugs, or alcohol which have been shown to reduce birth weight.

The effect of in-kind benefits such as food stamps, Medicaid coverage associated with AFDC, or public housing is more difficult to evaluate because it depends on the amount of the good that a household would purchase given the equivalent cash transfer. For example, Moffitt (1990) suggests that food stamps are probably regarded as cash transfers by most families because the small amounts involved are much less than most families' food budgets. It is possible that Medicaid coverage exceeds the amount of medical coverage that AFDC families would purchase given the cash. In this case, one might expect pregnant AFDC participants to use more prenatal care than equivalent households without Medicaid coverage.

In order to determine whether welfare programs operate through their effects on income or through the provision of specific services such as Medicaid, we add controls for poverty status, smoking, drinking and for delay in obtaining

prenatal care to the conditional birth weight production functions. We also investigate the possibility that welfare participation acts as a proxy for household structure by controlling for female headedness, and for whether or not the household is a nuclear as opposed to an extended family, where an extended family is defined as one with other adults besides the spouse or partner present in the birth year. These variables are also treated as endogenously determined with birth weight.

III. Data

This study takes advantage of one of the few data sets which links measures of the mother's participation in transfer programs during pregnancy to the birth weight of her child: the National Longitudinal Survey of Youth (NLSYM). The NLSY has information (collected annually) about AFDC or Food Stamp Program receipt in each month of the survey year. Respondents are also asked whether they lived in public housing or received a rent subsidy in the survey year. Unfortunately, the survey does not have information about whether the household received assistance from WIC, Medicaid or from a state Medically Needy program.[8]

The NLSY began in 1979 with 6,283 young women between the ages of 14 to 21. As of 1988, these women report more than 9,000 pregnancies which resulted in 7,346 live births. Retrospective information about the birth weight of each child was collected starting in 1983.[9] Excluding children with missing transfer or birth weight data leaves approximately 4,900 children born between 1979 and 1987. Almost half of the children are Black or Hispanic.

The sample composition reflects the fact that the NLSY over-sampled Blacks and Hispanics. The survey also over-sampled poor households: 73% of the Black

either a spouse or a "partner" in the birth year and the percentage whose mothers lived in an extended family in the birth year. The table shows the sharp difference between Blacks and others in the illegitimacy rate. It is also remarkable that 30% of the children had mothers who lived in an extended family in the birth year.[13] Finally, the table shows that 42% of the sample children were born to mothers who were in poverty in the birth year.

Panel C concerns birth weight inputs and outcomes. Both the mean birth weight and the percent of children weighing less than six pounds are shown. Because the relationship between infant health and birth weight is highly non-linear,[14] the latter may actually be a better measure of child welfare than the mean of the birth weight distribution. However, for the sake of comparability with other studies we will focus on the latter in the results reported below.[15] All of our results have been replicated using a dichotomous variable equal to one if the child weighed less than six pounds as the dependent variable.[16] The table indicates that Black children are born lighter on average, and are more likely to weigh less than 6 pounds at birth. Hispanic children are also more likely than other children to suffer low birth weight.

Panel C also shows measures of three important birth weight inputs: whether the mother delayed obtaining prenatal care beyond the first trimester, whether the mother smoked cigarettes in the 12 months prior to the birth, and whether the mother drank alcohol in the twelve months prior to the birth. Hispanics are most likely to delay obtaining prenatal care but least likely to smoke or drink. Conversely other Whites delay least but are most likely both to smoke and to drink.

IV. Results

A. Reduced Forms and Two-Stage Least Squares

We first estimate a reduced form model corresponding to the one described above. Birth weight is regressed on a vector of child characteristics which include: race and ethnicity (Black, Hispanic or other White), sex, and mother's height. Household characteristics include: dummy variables indicating whether the mother was in a grade appropriate for her age in 1979 ("on time"),[17] whether she lived in an urban area at age 14, and whether she belonged to the poverty sub-sample of the NLSY; the highest grade completed by the mother's mother (the grandmother); the number of mother's siblings; and dummy variables indicating whether the grandmother worked in 1978, whether there was an adult male in the household who worked when the mother was 14, and whether there was an adult female in the household who worked when the mother was 14.

Neighborhood characteristics are measured at the state level for the birth year and include: the maximum AFDC grant for a family of four; the need standard for a family of four; average payments to AFDC, Food Stamp Program, and Medicaid recipients; number of AFDC, Food Stamp Program and Medicaid recipients; the income cutoff for Medicaid coverage of pregnant women as a percent of the federal poverty line[18]; the number of physicians per 100,000 residents, outpatient visits per capita, and hospital beds per 1000 residents; the infant mortality rate; the percent of births of low birth weight; and the percent of births to unmarried women. We also include state dummies in order to control for unobserved state-level determinants of birth weight. Because of the possibility that households migrate to states with generous benefit levels (Rosenzweig and Wolpin, 1988), we measure the mother's state of residence using her state of

residence at age 14.[19] Finally, we include the Consumer Price Indices for all items and for food. And in order to control for the fact that our sample is aging over time, we include year dummies.

The estimates are shown in column 1 of Table 2. The raw difference of 7 ounces in mean birth weights between Blacks and others that was shown in Table 1 is reduced to 4 ounces by the inclusion of our other controls. Males weigh an average of 3 ounces more, and children gain an ounce for every inch of mother's height. Children of mothers from urban areas and children of mothers from the poverty sub-sample have children that weigh 2 and 3.5 ounces less than other children, respectively.

Whether the mother was on time in her education, characteristics of the grandmother's household, state characteristics (with the exception of the state dummies), and prices are not statistically significant determinants of birth weight. But columns 2 through 8 show that these variables are correlated with participation in AFDC during pregnancy, poverty status, birth weight input choices, and living arrangement indicators. We confine our discussion of program participation to participation in AFDC because the results for participation in the Food Stamp Program and housing assistance were similar.

Being on time in school reduces the probability of participating in AFDC, being in poverty, delaying prenatal care, smoking in the 12 months prior to the birth, or living in an extended family, and increases the probability of living with a spouse or partner. The grandmother's highest grade and having an adult male in the mother's household who worked when she was aged 14 have effects in a similar direction, although they also increase the probability that a mother drinks. Having an adult female in the household who worked when the mother was

14 is associated with increases in the probability of smoking and of living with a spouse or partner. Having a grandmother who worked in 1978 is associated with a decrease in the probability of being in poverty. Living in an extended family is negatively related to the number of mother's siblings.

The state level variables have less explanatory power although delay in obtaining prenatal care is positively related to the maximum AFDC grant and the number of outpatient visits and negatively related to the Medicaid income cutoff; there is a negative association between drinking and average food stamp payments; and the probability of living with a spouse or partner depends negatively on the food CPI and on the percent of low birth weight births.

Finally, the results in columns 2 to 8 of Table 2 highlight the importance of variables which are statistically significant determinants of birth weight in the determination of other endogenous variables: Even after controlling for other observables, Blacks are more likely than Whites to participate in AFDC, to live in poverty, to delay obtaining prenatal care and to live in an extended family. However they are less likely to smoke or drink or to live with a spouse or partner. Hispanics are twice as likely to delay prenatal care as Blacks, and even less likely to smoke or drink. Their living arrangements are more similar to other Whites then to Blacks, although relative to other Whites they are less likely to live with a spouse or partner and more likely to live in an extended family. Mothers who lived in an urban area at age 14 are less likely to delay obtaining prenatal care[20] but more likely to smoke. Members of the poverty subsample are more likely to participate in AFDC during pregnancy, be in poverty during the birth year, and live in an extended family and less likely to live with a spouse or partner.

Table 3 shows two-stage least squares estimates of birth weight production functions conditional on participation in AFDC during pregnancy. Participation in AFDC and the other endogenous variables have been instrumented using the following variables as instrumetns: whether the mother was on time in her education, characteristics of the grandmother's household, state characteristics (excluding state dummies), and prices.[21] Column 1 shows that the estimated "total" effect of participation in AFDC during pregnancy on birth weight is not statistically significantly different then zero. Controlling for other endogenous variables in columns 2 through 8 does not alter this result. However, column 3 shows that delaying prenatal care beyond the first trimester has a large negative effect on birth weight. The last row of the table shows that our over-identifying restrictions cannot be rejected at the 95% level of confidence. The effects of the exogenous variables are similar to those discussed above.

Given that Rosenzweig and Wolpin (1989) have shown using the same data that smoking, drinking, and delay in obtaining prenatal care have deleterious effects on birth weight, it is interesting to point out that if AFDC participation is omitted from the models in columns 2 through 8 we find that smoking and delay in obtaining prenatal care are estimated to reduce birth weight by 14 and 22 ounces

respectively. The former estimate is in the same range as the coefficients reported by Rosenzweig and Wolpin while the latter is much bigger.[22] We also find that poverty status in the birth year reduces birth weight by 6.5 ounces.

B: Differences Between Children of the Same Mother

In principal, the use of two-stage least squares solves the endogeneity

problem and provides estimates which are not sensitive to omitted variables bias. However, the presence of an omitted variable which was correlated with one of our instruments as well as with birth weight would invalidate our procedure. For example, a poor diet during pregnancy might be correlated both with low birth weight and with having a less educated grandmother. In order to control for this type of omitted variable, we also estimate models which include fixed effects for each mother.

These models are estimated by sorting children of the same mother according to birth order, and then taking first differences. A drawback of this procedure is that the sample size is reduced to roughly 1000 sibling pairs. Sixty-three percent of these differences are between second and first born children.

A problem with the fixed effects estimates is that there are relatively few mothers that change program participation status between the births. The number of program changers and mean differences in birth weights for changers and non-changers are shown in Appendix Table 1. The mean change in birth weight for women who never participated in welfare is about two ounces. This difference reflects the fact that first born children are lighter on average then children of higher birth order. More women entered programs then exited them between births which may be because mothers of first-born children are less likely to have been eligible for assistance during pregnancy. Mothers were also more likely marry than to divorce and more likely to leave an extended family then to join one between the births. Finally, they were more likely to leave poverty status then to enter it, and also more likely to begin smoking then to quit. These patterns in living arrangements and smoking behavior may reflect the aging of our sample.

The "no change" group can be divided into those mothers who participated in a program during both pregnancies and those who did not. If changes in program participation were exogenously determined then we would expect the mean differences in birth weight to be the same for these two groups, and we would expect the effects of entry and exit into the programs to be equal and opposite in sign, relative to the no change group. Although the small number of program changers makes inference difficult, these predictions appear to be violated.

Because changes in welfare participation status and in the other endogenous variables cannot be assumed to be exogenous, we instrument these changes using the mother's fixed characteristics such as race, height, whether she belongs to the poverty sub-sample, state of residence at age 14, and so on. We also include the birth interval, and a dummy variable equal to one if the difference was between a second and a first-born child as additional endogenous variables.[23] The first-stage regressions are shown in Appendix Table 2. Blacks and mothers who lived in an urban area at age 14 are more likely to enter AFDC and poverty status, respectively. Hispanics and mothers who had an adult male who worked in their households at age 14 have shorter birth intervals. Mothers who were on time in their educations in 1979 are more likely to divorce and also to have shorter birth intervals.

Two-stage least squares estimates of the effect of changes in AFDC status on changes in birth weight are shown in Table 4. All models include differences in sex, and year dummies to control for the fact that our sample of mothers is aging over time. The model in Column 1 shows that the total effect of a change in AFDC status is not statistically significantly different than zero. Columns 2 through 9 show that this result is not altered by the inclusion of other

endogenous variables. We find no statistically significant effect of changes in AFDC status, nor of changes in any of the other endogenous variables. Deleting the change in AFDC status from the model as we did above did not result in statistically significant coefficients on the other endogenous variables.[24] The last row of the table shows that our over-identifying restrictions cannot be rejected at the 95% level of confidence.

It is possible that the difference between the results in Table 3 and those in Table 4 is due to measurement error rather than to the inclusion of superior controls for omitted variables. It is not clear *a priori* whether first differencing will make the measurement error better or worse: We expect that true birth weights and program participation variables as well as measurement error, will be positively correlated across mothers. We corrected for gross errors in measurement by deleting the few observations for which the reported difference in birth weight between two children of the same mother exceeded 80 ounces, but the possibility remains that these first-differenced results are dominated by measurement error.

C: Differences Between Sisters' Children of the Same Birth Order

An alternative approach to the omitted variables problem is to control for a fixed effect associated with sisters' family background. In principal, a comparison of the results using mother fixed effects with those using family fixed effects will shed light on whether it is sufficient to control for common family background variables such as "exposure" to welfare as a child (Tienda, 1990) or whether it is necessary to control for additional individual-specific sources of heterogeneity.

Using sisters' children also allows us to control perfectly for differences associated with birth order. We first sort all the children born to sisters by birth order. We then take first differences excluding differences between children of different birth order. Pairs with differences in birth weight of more than 80 ounces were deleted. This procedure yields about 300 first-differenced observations. The number of sister pairs with differences in program participation, and the mean differences in birth weights are shown in Appendix Table 1.

Differences in welfare participation (and in the other endogenous variables we consider) cannot be assumed to be exogenous. Hence we instrument them using characteristics common to both sisters including the state of residence at age 14. The difference in the sisters' age at the birth is also included as an endogenous variable.[25] First-stage regressions are shown in Appendix Table 3. Differences in poverty status appear to be positively related to having an adult male in the household who worked when the mother was 14 and negatively related to having an adult female who worked. Differences in marital status and in the mother's age at the birth are positively related to having an adult female or grandmother who worked and mother's age at the birth is negatively related to having an adult male who worked.

Two-stage least squares estimates of the effect of differences in AFDC status on differences in birth weight are shown in Table 5. As in Tables 3 and 4, we do not find a statistically significant effect of AFDC participation on birth weight. However, we do find that sisters who drink and sisters who live in an extended family have significantly lighter children than their siblings who do not. The last row of the table shows that our over-identifying

restrictions are not rejected by the data.

One interpretation of the differences between Tables 4 and 5 is that there is important individual-level heterogeneity which remains when family background variables are controlled for and which is reflected in the mother's decision to drink or to live with an extended family. However the caveats regarding measurement error which were discussed above also apply to these results.

D: Conditional Input Demand Functions

The results above indicate that we are unable to find any direct effect of participation in AFDC on birth weight. A possible explanation is that participation in AFDC has mixed effects: for example a mother might be both less likely to delay obtaining prenatal care and more likely to spend additional unearned income on cigarettes. In this section we investigate the effects of participation in AFDC on input demands by estimating conditional input demand functions.

The estimates are shown in Table 6.[26] Columns 1, 3 and 5 show that participation in AFDC has no statistically significant effect on the probability that a mother delayed obtaining prenatal care or smoked, but participation in AFDC is estimated to significantly reduce the probability that she drank during pregnancy. Demand functions which included all of the other endogenous variables discussed above were estimated but for the sake of brevity only models which include poverty status are shown in the even-numbered columns.

These estimates show that being in poverty increases the probability of delay, and that about half of the negative effect of participation in AFDC on the probability of drinking is attributable to the fact that women who

participate are poor. However a significant (at the 90% level of confidence) negative effect remains even controlling for poverty status in the birth year. This effect is difficult to explain using our conceptual model, if (as seems likely) alcohol is a normal good. One possibility is that participation in AFDC places constraints on women, such as visits by social workers, which are not reflected in our model.

E: Selection Bias

Joyce (1987), and Grossman and Joyce (1990a, 1990b) point out that the sample of births is a selected sample of pregnancy outcomes.[27] If participation in welfare programs increases the probability that an infant from the lower tail of the birth weight distribution is born rather than aborted or lost, then selection effects could mask increases in birth weight among the other infants.

Joyce shows using county level data, that the decline in infant mortality rates which is associated with increases in abortion rates works primarily through reductions in the number of low birth weight births. This reduction may occur because abortion rates are highest among women less than 20 and those over 35, the two groups that are most at risk of having low birth weight babies. In addition, Grossman and Joyce (1990b) use individual-level data from New York City to infer that the same women who are most likely to have an abortion are also most likely to delay the initiation of prenatal care.

At the same time, several studies suggest that while AFDC benefit levels are not related to the probability of an out-of-wedlock birth (Moore and Caldwell (1977), Duncan and Hoffman (1990), Ellwood and Bane (1985)), two studies find that Medicaid coverage is associated with an increase in the probability of an

out-of-wedlock birth and a decrease in the probability of obtaining an abortion, respectively (Leibowitz, Eisen and Chow (1986) and Grossman and Joyce (1990)).[28]

Our capacity to investigate this issue is hampered by under-reporting of abortions in the NLSY which is particularly severe among blacks[29]. In addition, annual data about the availability of abortion services which might be used to identify selection effects is unavailable.[30] Nevertheless, we attempt to examine the selection issue in this section using the sample of all reported pregnancies.

Pregnancies can end in either a pregnancy loss, an abortion, or a live birth. Column 1 of Table 7 shows a reduced form regression for the probability of a pregnancy loss.[31] We do not find any effect of the level of state welfare benefits on the probability of a pregnancy loss. However, in column 2, we restrict the sample to the population of women who have had at least one live birth, and thus are likely to be eligible for AFDC and Medicaid. For this group, we find strong negative effects of the number of outpatient visits and of the maximum AFDC grant on the probability of a pregnancy loss. The average AFDC payment has a smaller positive effect, so that on balance a more generous AFDC program appears to reduce the probability of a pregnancy loss even after state dummies have been controlled for.

Column 3 shows a reduced form equation for the probability of an abortion. Pregnancies which ended in pregnancy losses have been excluded from this sample. The probability of an abortion is smaller for women from the poverty sub-sample and for those from large families. These results are consistent with the literature cited above, and increase our confidence that an examination of the data about abortions is useful despite the under-reporting. The number of AFDC recipients has a positive effect on the probability of an abortion while the

number of Food Stamp Program recipients has a smaller negative effect.

Column 4 shows the same model estimated using the population of women who had at least one live birth. Parameters of the state welfare program have no statistically significant effect on the probability of an abortion in this group. However, having an adult female in the household who worked when the mother was 14 and the CPI (all items) increase the probability that a pregnancy terminates in an abortion.

We next ask whether participation in AFDC is associated with changes in the probability of a pregnancy loss or an abortion. Results for abortions are shown in Table 8. Column 1 shows that there is no statistically significant effect of participation in AFDC during pregnancy on the probability of an abortion. Columns 2 to 4 indicate that this result is not altered by the inclusion of indicators for poverty status, presence of a spouse or partner, living in an extended family or mother's age. These indicators were included because most abortions are obtained by young, unmarried women (Henshaw et al., 1991). If participation in AFDC is excluded from the models estimated in columns 2 through 5, we find that having a spouse or partner present reduces the probability of an abortion 20% while living in an extended family increases the probability of an abortion 30%. (Both effects are statistically significant at the 90% level of confidence). Results about the effect of AFDC participation on pregnancy losses were similar and so are not shown due to space constraints.

In summary, the results in Table 7 provide some evidence that more generous welfare programs are associated with reductions in the probability of a pregnancy loss and more tenuously, with increases in the probability of an abortion. However, we find no evidence that *participation* in welfare programs

increases the probability of either pregnancy losses or of abortions. Hence, we believe that selection effects cannot account for the fact that participation in welfare programs does not have a statistically significant impact on birth weight.

F: Extensions

The discussion above focuses on a subset of our results. As mentioned above, we estimated similar models using participation in the Food Stamp Program, housing assistance, or in any of the three programs as the indicator of welfare participation. We did not find any effect of participation in these programs on birth weight.

In view of the large unexplained racial differences in birth weight, we also estimated the models shown in Tables 2 and 3 separately by race. Our results concerning the effect of participation in welfare programs were not changed.

As noted above, first-born children are usually lighter then children of higher birth orders, and their mothers are less likely to have been eligible for welfare during pregnancy. In order to see whether our results were affected by the fact that most of the children in our sample are either first or second born, we estimated models similar to those in Tables 2 and 3 using only first born children. We also estimated models similar to those in Table 4 using only differences between first and second born children. The results were similar to those discussed above.

In an effort to better control for the fact that woman who are on welfare are poor, we constructed a measure of the unearned income of the household and

used this variable instead of poverty status. Construction of this measure is discussed in the Data Appendix. In contrast to poverty status which was often statistically significant and generally of the expected sign, unearned income was not statistically significant in any of our models. We believe that this result reflects measurement error in the NLSY income data, and that poverty status is a more accurate measure of economic status in these data.

Finally, despite the problems with the reported amounts of AFDC and Food Stamp payments discussed above, we estimated models using only the subset of women who reported receiving benefits during pregnancy. We looked at whether either the reported amount of the payment, or the number of months of pregnancy in which the woman received a payment were related to the birth weight of her child. We did not find any statistically significant effects.

V: Conclusions

We do not find any statistically significant effect of a mother's participation during pregnancy in AFDC, the Food Stamp Program, or housing assistance on the birth weight of her child. This result can be contrasted with evaluations of the WIC program which find that resources which are directly targeted at improving the nutritional status of pregnant women have a statistically significant positive impact on birth weight.

However, it should be kept in mind that birth weight is only one measure of child welfare and that the older entitlement programs may well have positive impacts on the health and development of older children. This question will be investigated in future research.

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1. Moffitt (1990) provides a survey of this literature. He divides it into five categories: 1) effects on parent's labor force participation, 2) welfare dependency, 3) impacts on migration decisions, 4) impacts on family formation, and 5) inter-generational transmission of welfare dependency. Many of these studies have implications for the welfare of children, but it is not the primary outcome being considered.

2. WIC targets pregnant women, women with children, and children at "nutritional risk" who have incomes below 133% of the federal poverty line. Nutritional status is often determined using blood tests. The program offers food supplements and nutritional counseling. In October 1987, there were 3.5 million recipients of WIC and 14% of the caseload were pregnant women (USDA, 1990).

3. Infant mortality rates in the United States declined from 20 deaths per thousand live births in 1970 to less than 10 deaths per thousand live births in 1988, but since 1981 the rate of decline in mortality rates has slowed. Infant mortality remains higher in the U.S. then in other developed countries and higher for blacks than for whites. Much of the decline in infant mortality rates in the preceding two decades can be attributed to the diffusion of high-cost neo-natal intensive care rather than to underlying improvements in the health of newborns as measured by birth weight. Capacity for further reducing mortality rates by improving neo-natal intensive care is limited because of its high cost, and because such care is now widely available. Hence, further reductions in the infant mortality rate depend on reducing the proportion of newborns with low birth weight. (Low birth weight is medically defined as birth weight less than 2500 grams). As examples of the extensive literature on the negative effects of low birth weight see Baldwin (1986), Baumgartner (1962), Carran (1989), Chaikind and Corman (1990), Chase (1969), Corman *et al.* (1986), Eisner *et al.* (1979), Klein (1988, 1989), Noble-Jamieson (1982), Stewart (1981) and Williams *et al.* (1974).

4. In addition, Corman *et al.* use community level data to show that the availability of WIC reduces neo-natal (first month of birth) mortality rates.

5. The last children in our sample were born in 1987, so the dramatic expansion of Medicaid coverage to pregnant women which began in April 1987 post-dates our sample. Effective April 1987, states were given the option to extend coverage to pregnant women with incomes below a state-established threshold which could not exceed 100% of the federal poverty level. Effective April 1988, states were given the option to extend coverage to women with incomes less than 185% of the poverty line. The Medicare Catastrophic Care Act of 1988 made the OBRA-1986 option mandatory, but this requirement only affected five states as the others had voluntarily adopted this standard. Effective April 1990, the mandatory threshold was raised to 133% of the poverty line (OBRA-1989).

6. As of 1988, 31 states and the District of Columbia allowed these women to receive AFDC benefits, with eligibility beginning in the sixth or seventh month of pregnancy. The states which adopted such laws are: Connecticut (1981), Alaska (1983), Arizona (1985), North Carolina (1985) and Illinois (1986). States which

discontinued existing programs were Iowa (1981), South Dakota (1981), Alabama (1982), and South Carolina (1982). Pennsylvania canceled an existing program in 1982 and reinstated it in 1985 (U.S. Department of Health and Human Services, various years). The Omnibus Budget Reconciliation Act of 1981 prohibits states from offering AFDC benefits to pregnant women without other eligible children until the third trimester.

7. We are grateful to Duncan Thomas and John Strauss for suggesting this approach to modeling conditional birth weight production functions. The discussion in this section draws on Thomas, Strauss and Henriques (1990) and Thomas, Strauss, and Henriques (1991).

8. This problem is mitigated by the fact that there are close links between participation in these programs and participation in the programs we consider. We have already pointed out the close link between AFDC and Medicaid over our sample period. WIC participants are also likely to participate in other transfer programs. For example, in 1987, 45% of WIC participants also received Food Stamp Program benefits (USDA, 1990).

9. Unfortunately mothers appear to have only been asked the birth weight once per child so it is not possible to use repeated observations to check for measurement error.

10. Moffitt and Wolfe (1990) construct a measure of the value of Medicaid coverage to particular families, and find a positive relationship between this measure and participation in AFDC. Their result can be contrasted with that of Blank (1989) who found no relationship between the average level of Medicaid benefits in a state and the probability that a woman participated in AFDC.

11. In a comparison of responses to the Survey of Income and Program Participation to administrative records, Marquis and Moore (1990) found that fewer than 2% of respondents erroneously reported participation or non-participation in AFDC or the Food Stamp Program. There was more under-reporting then over-reporting. Unfortunately, even this small rate of response error led to large biases in the mean program participation rate. One source of response error was that respondents confused AFDC with General Assistance. In view of the retrospective nature of the NLSY, it is note-worthy that Marquis and Moore did not find any evidence that respondents were more likely to under-report participation that occurred further in the past.

12. Roughly 7% of the mothers report participation in the Food Stamp Program and housing assistance, 5.5% report participation in both AFDC and housing assistance, and about 4.7% of the mothers report participation in all three programs during pregnancy. Of mothers receiving any assistance, 38% participate in both AFDC and the Food Stamps Program, 21% participate in the Food Stamp Program and housing assistance, 16% participate in AFDC and housing assistance and 14% participate in all three programs.

13. This number can be compared to Bane and Ellwood's (1985) finding that in the Survey of Income and Education a quarter of single mothers and one fourth of those under 24 live in this type of family arrangement.

14. Schwartz (1989) reports that neonates weighing less than 2500 grams account for 9% of neonatal hospital caseloads and 57% of the cost of neonatal hospital care.

15. Other studies which look at birth weight are Corman *et al.* (1987), Grossman and Joyce (1990), Rosenzweig and Schultz (1982, 1983, 1988), and Rosenzweig and Wolpin. We also believe that the percent low birth weight is more subject to measurement error then the mean of the distribution. This problem is discussed in the Data Appendix.

16. Specifically, we estimated probits and included predicted values of the endogenous variables from linear probability models. This procedure produces consistent estimates although since it is a two-step method it is not efficient (Newey, 1985).

17. Because of the young age of our sample we felt that it was inappropriate to use the highest grade completed by the mother as the measure of educational attainment: The mother's highest grade might be determined simultaneously with her fertility decisions. Currie and Fallick (1990) find that a similar indicator for whether a teenager was "on time" in his or her education at age 14 is a significant determinant of whether he or she will later drop out of secondary school.

18. This variable was constructed keeping in mind changes in federal law, state AFDC income cutoffs, whether the state had a law allowing pregnant women without other eligible children to collect AFDC, and whether the state had a medically needy program which covered pregnant women. See the data appendix for details.

19. Approximately 18% of the children had mothers who changed states between age 14 and the birth year.

20. Rosenzweig and Schultz (1982, 1983, 1988) also found that residents of SMSAs had both lighter children and shorter delays. Rosenzweig and Schultz based their estimates on the National Natality Surveys, which are representative samples of U.S. legitimate births.

21. The identification in our model is similar to that in Rosenzweig and Schultz (1982, 1983, 1988). They use two-stage least squares to estimate birth weight production functions in which delay in obtaining prenatal care, birth order, mother's age at the birth, and smoking are endogenous variables. As instruments they use mother's education, father's education, husband's income, and state-level data about the availability of prenatal care, cigarette and milk prices, unemployment and the sectoral composition of employment. Since so many of the mothers in our sample are unmarried, it is not practical to use the father's education and income.

22. The size and significance of these effects are sensitive to the specification of the model. Rosenzweig and Wolpin include all three inputs in their models. In any given specification there is at least one of the three variables which is not statistically significant. The large effect that we find for delay in obtaining prenatal care is considerably attenuated if we also include smoking and drinking in the model.

23. Miller (1991) shows that birth intervals of less than two years are associated with lower birth weights largely because of an increased risk of prematurity.

24. If we estimate the same models using OLS, we find that becoming a smoker has a negative effect on the change in birth weight which is significant at the 90% level of confidence. However, becoming a drinker is estimated to have a positive effect on birth weight which is also significant at the 90% level.

25. Geronimus and Korenman (1990) provide a survey of the controversy surrounding the effects of mother's age at the birth. They use the same data and a similar method and conclude that mother's age at the birth has no effect on an array of socio-economic indicators. Our Table 5 result that differences in sisters' age when they give birth have no statistically significant effect on differences in birth weight complements their findings.

26. We also estimated these models using probits. See footnote 15.

27. We thank Joseph Hotz for drawing this issue to our attention.

28. The vast majority of abortions are obtained by unmarried women (82% according to Henshaw, *et al.* (1991)). Hence the probability of having an out-of-wedlock birth is likely to be inversely related to the probability of having an abortion. The Grossman and Joyce finding that Medicaid coverage reduces the probability of aborting is remarkable because in their sample Medicaid covered abortions.

29. See Mott(1985) and Lundberg and Plotnick (1990). In a nationally representative sample, one would expect about 30 percent of pregnancies (excluding pregnancy losses) to end in an abortion and the abortion ratio would be higher for Blacks than for Whites: The number of abortions per 100 births plus abortions was 25 for Whites and 39 for Blacks in 1987 (Henshaw *et al.*, 1991). In the NLSCM, only about 11% of reported pregnancies end in an abortion and there is little difference between the reported Black and White abortion ratios. Since birth rates and pregnancy losses appear to be accurately reported, abortions must be under-reported.

30. The best data about the availability of abortion services is provided by the Alan Guttmacher Institute in New York City. The AGI periodically surveys all known abortion providers and publishes state-level information about abortion rates per 1000 women, abortion ratios per 100 pregnancies, percent of women obtaining abortions out of state, and percent of out-of-state women obtaining abortions in a state.

31. Similar results were obtained using probits.

Table 1
Means of Key Variables

	Hispanic	Black	Other	All
		A: Welfare Participation		
AFDC	.161	.273	.114	.169
Food Stamp Program	.244	.322	.174	.230
Housing assistance	.121	.254	.085	.140
More than one program	.323	.500	.245	.334
		B: Living Arrangements		
Married or Partner Present in the Birth Year	.718	.356	.820	.667
Extended Family in the Birth Year	.316	.493	.178	.295
In Poverty in the Birth Year	.466	.651	.291	.421
		C: Birth Weight and Birth Weight Inputs		
Birth Weight in ounces	116.594 (21.544)	111.255 (21.528)	118.149 (21.076)	115.865 (21.502)[1]
Birth Weight less than 6 lbs.	.111	.163	.107	.124
Delayed obtaining prenatal care more than 3 months	.258	.230	.184	.211
Mother smoked cigarettes 12 months prior to birth	.201	.307	.452	.362
Mother drank alcohol 12 months prior to birth	.307	.334	.521	.427
Number of observations	946	1421	2567	4934

Notes:

[1] Standard error of the mean in parentheses.

Table 2
Reduced Form for Birth weight and First Stage Regressions for Welfare Participation and Other Endogenous Variables

Dependent Variable	Birth Weight	AFDC Status	Poverty Status	Delay	Smoker	Drinker	Spouse	Extended Family
Personal Characteristics								
Black	-3.915	.165	.268	.041	-.161	-.102	-.404	.237
	(1.056)[1]	(.018)	(.022)	(.020)	(.024)	(.024)	(.020)	(.020)
Hispanic	1.799	-.014	.031	.086	-.224	-.138	-.052	.055
	(1.376)	(.023)	(.028)	(.026)	(.031)	(.031)	(.026)	(.027)
Male	3.336	.011	.016	.001	-.004	.000	.001	.012
	(.732)	(.012)	(.015)	(.014)	(.016)	(.017)	(.014)	(.014)
Mother's height	1.020	.001	.002	-.000	.006	.002	-.003	.002
	(.140)	(.002)	(.003)	(.003)	(.003)	(.003)	(.003)	(.003)
"Ontime" in school, 1979	1.413	-.064	-.166	-.036	-.055	.027	.099	-.074
	(.900)	(.015)	(.018)	(.017)	(.020)	(.021)	(.017)	(.017)
Urban Resident at age 14	-1.891	.011	.006	-.042	.041	.026	-.006	.010
	(.940)	(.016)	(.019)	(.018)	(.021)	(.021)	(.018)	(.018)
Poverty sample	-3.515	.033	.066	-.019	.026	.009	-.036	.048
	(.881)	(.015)	(.018)	(.017)	(.020)	(.020)	(.017)	(.017)
Grandmother's highest grade	.113	-.009	-.016	-.004	-.007	.015	.001	-.001
	(.147)	(.002)	(.003)	(.003)	(.003)	(.003)	(.003)	(.003)
# Mother's siblings	-.146	.003	.002	.003	.000	-.004	-.003	-.007
	(.148)	(.002)	(.003)	(.003)	(.003)	(.003)	(.003)	(.003)
Grandmother worked, 1978	-.158	-.024	-.038	.002	-.011	.022	.003	-.020
	(.938)	(.016)	(.019)	(.018)	(.021)	(.021)	(.018)	(.018)
Adult male in household worked, mother age 14	.682	-.068	-.093	-.029	-.032	.042	.096	-.051
	(.847)	(.014)	(.017)	(.016)	(.019)	(.019)	(.016)	(.016)
Adult female in household worked, mother age 14	-.777	-.017	-.009	.004	.047	.029	.036	-.003
	(.917)	(.015)	(.019)	(.017)	(.020)	(.021)	(.018)	(.018)

(Table 2 continued)

State Characteristics

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Maximum[2] AFDC grant, family of 4	.015	-.068	-.097	.128	-.011	-.093	.051	-.035
	(2.978)	(.050)	(.061)	(.056)	(.066)	(.068)	(.057)	(.058)
AFDC need[2] standard family of 4	-.460	-.001	-.008	-.014	.017	.013	-.004	.001
	(.549)	(.009)	(.011)	(.010)	(.012)	(.013)	(.010)	(.011)
Average AFDC[2] payment	.193	-.004	-.002	-.020	.008	.011	.003	.013
	(.639)	(.011)	(.013)	(.012)	(.014)	(.015)	(.012)	(.012)
Number AFDC[2] recipients	-19.609	.169	-.491	.080	-.353	-.142	.340	.357
	(16.008)	(.267)	(.327)	(.303)	(.356)	(.365)	(.306)	(.310)
Average[2] Food Stamp payments	-1.634	.021	-.015	.034	-.058	-.097	-.017	.062
	(1.837)	(.031)	(.038)	(.035)	(.041)	(.042)	(.035)	(.036)
Number[2] Food Stamp recipients	-.441	-.019	.061	.093	.019	-.094	-.072	.049
	(5.452)	(.091)	(.111)	(.103)	(.121)	(.124)	(.104)	(.105)
Medicaid[2] income cutoff (% of poverty line)	1.163	.092	-.001	-.148	.025	-.003	.109	-.110
	(3.134)	(.052)	(.064)	(.059)	(.070)	(.072)	(.060)	(.061)
Average[2] Medicaid payments	-3.159	.002	.001	.007	-.004	-.002	.001	-.004
	(2.980)	(.005)	(.006)	(.006)	(.007)	(.007)	(.006)	(.006)
Number[2] Medicaid recipients	11.954	.128	.023	-.126	.070	.062	-.080	-.239
	(6.752)	(.113)	(.138)	(.128)	(.150)	(.154)	(.129)	(.131)
% of births[2] to unmarried women	.749	-.001	.008	.049	.004	.018	.009	-.019
	(.679)	(.011)	(.014)	(1.286)	(.015)	(.015)	(.013)	(.013)
CPI--all items[2]	13.922	.022	-.133	-.104	.183	.181	.007	-.035
	(11.732)	(.196)	(.240)	(.222)	(.261)	(.268)	(.224)	(.227)
CPI--food[2]	-16.313	.544	.206	.456	.583	-.387	-.840	.382
	(17.643)	(.295)	(.360)	(.334)	(.393)	(.403)	(.337)	(.341)
Physicians	.172	.001	-.005	-.003	.002	.002	.002	.056
	(.119)	(.002)	(.003)	(.002)	(.003)	(.003)	(.002)	(.230)
Outpatient visits	-1.796	.063	.003	.208	.107	-.028	.020	.072
	(4.622)	(.077)	(.094)	(.088)	(.103)	(.105)	(.088)	(.089)

(Table 2 continued)

Hospital beds	-.298	-.026	-.015	.001	-.007	.005	.007	.002
	(1.055)	(.018)	(.022)	(.020)	(.024)	(.024)	(.020)	(.020)
Infant mortality rate	.820	.008	.008	-.011	-.006	-.006	-.016	.013
	(.755)	(.013)	(.015)	(.014)	(.017)	(.017)	(.014)	(.015)
% low birth weight	.106	-.014	.067	.052	-.039	-.027	-.137	.043
	(2.878)	(.048)	(.059)	(.054)	(.064)	(.066)	(.055)	(.056)
Intercept	16.052	-.499	1.734	-.568	-1.227	.928	2.129	-.798
	(48.157)	(.805)	(.983)	(.912)	(1.073)	(1.099)	(.920)	(.932)
State + year dummies	y	y	y	y	y	y	y	y
R-square	.079	.138	.263	.041	.090	.101	.258	.148
Degrees of freedom	3271	3271	3271	3271	3271	3271	3271	3271

Notes:

1 Standard Errors in parentheses.

2 Coefficients and standard errors multiplied by 100.

Table 3

Two Stage Least Squares Regressions of Birth Weight (in ounces) on AFDC status

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Includes:[1]		Poverty Status	Delay	Smoker	Drinker	Spouse	Extended Family
AFDC status	-8.820 (5.579)[2]	1.963 (9.759)	-3.314 (6.404)	-5.333 (6.343)	-3.126 (9.409)	-4.446 (8.512)	-5.378 (6.589)
see column heading	----	-7.433 (5.549)	-19.958 (9.686)	-9.152 (8.316)	6.863 (9.100)	4.921 (7.312)	-7.954 (8.200)
Black	-2.750 (1.491)	-2.550 (1.482)	-2.763 (1.555)	-4.717 (2.313)	-3.017 (1.542)	-1.457 (2.426)	-1.465 (1.989)
Hispanic	1.324 (1.320)	1.884 (1.370)	3.241 (1.662)	-.557 (2.147)	2.518 (2.067)	1.563 (1.358)	1.771 (1.392)
Male	3.399 (.737)	3.436 (.729)	3.387 (.768)	3.326 (.728)	3.340 (.745)	3.372 (.733)	3.479 (.738)
Mother's height	1.028 (.140)	1.030 (.138)	1.015 (.146)	1.080 (.146)	1.008 (.143)	1.041 (.140)	1.043 (.140)
Urban resident, at age 14	-1.675 (.936)	-1.805 (.931)	-2.604 (1.076)	-1.349 (.969)	-1.967 (1.019)	-1.663 (.931)	-1.606 (.935)
Poverty sample	-3.311 (.915)	-3.156 (.912)	-3.820 (.986)	-3.176 (.909)	-3.542 (.971)	-3.275 (.911)	-3.060 (.946)
Intercept	55.084 (9.477)	53.533 (9.444)	58.605 (10.033)	55.075 (9.335)	50.479 (11.325)	49.065 (12.987)	53.483 (9.574)
State + year dummies	y	y	y	y	y	y	y
R-squared	.073	.075	.068	.075	.072	.074	.074
Degrees of freedom	3294	3293	3293	3293	3293	3293	3293
Chi-squared test[3]	7.999	6.999	5.000	5.999	8.666	7.999	8.333

(Table 3 continued)

Notes:

[1] Endogenous variables included in models 2 through 5 are: poverty status in the birth year, an indicator equal to one if the woman delayed obtaining prenatal care more than three months, whether the woman smoked or drank in the twelve months prior to the birth, whether there was a spouse or partner present in the birth year, and whether the woman lived with other adults besides the spouse or partner in the birth year. All regressions also include dummies for the year of birth and the state of residence at age 14.

[2] Standard errors in parentheses.

[3] Chi-squared test of the over-identifying restrictions. The degrees of freedom for the test in column 1 are 22. All the other columns have degrees of freedom equal to 21. The critical values for the 95% level of confidence are 33.924 and 32.671, respectively.

Table 4
Differences in Birth Weight Betweeen Children of the Same Mother[1] and Changes in AFDC Status
Two-Stage Least Squares

Includes[2] Changes in:	(1) --	(2) Poverty	(3) Delay	(4) Smoking	(5) Drinking	(6) Spouse	(7) Extended Family	(8) Birth Order	(9) Birth Interval
Changes in:									
AFDC	-4.937	-7.751	-4.928	-5.484	-5.127	-7.218	-3.487	-5.161	-4.488
	(5.634)[3]	(6.053)	(5.659)	(5.903)	(5.845)	(5.905)	(5.838)	(5.674)	(5.643)
see column heading	---	8.681	-.090	2.444	.664	-8.756	7.564	-1.844	-.110
		(4.978)	(5.215)	(7.491)	(5.433)	(5.853)	(5.025)	(4.173)	(.073)
Sex	3.357	3.424	3.356	3.433	3.371	3.466	3.418	3.310	3.176
	(.889)	(.921)	(.896)	(.922)	(.896)	(.903)	(.909)	(.898)	(.897)
Intercept	2.622	3.823	2.624	2.661	2.624	3.822	3.419	3.806	-.879
	(.712)	(1.009)	(.717)	(.726)	(.712)	(1.079)	(.900)	(2.772)	(2.416)
R-square	.015	.017	.015	.015	.015	.017	.016	.015	.017
Degrees of freedom	970	969	969	969	969	969	969	969	969
Chi-square test[4]	54.691	48.048	54.691	54.145	54.691	51.051	50.323	54.145	52.325

1. Children of the same mother were sorted by birth order and then first-differenced. Hence the difference is between the younger and the older child.

2. Endogenous variables included in columns 2 through 7 are the same as those in Table 2 with the additions of a dummy variable equal to one if the difference was between the second and the first child and zero otherwise, and of the number of months between the births.

3. Standard errors in parentheses.

4. Chi-squared tests of the overidentifying restrictions. The degrees of freedom of the test in column 1 are 62. The degrees of freedom are 61 in the other columns. The critical value for a Chi-squared statistic with 60 degrees of freedom is 79.082 at the 95% level of confidence.

Table 5
Differences in Birth Weight Betweeen Children of Sisters[1]
and Changes in AFDC Status
Two-Stage Least Squares

Includes Differences in:[2]	(1) --	(2) Poverty Status	(3) Delay	(4) Smoking	(5) Drinking	(6) Spouse	(7) Extended Family	(8) Mother's Age
Differences in:								
AFDC status	-14.516 (10.019)[3]	-15.039 (10.383)	-15.318 (10.381)	-15.079 (10.225)	-12.373 (10.520)	-18.000 (10.523)	-10.533 (10.360)	-14.889 (10.081)
see column heading	---	1.552 (7.692)	2.489 (7.726)	3.259 (8.889)	-17.646 (7.789)	-9.724 (7.510)	-16.288 (7.498)	.844 (1.255)
Sex	2.315 (3.232)	2.466 (3.329)	2.310 (3.252)	2.527 (3.312)	3.167 (3.401)	2.681 (3.294)	.947 (3.349)	1.864 (3.316)
Intercept	3.177 (3.048)	3.099 (3.083)	3.268 (3.080)	3.094 (3.084)	3.279 (3.188)	3.147 (3.096)	2.833 (3.106)	4.369 (3.539)
R-square	.014	.014	.015	.015	.041	.023	.039	.016
Degrees of freedom	177	176	176	176	176	176	176	176
Chi-square test[4]	34.977	34.951	34.728	34.505	28.375	32.881	30.523	31.309

1. In cases where there was a difference in AFDC status, the difference was taken between the child of the sister who participated and the one who did not.

2. Endogenous variables included in columns 2 through 8 are the same as those in Table 4 except that there is no control for birth order, and birth interval has been replaced with a measure of the difference in the mother's ages.

3. Standard errors in parentheses.

4. Chi-squared tests of the overidentifying restrictions. The degrees of freedom of the test in column 1 are 47. The degrees of freedom are 46 in the other columns. The critical value for a Chi-square with 60 degrees of freedom is 71.420 at the 95% level of confidence.

Table 6
Birth weight Inputs and AFDC Status

	Delay		Smoking		Drinking	
	(1)	(2)	(3)	(4)	(5)	(6)
AFDC	.119 (.125)[1]	-.222 (.207)	.146 (.146)	.027 (.235)	-.898 (.183)	-.528 (.279)
Poverty status	--	.326 (.154)	--	.113 (.175)	--	-.353 (.208)
Black	.023 (.030)	-.007 (.034)	-.182 (.035)	-.192 (.039)	.051 (.044)	.085 (.046)
Hispanic	.092 (.024)	.067 (.028)	-.206 (.028)	-.215 (.032)	-.179 (.036)	-.152 (.038)
Male	-.002 (.014)	-.006 (.014)	-.001 (.016)	-.002 (.016)	.003 (.020)	.007 (.019)
Mother's height	-.001 (.003)	.001 (.003)	.006 (.003)	.006 (.003)	.002 (.004)	.002 (.004)
"Ontime" in school, 1979	-.033 (.020)	.002 (.027)	-.046 (.023)	-.033 (.030)	-.024 (.029)	-.063 (.036)
Urban resident at age 14	-.046 (.017)	-.043 (.018)	.044 (.020)	.045 (.020)	.040 (.026)	.037 (.024)
Poverty sample	-.016 (.017)	-.028 (.019)	.028 (.020)	.024 (.021)	.039 (.025)	.053 (.025)
Outpatient visits per 1000 residents	.139 (.069)	.157 (.071)	.042 (.080)	.048 (.081)	.073 (.100)	.054 (.096)
Intercept	.077 (.198)	.072 (.204)	.042 (.231)	.040 (.231)	.678 (.290)	.683 (.275)
year + state dummies	y	y	y	y	y	y
R-square	.032	.031	.085	.085	.065	.073
Degrees of freedom	3387	3386	3387	3386	3387	3386
Chi-squared test[2]	10.989	6.525	11.332	10.302	6.181	4.808

(Table 6 continued)

Notes:

1 Standard errors in parentheses.

2 Chi-squared test of the overidentifying restrictions. The test in columns (1), (3), and (5) have 16 degrees of freedom. Those in columns (2), (4) and (6) have 15 degrees of freedom. The critical value for these tests are 26.296 and 24.996 respectively, at the 95% level of confidence.

Table 7
Pregnancy Resolutions and Benefit Levels

	Pregnancy Losses		Abortion[1]	
	All events	After 1st child only	All events	After 1st child only
Black	-.036 (.011)[2]	-.107 (.023)	.022 (.013)	.076 (.022)
Hispanic	-.031 (.015)	-.105 (.028)	.052 (.016)	.084 (.027)
Mother's height	.002 (.0003)	.002 (.0001)	.002 (.001)	.004 (.003)
"Ontime" in school, 1979	.005 (.010)	.025 (.019)	-.008 (.011)	-.006 (.018)
Urban Resident at age 14	.006 (.011)	.016 (.022)	.017 (.012)	.005 (.021)
Poverty sample	.002 (.010)	.027 (.019)	-.023 (.011)	-.034 (.018)
Physicians	.001 (.001)	.003 (.003)	-.002 (.001)	-.005 (.003)
Outpatient visits	-.037 (.050)	-.136 (.097)	-.012 (.056)	-.034 (.094)
Hospital beds	.004 (.008)	.017 (.015)	-.003 (.009)	-.008 (.015)
Infant mortality rate	.003 (.008)	.020 (.016)	-.006 (.009)	-.008 (.016)
% low birth weight	.043 (.029)	-.034 (.059)	-.026 (.033)	.009 (.058)
Grandmother's highest grade	.000 (.002)	-.006 (.003)	.013 (.002)	.005 (.003)
# Mother's siblings	-.002 (.002)	-.003 (.003)	-.004 (.002)	-.006 (.003)
Grandmother worked, 1978	.011 (.010)	.001 (.020)	.008 (.011)	-.004 (.019)
Adult male in household worked, mother age 14	-.005 (.009)	.015 (.018)	-.003 (.010)	-.019 (.017)

(Table 7 continued)

Adult female in household worked, mother age 14	-.017 (.010)	.011 (.019)	.016 (.011)	.047 (.019)
Maximum AFDC grant, family of 4[3]	-.025 (.030)	-.116 (.059)	.002 (.033)	-.023 (.057)
AFDC need standard family of 4[3]	.011 (.006)	.015 (.012)	-.008 (.007)	.008 (.012)
Average AFDC payment[3]	.009 (.007)	.027 (.013)	-.010 (.007)	-.002 (.013)
Number AFDC recipients[3]	.080 (.163)	.164 (.344)	.505 (.180)	-.005 (.003)
Average Food Stamp payments[3]	.005 (.020)	-.035 (.042)	.026 (.022)	-.008 (.042)
Number Food Stamp recipients[3]	-.014 (.053)	-.080 (.115)	-.134 (.058)	-.065 (.114)
Medicaid income cutoff (% of poverty line)[3]	.037 (.034)	-.095 (.165)	-.020 (.038)	.013 (.065)
Average Medicaid payments[3]	.001 (.003)	.102 (2.005)	.000 (.003)	.006 (.006)
Number Medicaid recipients[3]	-.011 (.072)	-.095 (.165)	.002 (.080)	-.066 (.162)
% of births to unmarried women[3]	-.008 (.007)	-.025 (.015)	-.002 (.008)	.003 (.016)
CPI--all items[3]	-.196 (.129)	.317 (.241)	.188 (.143)	.588 (.223)
CPI--food[3]	.060 (.183)	.257 (.340)	.162 (.204)	-.492 (.325)
Intercept	-.229 (.495)	.591 (1.000)	-.333 (.550)	.512 (.989)

(Table 7 continued)

State + year dummies	y	y	y	y
R-square	.020	.083	.086	.312
Degrees of freedom	6109	2277	5415	1851

Notes:

1 Losses excluded from this sample.

2 Standard errors in parentheses.

3 Coefficients and standard errors multiplied by 100.

Table 8
Abortions and AFDC Status
Pregnancies After a First Birth Only[1]

Includes:[2]	(1) --	(2) Poverty status	(3) Spouse	(4) Extended family	(5) Mother's Age
AFDC status	.172 (.162)[3]	.191 (.218)	.024 (.225)	.043 (.163)	.235 (.290)
see column heading	--	-.029 (.225)	-.149 (.166)	.285 (.183)	.010 (.037)
Black	.044 (.046)	.048 (.053)	.021 (.050)	.013 (.044)	.035 (.059)
Hispanic	.075 (.030)	.077 (.035)	.069 (.029)	.043 (.033)	.073 (.032)
Mother's height	.004 (.003)	.004 (.003)	.004 (.003)	.004 (.003)	.004 (.003)
"Ontime" in school, 1979	.016 (.027)	.011 (.044)	.014 (.026)	.019 (.024)	.013 (.029)
Urban resident at age 14	-.006 (.025)	-.005 (.025)	-.002 (.024)	-.001 (.022)	-.009 (.027)
Poverty sample	-.025 (.021)	-.023 (.024)	-.024 (.019)	-.025 (.018)	-.027 (.022)
Grandmother's highest grade	.007 (.004)	.007 (.004)	.004 (.005)	.006 (.003)	.007 (.004)
# Mother's siblings	-.005 (.003)	-.004 (.004)	-.005 (.003)	-.003 (.003)	-.005 (.004)
Adult Female in Household worked, mother aged 14	.057 (.019)	.053 (.020)	.045 (.020)	.036 (.020)	.058 (.027)
Physicians	-.002 (.002)	-.002 (.002)	-.022 (.002)	-.002 (.002)	-.003 (.002)
Intercept	.032 (.411)	.050 (.437)	.238 (.451)	-.055 (.362)	18.191 (68.861)
State + year dummies	y	y	y	y	y

(Table 8 continued)

R-squared	.296	.293	.319	.357	.288
Degrees of freedom	1620	1619	1619	1619	1619
Chi-squared test[4]	2.505	2.505	3.173	2.839	2.338

Notes:

[1] Pregnancy losses are excluded from this sample.

[2] Endogenous variables included in columns (2)-(5) are: poverty status in the birth year, whether there was a spouse or partner present in the birth year, whether the woman lived with other adults besides a spouse or partner in the birth year, and the mother's age at the birth.

[3] Standard errors in parentheses.

[4] Chi-squared tests of the over identifying restrictions. The test in column one has 13 degrees of freedom. The others have 12. The critical values at the 95% level of confidence are 22.362 and 21.026 respectively.

Appendix Table 1
Mean Differences in Birth Weight[1]

	Children of the Same Mother				Sister's Children	
	Exit	No Change 0	Change 1	Enter	Change	No Change
AFDC	-1.220	2.040	-2.301	1.042	-1.635	.465
	(2.314)[2]	(.570)	(1.568)	(1.351)	(4.367)	(1.639)
	[82][3]	[1310]	[219]	[236]	[63]	[258]
Food Stamp Program	1.383	1.480	-.977	2.369	-4.884	.238
	(2.182)	(.620)	(1.235)	(1.175)	(3.434)	(1.724)
	[115]	[1117]	[302]	[314]	[69]	[252]
Housing assistance	3.136	1.030	-1.168	5.102	1.509	-2.287
	(2.077)	(.555)	(1.520)	(1.692)	(3.217)	(1.711)
	[103]	[1455]	[173]	[147]	[55]	[282]
Spouse or partner	-1.759	-.614	1.750	3.151	1.360	1.050
	(2.904)	(1.114)	(.616)	(1.186)	(2.579)	(1.939)
	[79]	[407]	[1053]	[304]	[111]	[218]
Extended family	3.326	1.532	-.673	-3.438	-7.153	-.031
	(1.056)	(.607)	(1.425)	(2.108)	(2.506)	(1.894)
	[387]	[1096]	[275]	[121]	[111]	[226]
Poverty status	4.175	2.183	-.220	-.832	-.356	3.268
	(1.257)	(.808)	(1.070)	(2.225)	(3.347)	(2.596)
	[240]	[553]	[400]	[101]	[73]	[138]
Delayed prenatal care	3.313	1.782	.500	-.173	-.869	-3.245
	(1.384)	(.653)	(1.780)	(1.390)	(2.774)	(2.001)
	[233]	[1005]	[134]	[231]	[99]	[204]
Smoked	3.017	2.121	.830	.181	-7.048	-2.028
	(2.200)	(.658)	(2.166)	(.873)	(3.039)	(1.805)
	[117]	[1019]	[112]	[514]	[83]	[246]
Drank	.573	2.191	.033	2.883	-4.008	-4.258
	(1.410)	(.729)	(.936)	(1.420)	(2.428)	(1.977)
	[211]	[834]	[475]	[247]	[120]	[209]

Notes:

[1] For children of the same mother, differences are taken between a younger child and the next oldest. 63% of differences are between second and first born, and 26% are between third and second born. If no change was equal to zero (one) then the mother was not (was) a participant in AFDC, for example, for both births. Sister's children are of the same birth order. In cases where there was a difference in participation, the difference is taken between the child of the participant and the child of the non-participant.

[2] Standard errors in parentheses.

[3] Number of observations in the cell.

Appendix Table 2
Reduced Form for Changes in Birth Weight and First Stage Regressions for Changes in Endogenous Variables: Children of the Same Mother

	(1) Birth Weight	(2) AFDC	(3) Poverty	(4) Delay	(5) Smoking	(6) Drinking	(7) Spouse	(8) Extended Family	(9) Birth Interval
Black	-2.736	.075	.013	-.022	-.010	.028	.069	-.038	-.492
	(1.911)	(.038)	(.050)	(.054)	(.036)	(.050)	(.040)	(.048)	(1.526)
Hispanic	1.844	.001	-.054	-.067	-.006	.025	.042	.062	-3.727
	(2.386)	(.047)	(.063)	(.067)	(.046)	(.063)	(.050)	(.060)	(1.906)
Younger is Male	-2.572	.023	.031	.024	-.013	-.064	-.060	-.021	-1.275
	(1.753)	(.034)	(.046)	(.050)	(.033)	(.046)	(.037)	(.044)	(1.340)
Mother's height	-.239	.001	.009	.001	.001	-.001	-.007	.002	.040
	(.236)	(.005)	(.006)	(.007)	(.004)	(.006)	(.005)	(.006)	(.188)
"Ontime" in school, 1979	.440	.011	-.061	-.034	.023	-.028	-.067	.074	-3.509
	(1.563)	(.031)	(.041)	(.044)	(.030)	(.041)	(.033)	(.039)	(1.248)
Urban resident at age 14	.158	.007	.094	.046	-.013	.037	-.019	-.032	1.329
	(1.548)	(.030)	(.041)	(.044)	(.030)	(.041)	(.033)	(.039)	1.236
Poverty sample	1.188	.048	.024	.059	.027	.031	-.028	-.049	-.683
	(1.540)	(.030)	(.040)	(.043)	(.029)	(.041)	(.033)	(.039)	(1.230)
Grandmother's highest grade	.022	-.001	.001	-.004	-.001	.005	-.000	-.002	.228
	(.238)	(.005)	(.006)	(.007)	(.005)	(.006)	(.005)	(.006)	(.190)
# Mother's siblings	-.145	.001	.001	-.007	.000	-.001	-.001	-.003	-.077
	(.242)	(.005)	(.006)	(.007)	(.005)	(.006)	(.005)	(.006)	(.193)
Grandmother worked, 1978	.324	.009	.033	.006	-.011	.017	.017	.009	.710
	(1.574)	(.031)	(.041)	(.044)	(.030)	(.041)	(.033)	(.039)	(1.257)
Adult male in household worked, mother age 14	1.113	-.081	-.027	.052	-.022	-.057	.048	.037	-3.596
	(1.475)	(.029)	(.039)	(.042)	(.028)	(.039)	(.031)	(.037)	(1.178)

(Appendix Table 2, continued)

Adult female in household worked, mother aged 14	-1.502 (1.582)	-.045 (.031)	-.036 (.041)	-.003 (.045)	.009 (.030)	.011 (.042)	-.039 (.033)	.030 (.040)	-.371 (1.263)
Difference in sex (younger-older)	4.000 (1.264)	.014 (.025)	-.022 (.033)	-.023 (.036)	-.027 (.024)	.023 (.033)	.038 (.027)	-.006 (.032)	.126 (1.010)
Intercept	19.436 (15.757)	-.032 (.310)	-.733 (.413)	-.038 (.445)	-.088 (.301)	-.029 (.415)	.618 (.333)	-.289 (.394)	-40.052 (12.583)
year + state dummies	y	y	y	y	y	y	y	y	y
R-squared	.075	.085	.070	.050	.059	.056	.074	.071	.252
Degrees of freedom	909	909	909	909	909	909	909	909	909

Appendix Table 3
Reduced Form for Differences in Birth Weight
and First Stage Regressions for Differences in
Endogenous Variables: Sister's Children

	(1) Birth Weight	(2) AFDC	(3) Poverty	(4) Delay	(5) Smoking	(6) Drinking	(7) Spouse	(8) Extended Family	(9) Birth Interval
Black	-5.201	.202	.161	-.111	-.236	.179	-.046	-.100	-.526
	(8.392)	(.105)	(.161)	(.169)	(.155)	(.172)	(.168)	(.151)	(.708)
Hispanic	-5.345	.072	.078	-.006	-.152	-.084	.021	-.143	-.483
	(9.135)	(.115)	(.175)	(.184)	(.169)	(.187)	(.183)	(.165)	(.770)
Urban Resident at age 14	-8.057	.004	-.084	.016	.114	-.077	.119	.118	.466
	(8.171)	(.103)	(.157)	(.165)	(.151)	(.167)	(.163)	(.147)	(.689)
Poverty sample	2.991	.051	-.073	.009	.126	-.031	-.131	.065	-.089
	(6.302)	(.079)	(.121)	(.127)	(.116)	(.129)	(.126)	(.114)	(.531)
Grandmother's highest grade	2.239	-.006	.011	-.028	-.002	-.004	.022	-.005	.090
	(.993)	(.012)	(.019)	(.020)	(.018)	(.020)	(.020)	(.018)	(.084)
# Mother's siblings	.486	.014	.023	.018	.007	-.000	.008	.017	.013
	(1.059)	(.013)	(.020)	(.021)	(.020)	(.022)	(.021)	(.019)	(.089)
Grandmother worked, 1978	16.714	.171	.144	.107	.113	.010	.017	-.216	1.262
	(6.943)	(.087)	(.133)	(.140)	(.128)	(.142)	(.139)	(.125)	(.586)
Adult male in household worked, mother age 14	-4.493	-.023	.242	.137	.013	.028	-.084	.038	-1.189
	(5.913)	(.074)	(.113)	(.119)	(.109)	(.121)	(.118)	(.107)	(.497)
Adult female in household worked, mother aged 14	-4.657	-.150	-.363	-.092	-.045	.030	.299	.082	.030
	(6.693)	(.084)	(.128)	(.135)	(.123)	(.137)	(.134)	(.121)	(.564)
Difference in sex (younger-older)	2.926	.008	-.123	-.018	-.064	.015	.047	-.095	.386
	(3.708)	(.047)	(.071)	(.075)	(.068)	(.076)	(.074)	(.067)	(.313)

(Appendix Table 3 continued)

Intercept	-18.741 (20.334)	-.105 (.256)	-.387 (.390)	.645 (.410)	.068 (.375)	.150 (.416)	-.137 (.406)	-.125 (.367)	-2.677 (1.715)
year + state dummies	y	y	y	y	y	y	y	y	y
R-squared	.289	.340	.291	.264	.238	.260	.279	.327	.432
Degrees of freedom	129	129	129	129	129	129	129	129	129

Data Appendix

I: Overview of the Data.

The data for this paper are drawn from the National Longitudinal Survey of Youth Merged Child-Mother file (NLSCM) for 1990. Where necessary, additional variables were constructed using the data from the main National Survey of Youth (NLSY) files, and from various published sources. A description of all the variables used in our analysis and their sources is contained in Tables A1 and A2. Sample means and variances are shown in Table A3.

The NLSCM contains data for each child born to a woman in the original NLSY survey, as well as a selection of variables from the NLSY. The NLSY began in 1979 with a sample of youths between the ages of 14 and 21. Blacks, Hispanics and the poor were oversampled. Of the 6,283 women who began the survey in 1979, 3822 had given birth to 7346 children by 1988. Our sample of births excludes births to mothers in the military sub-sample, and births prior to 1979 and after 1987. The sample is limited to births after 1979 and before 1988 due to the corresponding availability of monthly AFDC and Food Stamp Program receipt data. Information about income, education, and pregnancy outcomes was drawn from the main NLSY files.

The state and SMSA (if applicable) of residence at age 14 were determined using the NLSY Geocode file. The Geocode file contains the FIPS codes for the state and county of residence. We determined the SMSA by merging the Geocode data with a list of SMSA's and their corresponding FIPS codes from the County and City Data Book. This information was used to merge data from public sources to the data extracted from the NLSCM and NLSY.

II: Construction of Variables.

1) AFDC/Food Stamp Program Participation During Pregnancy.

AFDC and Food Stamp Program participation is reported on a monthly basis in the NLSY survey. The earliest observation of a mother's AFDC (Food Stamp Program) receipt is in the first survey in 1979 when she was asked if she received AFDC (Food Stamp Program) income in the previous year. The last observation is from the 1988 NLSY interview which asked about AFDC income in 1987.

The 1986 Merged Child-Mother file contains the reported month and year of pregnancy for all births occurring prior to the 1986 interview. The 1988 file does not contain this data so we used the date of birth and gestation period to determine the date of pregnancy onset for births occurring after the 1986

interview.[1] We then determined whether AFDC (Food Stamp Program) benefits were received during the gestation period up until the month prior to the month of birth.

2) CPI

The CPIs are available for 28 selected SMSAs and for four regions of the U.S.[2] These data were merged with the NLSY data by SMSA or region of residence at age 14.

3) Education.

In order to determine whether mothers were "on time" in their educational attainment, we compared actual educational attainment in 1979 to expected attainment, given age. Expected attainment is based on the assumption that high school graduation occurs in the same calendar year as the 18th birthday (and therefore that age - highest grade attended = 6). The construction is straightforward for those women still in school in 1979. For those not in school and without a diploma, the relevant comparison is highest grade attended and age in the year they left school. For those who received a diploma before 1979, we determined whether they received their diploma by the calendar year of their 18th birthday.

A problem with our measure of expected attainment is that different school districts have different starting ages and so individuals with birthdays in September-December may be "left back" for either institutional or academic reasons. We therefore constructed a variable that takes on a value of one if the mother is within one year of being "on time", and zero otherwise.

4) Poverty Status and Unearned Income

The NLSY poverty status index is based on a "key variable" called net family income. For the years 1978 to 1985, this key variable is based on self-reported net family income. If the self-reported measure was missing, the NLSY constructed a measure by summing the components of net family income. For the years 1986 and 1987, the key variable is based on the sum of the income components. Unfortunately, the self-reported measure and the sum of the income components often differ, especially in the earlier years of the survey.[3]

We constructed our own poverty status index based on the sum of the reported components of income in all years. Our measure of net family income

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[1]In 116 cases we found inconsistent reporting with respect to the date of birth, date of pregnancy, and gestation period. In all of these cases we corrected the date of pregnancy onset to be consistent with the reported gestational age.

[2]Source: Statistical Abstract of the United States, (various years).

[3] In 1978, the self reported net income was less than the sum of the income components in 69.1% of the time. By 1985, the two measures agreed 85.8% of the time.

differs from the NLSY definition because in cases where an unmarried woman lived with a "partner" in the birth year we include the partner's income. The NLSY includes spouse's income, but not partner's income.

Unearned income is defined as the net family income less the earned income of the woman. Both our poverty status indicator and the unearned income variable refer to the year prior to the birth year. The reason is that in a given interview, the questions about whether there was a spouse or partner present refer to the birth year, and the income questions refer to the year prior to the interview.

5) Medicaid Income Cutoffs for Pregnant Women.

A summary of legislative changes affecting the Medicaid coverage of pregnant women is given in Table A4. The construction of the Medicaid income cutoff depends on the time period as follows:

From 1979 to 1981, the Medicaid income cutoff is defined as the AFDC breakeven level if the State allowed pregnant women without other eligible children to receive AFDC benefits. The AFDC program allowed states the option of extending eligibility to pregnant women who met the AFDC income requirements, regardless of family structure. Coverage varied across states with respect to the month of pregnancy at which eligibility began, however the program did not allow coverage before the third trimester.

AFDC income eligibility is determined using the state's "need standard". The need standard is defined as "the income the State decides is essential for basic consumption items". The State also determines the relationship between the need standard and the payment standard, the latter being the maximum benefit available to a family without countable income. The breakeven level of income is the level of income at which benefits are reduced to zero.

From 1982 to 1986, the Medicaid income cutoff was equal to the maximum of the AFDC breakeven level and the Medically Needy income level, conditional on the existence of a Medically Needy program and prior to 1984, conditional on state AFDC coverage of pregnant women without other eligible children.

The Medicaid program allows states the option of creating a Medically Needy program to extend Medicaid coverage to categories of individuals. "The general intent of the medically needy option is to accommodate individuals who meet all criteria for categorically needy assistance with the exception of income and who have incurred relatively large medical bills". Prior to Oct. 1981, pregnant women without other children were not "categorically needy" and therefore were not eligible for the Medically Needy program. OBRA-81 mandated that if a state offered medically needy coverage to any group, then it must offer prenatal and delivery coverage to women who meet the medically needy income criteria. The income eligibility standard for the program is determined at the state level, subject to a federal ceiling which is 133% of the AFDC payment standard. Mandatory Medicaid coverage of pregnant women who met the AFDC income requirements became effective in October 1984.

Starting in 1987, the cutoff is equal to the maximum of the AFDC breakeven level, the Medically Needy income level, and the OBRA-86 optional coverage level. After 1986, Medicaid coverage varied across states according to the presence of a Medically Needy program and whether states adopted optional coverage for women with incomes above the AFDC limit.

6) Pregnancy Losses/Abortions.

The NLSY records pregnancy outcomes as either a loss (a miscarriage or still birth), an abortion, or a live birth. The NLSY asks a number of questions regarding pregnancy outcomes:

i) How did the 1st (2nd,3rd,...) pregnancy before the 1st child (after the 1st,after the 2nd,...) end?

ii) Did you have 1st (2nd,3rd,...) pregnancy loss before the 1st (2nd,3rd,...) child?

iii) How many pregnancy losses between the 1st and 2nd (2nd & 3rd,...) child?

In addition, each woman is asked to provide the month and year of each abortion and the date of each pregnancy loss, along with the month of pregnancy in which the loss occurred. The questions regarding pregnancy losses were first asked in the 1982 interview year and were then asked in every subsequent year. The questions regarding abortions were asked in the 1984, 1986 and 1988 interviews. The NLSY supplemental fertility file contains a version of these data which provides "cleaned" counts of the total number of losses and abortions for each woman as of the 1984, 1986, and 1988 interview years.

The main problems with using these data are: 1) the under-reporting of pregnancies ending in abortions relative to what one would expect based on national data (see the discussion in the text), and 2) duplicate reporting of events. To alleviate the second problem, we discarded all pregnancy losses that occurred within two months of a reported abortion (335 losses were discarded). In addition we "hand-checked" the data in cases where the reported number of dates was inconsistent with the count of events from the Supplemental Fertility File. This check resulted in the reassignment of 90 losses to be abortions.

We assumed that AFDC (Food Stamp Program) benefits were received during the pregnancy if benefits were received in the six months prior to the abortion date or, in the case of a pregnancy loss, if benefits were received at any time during the gestational period.

III: Measurement Error

A: Birth Weight

Measurement error in the dependent variable may bias estimated coefficients if it is correlated with the independent variables. Figures 1 through 4 provide evidence that measurement error is correlated with race and education: The extent of "heaping" is greatest for minorities and for those with less than a high school education. Nevertheless, figure 5 shows that the overall distribution of birth weights is very similar to that for the U.S. population

as a whole taken from vital statistics data. In an earlier version of this paper, we identified birth weight outliers by examining the influence of each observation.[4] However, since deleting these outliers did not materially affect our results, they are included in this version of the paper.

Figure 6 compares the distribution of reported gestational ages in the NLSY to that of the U.S. population as a whole. The NLSY data has a sharp peak at 39 weeks which is much more pronounced than the peak in the vital statistics data. Thus, although in principal we are interested in the determinants of prematurity, we do not believe this question should be addressed using these data.

In the text, we discussed the decision to use birth weight rather than the percent low birth weight as the dependent variable. Figures 7 and 8 plot the percent low birth weight against the month that prenatal care began. The vital statistics data show that the percent low birth weight rose gradually with months of delay in prenatal care and then fell during the third trimester. (One should keep in mind that relatively few women delay until the third trimester and that no adjustments for individual heterogeneity can be made.) In contrast, the relationship between the percent low birth weight and delay in obtaining prenatal care in the NLSY has several sharp spikes. The percent low birth weight is particularly noisy among Black women who delayed more than five months.

It is interesting to note that the NLSY distribution of months of delay in obtaining prenatal care is reasonably similar to the vital statistics data, although NLSY Blacks are more likely to obtain early prenatal care than Blacks in the U.S. as a whole.

B: AFDC and Food Stamp Program Income Data.

The AFDC and Food Stamp Program data reported in the NLSY survey appear to be subject to considerable measurement error. The NLSY Merged Child-Mother file reports AFDC income on an annual basis. Of the 3822 mothers in the survey, 39.2% received AFDC income in at least one year during the period 1978-1986, and 50.9% received Food Stamp Program benefits in at least one year.[5] The data show a large degree of variance in the amounts received, both over mothers in any given year, and over years for a given mother. Looking across years, 11.1% (21.7%) of the mothers who received AFDC (Food Stamp Program) benefits in more than one year had a maximum benefit that exceeded their minimum benefit by at least a factor of ten. Looking across mothers, 7.2% (2.2%) of the mothers had receipts of AFDC (Food Stamp Program) income outside of two standard deviations

[4]We calculated the "influence" of each observation as the change in the predicted value for the observation due to deleting the observation from the sample. We then identified the observations at the top and bottom 1% of the distribution of the influence statistic as outliers. See Belsley, Kuh, and Welsch (1980).

[5]Given that a mother received AFDC or Food Stamp Program benefits, the average number of years of receipt was 3.5 years. The range was 1 to 9 years.

of the mean for all mothers (where the mean and standard deviation were calculated by year).

The variation in AFDC and Food Stamp Program income could be due to variation in the monthly receipt as well as variation in the number of months of receipt. The main NLSY file reports the following: 1) average monthly AFDC income in the survey year, 2) monthly Food Stamp Program income in the most recent month of the survey year, and 3) the months in which the income was received. The monthly data show less variability than the annual data; only 4% (6.7%) of mothers have a maximum monthly AFDC (Food Stamp Program) receipt that exceeds their minimum receipt by a factor of ten. However a more exact test of the accuracy of the data is a comparison to the maximum AFDC and Food Stamp Program benefit levels given the year, state of residence, and family size. We did this comparison for three years (1980, 1982, and 1985) and found that 12.8% of the reported AFDC receipts exceeded the maximum benefit level.[6]

[6]Maximum benefit levels are from the Committee on Ways and Means Report. The exact comparison was reported AFDC receipt to maximum benefit level plus ten dollars.

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Table A1. Definition and Source of Variables

Variable	Definition	NLSY Variable
I. Variables from the NLSY Merged Mother-Child File.		
Birth weight	Birth weight of child in ounces	D3286
Birth wgt <= 5.5 lbs	1 if birth weight of child was 5.5 lbs or less	D3287
Birth order	Birth order of child	D58
Male	1 if male child	D54
Prenatal delay	1 if prenatal care delayed beyond first trimester	D3201
Smoker	1 if mother smoked cigarettes in 12 mos. prior to birth	D3204
Drinker	1 if mother consumed alcohol in 12 mos. prior to birth	D3202
Mother's age	Mother's age at birth of child	D377
II. Variables from the main NLSY files.[1]		
Mother's height	Mother's height in 1985 (or most recent observation prior to 1985)	R4816,R7798, R17739
Mother's siblings	Number of siblings of mother as reported in 1979	R91
Grandmother's educ.	Highest grade of maternal grandmother, reported in 1979	R65
Adult female worked	1 if adult female in mother's household worked when mother was 14	R21
Adult male worked	1 if adult male in mother's household worked when mother was 14	R24
Grandmother worked	1 if maternal grandmother was employed in 1978	R68
Urban	1 if mother's place of residence at age 14 was urban	R18
Black	1 if race of mother is black	R96
Hispanic	1 if race of mother is Hispanic	R96
Poverty sample	1 if mother is in the supplemental poverty sample	R1736
III. NLSY source of constructed variables.		
AFDC status	1 if AFDC was received during pregnancy NLSY variables: Months in which AFDC income was received, 1978-87 Month and year pregnancy began Date of birth of child Gestation period	 R1596-1607,R3166-3177,R4871-4882, R7873-7884,R10292-10303,R14159-14170, R17837-17848,R21468-21479,R23555-23566, R27277-27288 C2070.10,C2070.11 D7505-D7507 D3280

Table A1. (cont.)

Variable	Definition	NLSY Variable
Food Stamp status	1 if Food Stamps were received during pregnancy	
	NLSY variables:	
	Months in which Food Stamps were received, 1978-87	R1610-1621,R3180-3191,R4885-4896, R7887-7898,R10306-10317,R14173-14184, R17851-17862,R21482-21493,R23569-23580, R27291-27302
Housing assistance	1 if mother lived in public housing or received rent subsidies in the year prior to birth, or the birth year	
	NLSY variables:	
	Receipt of public housing assistance, 1978-84	R1698,R3287,R4992,R7993,R10402,R14269
	Receipt of rent subsidies, 1978-87	R1699,R3288,R4993,R7994,R7994,R10403, R14270,R17908,R21539,R23625,R27354
"Ontime" in school, 1979	1 if mother's highest grade completed was within one grade of the expected grade, given her age (as of the 1979 interview)	
	NLSY variables:	
	Attending or enrolled in school, 1979	R156
	Grade attending if enrolled 1979	R157
	Year last enrolled if not enrolled, 1979	R170
	Highest grade attended, 1979	R172
	Received diploma or GED	R183
	Year received diploma or GED	R185
Spouse/partner present[2]	1 if spouse or partner was present in household in birth year	
	NLSY variables:	
	Spouse present in household, 1979-87	D900,D931,D962,D993,D1024, D1055,D1086,D1117,D1169
	Partner present in household, 1979-87	D902,D933,D964,D995,D1026, D1057,D1088,D119,D1171
Extended family[2]	1 if household record contained persons other than mother, spouse/partner, and mother's children in the birth year	
	NLSY variables:	
	Number of members in household, 1979-87	D906,D937,D968,D999,D1030, D1061,D1092,D1123,D1146

Table A1. (cont.)

Variable	Definition	NLSY Variable
Pregnancy losses	Number of pregnancy losses reported prior to birth of child	
Abortions	Number of abortions reported prior to birth of child	
	NLSY variables:	
	Outcome of pregnancies: before 1st child	R7567,R10664
	(1982,1983 interviews) after 1st child	R7588,R7594,R7600,R10685,R10691, R10697
	after 2nd child	R7609,R7615,R10706,R10712
	after 3rd child	R7634,R7630,R10721,R10727
	after 4th child	R7639,R10736,R10742
	Outcome of pregnancies since last interview:	
	1984 INT	R13194,R13211,R13228
	1985 INT	R16980,R16993,R17006
	1986 INT	R19972,R19988
Unearned income	Total family income - mother's earned income, in year before birth (or year before pregnancy loss/abortion)	
	NLSY variables:	
	Unearned income = mother's income from: UC bnfts + educ bnfts + AFDC + Food Stamp + Public Assist + income from other persons + income from other sources + SSI income + alimony + child support + veterans bnfts + regular income of other family members in household + welfare income of other family members in household	
	+ spouse's income from: farm and business income + wages and salary + UC Bnfts + educ bnfts	
	+ income from all sources for opposite sex adult in household	
	(See NLSY Appendix 2: Total Net Family Income Variable Creation 1979-1988 for the NLSY variable numbers that correspond to each item.)	
Poverty status	1 if total family income was below poverty level in year before birth (or year before pregnancy loss/abortion)	
	(See NLSY Appendix 2 for the poverty levels and the algorithm to compute family size.)	

[1] All of the variables in this section also appear in the Merged Child-Mother file, however our analysis of of pregnancy outcomes includes women who never had a live birth and therefore do not appear in the NLSCM.

[2] For women who do not appear in the Merged Child-Mother file, this variable was constructed by searching the household enumeration record.

Table A2. Demographic Variables

Variable	Source	Range across States-1985 Min	Median	Max
I. State-level variables.[1]				
Maximum AFDC grant for a family of four	House Ways & Means Report	144	400	800
AFDC need standard for a family of four	" " "	246	535	943
AFDC payments, average per recipient	Statistical Abstract of the U.S.	408.4	1217.5	2625.0
AFDC recipients, per 1000 residents	" " "	13.3	37.5	89.7
Food Stamp payments, average per recipient	Statistical Abstract of the U.S.	406.6	564.5	1041.7
Food Stamp recipients, per 1000 residents	" " "	26.1	71.2	187.5
Medicaid payments, average per recipient[2]	Statistical Abstract of the U.S.	819.9	1780.0	3385.5
Medicaid recipients, per 1000 residents	" " "	29.8	74.9	157.3
Medicaid income cutoff for pregnant women, as percent of poverty level (see text for construction)	House Ways & Means Report, Medicare & Medicaid Data Book, National Governors' Assoc	13.1	46.2	94.7
Physicians, per 100,000 residents	Statistical Abstract of the U.S.	119.0	178.0	573.0
Outpatient visits, annual per capita	" " "	0.8	1.2	3.2
Hospital beds, per 1000 residents	" " "	3.1	5.5	13.3
% of total births to unmarried women	Vital Statistics of the U.S.	8.7	19.7	56.7
Infant mortality rate, per 1000 live births	" " "	8.2	10.5	20.8
% of total births < 2500 grans	" " "	4.8	6.6	13.3
II. Consumer price indices.[3]				
CPI - all items (1977=100)	Statistical Abstract of the U.S.	161.3	176.5	205.1
CPI - food (1977=100)	" " "	152.6	159.3	172.9

[1] Variables in this section were merged with NLSY data by mothers' state of residence at age 14 (R16) and birth year of child (D7505), or year of pregnancy loss/abortion.

[2] Statistics for Medicaid exclude Arizona which did not have a Medicaid program.

[3] The CPIs are available for 28 selected SMSAs and for four regions of the U.S. These data were merged with the NLSY data by SMSA or region of residence at age 14.

Table A3. Means and Standard Deviations of NLSY Variables[1]

	Black (N=1421)	Hispanic (N=946)	Other (N=2567)	Full sample (N=4934)
Birth weight	111.2548	116.5941	118.1492	115.8654
	(21.5281)	(21.5439)	(21.0764)	(21.5019)
Birth order	1.8564	1.8319	1.6778	1.7588
	(0.9760)	(1.0143)	(0.8624)	(0.9303)
Birth interval	2.6075	2.5421	2.5612	2.5705
	(1.6514)	(1.4996)	(1.4183)	(1.5049)
Prenatal delay	0.2298	0.2578	0.1845	0.2113
	(0.4209)	(0.4377)	(0.3880)	(0.4083)
Abortions	0.1619	0.1681	0.1508	0.1573
	(0.4884)	(0.4979)	(0.4699)	(0.4807)
Pregnancy losses	0.1175	0.1649	0.1924	0.1656
	(0.3821)	(0.4740)	(0.5091)	(0.4700)
Mother's age, birth year	21.8360	22.3055	22.8383	22.4474
	(2.9893)	(3.0593)	(3.0834)	(3.0825)
Mother's height	64.1921	62.6279	64.3963	63.9984
	(2.8867)	(2.5723)	(2.5814)	(2.7543)
# Mother's siblings	5.1840	5.1421	3.7579	4.4326
	(3.1997)	(3.0839)	(2.3106)	(2.8350)
Grandmother's highest grade	10.3069	7.2305	11.0237	10.1069
	(2.6330)	(3.9312)	(2.4635)	(3.1764)
Dichotomous variables:				
Birth weight ≤ 5.5 lbs	0.1203	0.0867	0.0736	0.0896
	(0.3255)	(0.2815)	(0.2612)	(0.2856)
Male	0.5000	0.5359	0.5111	0.5127
	(0.5002)	(0.4990)	(0.5000)	(0.4999)
Firstborn	0.4455	0.4715	0.5146	0.4864
	(0.4972)	(0.4994)	(0.4999)	(0.4999)
AFDC received during preg.	0.2738	0.1607	0.1141	0.1690
	(0.4460)	(0.3674)	(0.3180)	(0.3748)
Food stamps received during pregnancy	0.3223	0.2442	0.1737	0.2300
	(0.4675)	(0.4298)	(0.3790)	(0.4209)
Housing assist.	0.2540	0.1205	0.0849	0.1405
	(0.4355)	(0.3257)	(0.2788)	(0.3475)
Poverty status, birth year	0.6514	0.4663	0.2910	0.4212
	(0.4768)	(0.4992)	(0.4543)	(0.4938)
Spouse/partner present	0.3558	0.7178	0.8204	0.6668
	(0.4789)	(0.4503)	(0.3839)	(0.4714)

Table A3. Means and Standard Deviations of NLSY Variables (cont.)

	Black	Hispanic	Other	Full sample
Extended family	0.4926 (0.5001)	0.3161 (0.4652)	0.1784 (0.3829)	0.2953 (0.4562)
"Ontime" in school, 1979	0.6897 (0.4628)	0.6279 (0.4836)	0.8009 (0.3994)	0.7357 (0.4410)
Urban resident at age 14	0.7834 (0.4120)	0.8887 (0.3147)	0.7449 (0.4360)	0.7836 (0.4119)
Poverty sample	0.7291 (0.4446)	0.7706 (0.4207)	0.3136 (0.4640)	0.5209 (0.4996)
Grandmother worked, 1978	0.5299 (0.4993)	0.4345 (0.4959)	0.6085 (0.4882)	0.5525 (0.4973)
Adult male in household worked, mother age 14	0.5468 (0.4980)	0.6797 (0.4668)	0.7818 (0.4131)	0.6946 (0.4606)
Adult female in household worked, mother age 14	0.5559 (0.4970)	0.4133 (0.4927)	0.4979 (0.5001)	0.4984 (0.5000)
Alcohol consumption	0.3343 (0.4719)	0.3068 (0.4614)	0.5211 (0.4997)	0.4266 (0.4946)
Cigarette consumption	0.3065 (0.4612)	0.2011 (0.4010)	0.4521 (0.4978)	0.3624 (0.4807)
Any prior pregnancy loss	0.2062 (0.4047)	0.2262 (0.4186)	0.2462 (0.4309)	0.2308 (0.4214)

[1] Sample excludes observations with missing birth weight and transfer program data.

Table A4.
AFDC and Medicaid Legislation Concerning the Coverage of Pregnant Women

Legislation	Effective Date	Program	Rule
OBRA-1981	Oct. 1981	AFDC	Prohibited AFDC cash payments on the basis of an unborn child prior to the 6th month of pregnancy.
		Medicaid	Option to extend medicaid coverage to pregnant women who meet the AFDC income requirements, as of the date of medical verification of pregnancy.
			Mandated that if a state offers a medically needy program, it must extend coverage to pregnant women.
1984 Deficit Reduction Act	Oct. 1984	Medicaid	Mandated coverage of pregnant women who meet the AFDC income requirements.
OBRA-1986	Apr. 1987	Medicaid	Option to extend coverage to women with income above the AFDC income standard, but not to exceed 100% of the federal poverty level.
OBRA-1987	July 1988	Medicaid	Option to extend coverage to pregnant women with income up to 185% of poverty level.
Medicaid Catastrophic Coverage Act	July 1989	Medicaid	Mandated coverage of pregnant women with income up to 100% of the poverty level. (To be phased in: July 1989 states must be at 75% of poverty level, July 1990 they must be at 100%.)
OBRA-1989	Apr. 1990	Medicaid	Mandated coverage up to 133% of poverty level.

Sources: Commerce Clearing House, Medicare and Medicaid Guide, 1985-87.

Committee on Ways and Means, Background Material and Data on Programs Within the Jurisdiction of the Committee on Ways and Means, 1988.

U.S. Dept. of HHS, Health Care Financing Program Statistics, 1986.

Distribution of Birth Weights, By Race

Figure 1

Full Sample

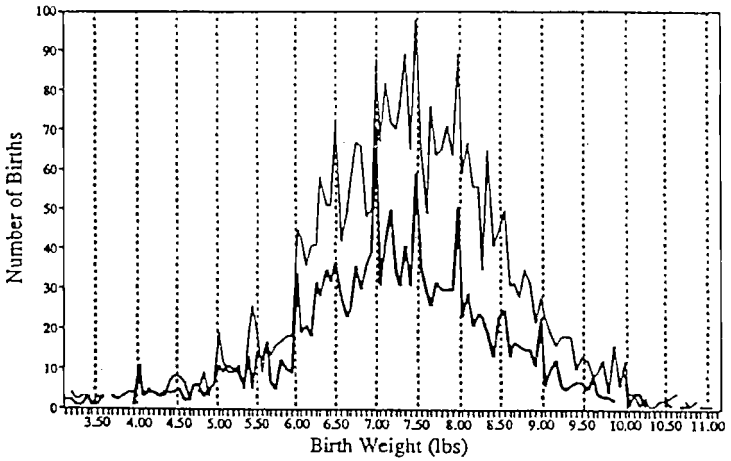
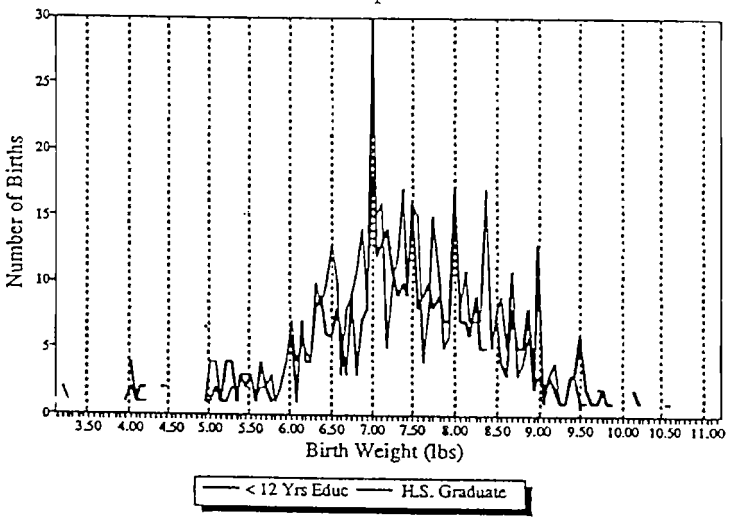


Figure 2

Hispanic



Distribution of Birth Weights, By Race

Figure 3

Black

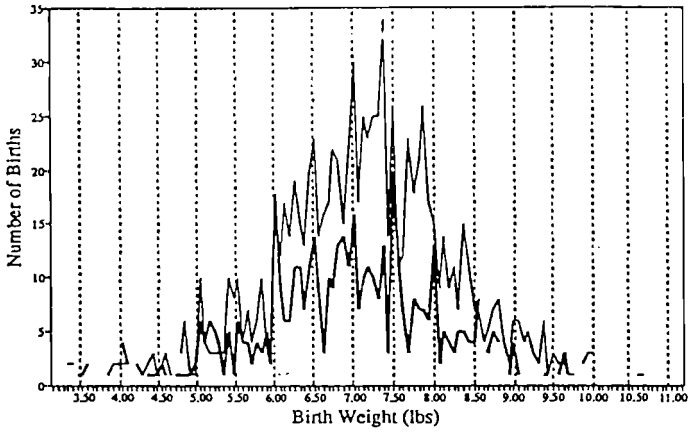
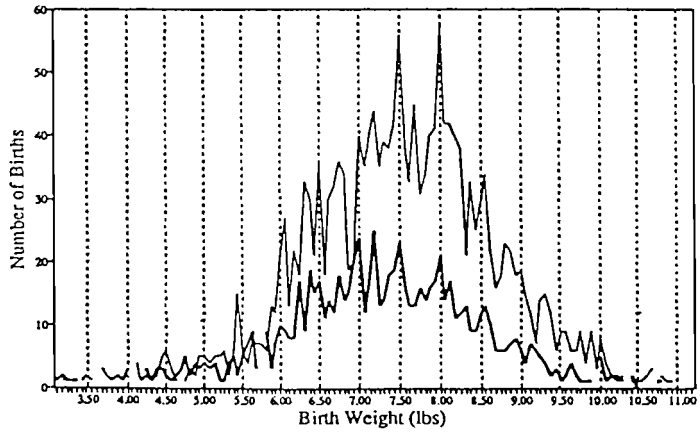


Figure 4

White



< 12 Yrs Educ — H.S. Graduate

Distribution of Live Births, NLSY Sample & U.S. Population

By Birth Weight and Gestation

Figure 5

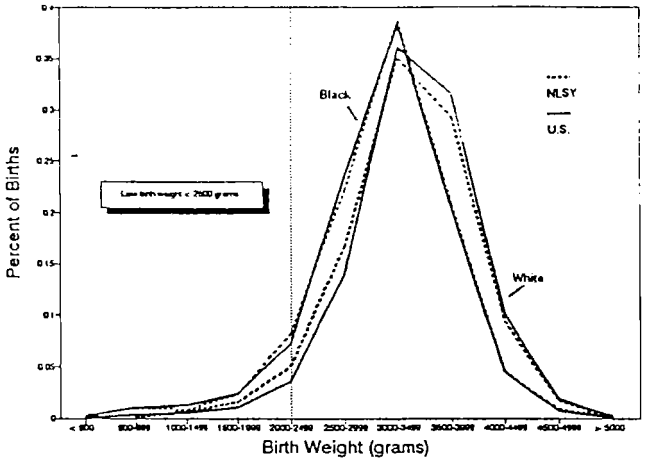
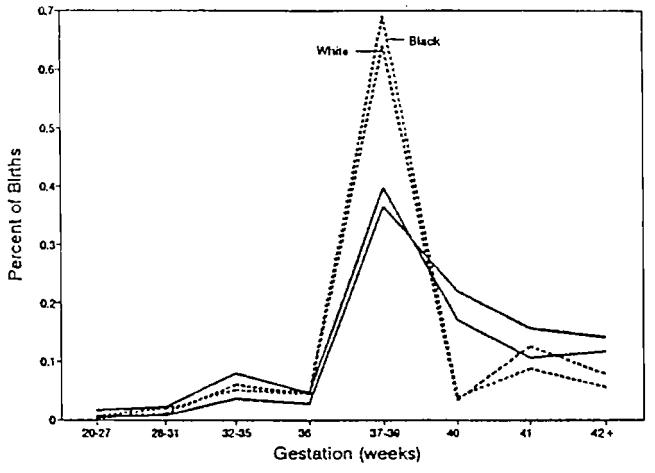


Figure 6



Sources: Vital Statistics of the United States, Dept. of HHS, 1985.
National Longitudinal Survey of Youth, 1979-1985.

Distribution of Births and Percent Low Birth Weight By Month Prenatal Care Began

Figure 7

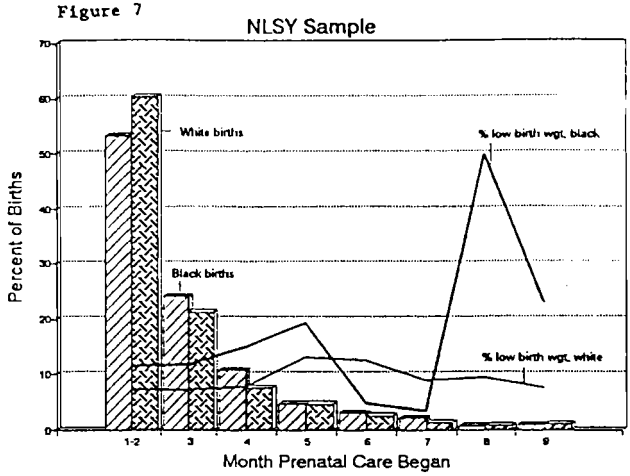
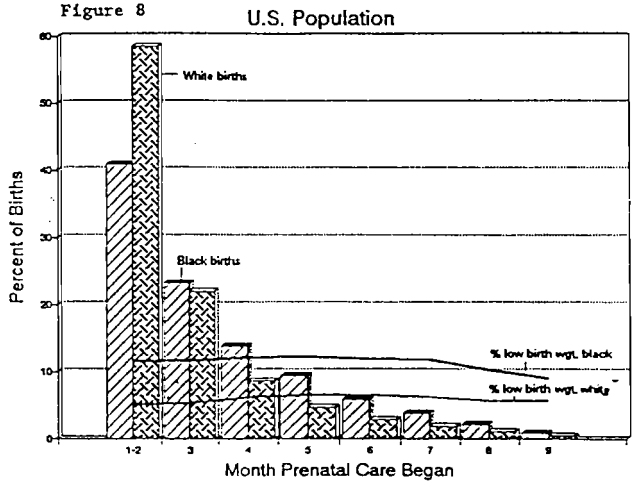


Figure 8



Sources: Vital Statistics of the United States, Dept. of HHS, 1986.
National Longitudinal Survey of Youth, 1979-1985.