THE EFFECT OF PRIOR FAMILY PLANNING PARTICIPATION ON PRENATAL CARE USE AND LOW BIRTH WEIGHT

by
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ABSTRACT

Background and Purpose: This study assesses the effects of prior family planning participation on low birth weight and use of prenatal health services in a low-income population.

Methods: Records of North Carolina birth certificates for 1989 and 1990 were linked with records of family planning services received in North Carolina public health departments in order to compare rates of low birth weight between prenatal patients in health departments who did and did not receive family planning services in the two years before conception. Intermediate measures known to be related to poor birth outcomes were also examined, such as initiation into prenatal care, adequacy of prenatal care as determined by the Kessner Index, and birth interval.

Results: Pregnant women who had participated previously in family planning services were significantly more likely to have a birth-to-conception interval of greater than six months than those who did not participate. They were also more likely to receive early and adequate prenatal care and to be involved in prenatal WIC and maternity care coordination. In addition, the family planning participants were less likely to be under the age of 18 and less likely to deliver a low-weight baby than were the nonparticipants.

Conclusions: Family planning services should be promoted as a preventive measure to improve use of prenatal health services and birth weight, particularly among low-income women.

Denise Jamieson is a medical student at Duke University. This project was completed during her internship at the State Center for Health and Environmental Statistics in the Fall of 1991. An earlier version of this paper fulfilled part of her requirements for a master's degree in public health from the Department of Maternal and Child Health at the University of North Carolina.
INTRODUCTION

The status of and trends in birth outcomes in the United States have become issues of national concern. The United States' unfavorable ranking among developed countries with respect to infant mortality,\(^1\) as well as some recent setbacks in continued improvements in infant mortality rates, have contributed to widespread concerns that not enough is being done to prevent infant deaths in this country.\(^2\) The poor international ranking of the United States in infant mortality is mainly due to this country's high incidence of low birth weight.\(^3\) Low birth weight infants are at an increased risk of dying, particularly during the neonatal period, and contribute disproportionately to high rates of infant mortality. Historically, success in reducing infant mortality rates in this country has come primarily by improvements in birth weight-specific mortality rates, while the rate of low birth weight has improved relatively little. Large racial disparities also exist with regard to rates of low birth weight and infant mortality. Rates of infant mortality and low birth weight are consistently higher among blacks than among whites.\(^4\)

Many programs have been employed in an effort to improve birth outcomes in the United States. Most have focused on the period of pregnancy, particularly on increasing the use of prenatal care.\(^2\) Less attention has been given to opportunities for intervention before pregnancy. Preconceptional methods may be more effective because a healthy pregnancy begins before pregnancy. By the time a pregnancy is established, many risk factors already have been determined.\(^4\) For these reasons, increasing the use of family planning services has been proposed by the Institute of Medicine\(^4\) and others\(^2,5,6,7\) as a preventive strategy to combat high rates of low birth weight and infant mortality before the period of pregnancy.

Increasing the use of family planning services could affect birth outcomes in several ways. An important goal of family planning services is to help women avert unintentional pregnancies. Women who become pregnant unintentionally are more likely to have poor birth outcomes\(^8\) and less likely to seek early prenatal care.\(^9\) Unwanted and unplanned children are also at an increased risk for abuse and neglect.\(^10\) Family planning services may ensure that births are better timed. For example, by using a reliable form of contraception, young, sexually active women may postpone pregnancy until their education is complete and until they are in a more secure social and economic situation. Women also can avoid the negative health consequences of a short interval between pregnancies by practicing a method of contraception following a birth or other pregnancy termination.\(^11,12\)

Use of family planning services also offers an opportunity for health education and pregnancy counseling before conception. Women may receive information about the importance of prenatal care so they quickly initiate testing and prenatal care if they suspect a pregnancy. Women may also be counseled about possible pregnancy risk factors so they can make informed decisions about pregnancy. For example, a woman may decide to continue practicing contraception until she has quit smoking. Other risk factors that can be recognized and dealt with before pregnancy include alcohol use, substance abuse, poor nutritional status, susceptibility to rubella, obesity, and poor diabetic management.\(^4\) The reduction of risk factors prior to conception will offer more benefit to the mother and child than waiting until after the pregnancy has been established.\(^4\) In general, improved health in the preconceptional period will result in improved health for the mother and child during and after pregnancy.

To increase the effect of family planning services on birth outcomes in the United States, specific high-risk populations should be targeted. Women who are poor, black, young, undereducated, or unmarried are at increased risk for a poor pregnancy outcome.\(^4,13\) Births to these women contribute disproportionately to overall rates of low birth weight and infant mortality. These women also are more likely to have an unintentional pregnancy\(^8,14\) and less likely to regularly use a method of contraception.\(^15\)

Although there are a number of reasons to suspect that family planning may help improve birth outcomes, there has been only limited research addressing this issue.

Several studies using county-level data suggest that increasing the availability of family planning services in a county would reduce the neonatal mortality rate, especially among blacks.\(^16,17,18,19\) However, interpretation of studies that use data for geographic areas to suggest that individuals would benefit from family planning services may be subject to error. These types of studies can not determine whether the individuals who received family planning services had better birth outcomes.

There has been even less effort to directly assess the effects on individuals of participation in family planning services. A study by Kaufman and Buescher
linked health department records of family planning and maternity care services for North Carolina in 1987 to determine if women who had previously participated in family planning had better birth outcomes than women who had not participated. The study found that, with marital status, age, race, and education statistically controlled, women who had not received family planning services were 1.17 times as likely to deliver a low birth weight baby as women who had received family planning services. This association was statistically significant (p < .015).

The present study will expand upon that earlier study by linking 1989 and 1990 North Carolina birth certificate records to records of family planning services received in North Carolina public health departments. Intermediate measures known to be related to poor birth outcomes will also be examined, such as time of initiation of prenatal care, adequacy of prenatal care as determined by the Kessner Index, and birth interval.

METHODS

North Carolina has an automated health department patient information system called the Health Services Information System (HSIS). HSIS files of family planning visits were linked to live birth records to identify women who had previously used family planning services in a health department and had a live birth in 1989 or 1990. A family planning participant was defined as a woman who had a return family planning visit within the two-year period before conception. Patients who made only an initial visit were excluded because they may not be regular contraceptors.

To determine family planning participation, HSIS records for return visits were selected for two years before the earliest possible date of conception for the groups of women who delivered in 1989 and 1990. Family planning records from April 1986 through May 1989 were matched to 1989 births, and family planning records from April 1987 through May 1990 were matched to 1990 births. For each patient, the dates of all family planning visits were combined with general patient information (name, date of birth, and other demographics) to generate one record per family planning participant. This resulted in 182,997 records to be matched to 1989 births and 188,326 records to be matched to 1990 births (see figure on page 11).

Records of 1989 and 1990 births were then matched to the files of family planning participants. The birth certificate records contained information added from a previous study: indicators of infant mortality and participation in Medicaid, health department prenatal care, maternity care coordination, and WIC. Initially, the records were matched based upon the mother’s last name, first name, date of birth, and county of residence (13,598 family planning records were matched to births in 1989 and 14,152 family planning records were matched to births in 1990). The nonmatching records were then rematched using less stringent matching criteria: the first five letters of the mother’s last name, the first three letters of her first name, and her date of birth. This generated 2,099 additional matches for 1989 and 2,186 additional matches for 1990. The 15,697 matches for 1989 and the 16,338 matches for 1990 were then screened to select the subset of women who had one or more return family planning visits in the two years before their estimated date of conception (this date derived from birth certificate data). This resulted in 26,679 qualified records for 1989 and 1990 births.

Records of all women who delivered after receiving health department prenatal care were examined to compare those who had and had not received family planning services in a health department. Only the women who received health department prenatal care were considered for analysis for two reasons. First, health departments have income eligibility requirements for prenatal care and women in this group should therefore be from similar economic backgrounds. Some of the family planning participants who received prenatal care outside of health departments may have had higher incomes and received family planning services as sliding-fee or full-pay patients. Secondly, we wanted the two comparison groups to be similar in their source of prenatal care. Source of prenatal care has been shown to influence birth outcomes, with several studies indicating a positive effect of public health department prenatal care for women in poverty. This resulted in the following numbers of health department prenatal patients for comparison: 14,338 family planning participants and 30,761 non-participants (see figure on page 11).

These groups were stratified according to race and then compared primarily on measures expressed as percentages: low birth weight (<2500 grams), initiation of prenatal care in first trimester, adequacy of prenatal care as determined by the Kessner Index,
interval from previous delivery or other pregnancy termination to conception, participation in WIC and maternity care coordination, and age under 18. These comparisons were made using information from the birth certificates. Logistic regression analysis was used to control for other low birth weight risk factors and assess the independent effect of previous family planning participation on low birth weight.

RESULTS

Table 1 shows the distribution of race and other risk factors related to poor pregnancy outcomes in the family planning and non-family-planning groups. The groups are fairly similar in terms of education, Medicaid enrollment, smoking, medical risk factors (from birth certificate), and previous fetal death or live born who died. The only risk factor that was very different between the two groups was race: 64 percent of the family planning participants were black and 48 percent of the nonparticipants were black. [Note: The data shown in this paper are actually for all races other than white. Since 93 percent of births for races other than whites are to blacks, we will refer to this population as black.]

Six intermediate measures thought to be related to birth outcomes were analyzed: young maternal age, WIC participation, maternity care coordination, less than adequate prenatal care as determined by the Kessner Index, early initiation of prenatal care, and birth-to-conception intervals (Table 2). Whites and blacks were analyzed separately since there are significant differences between the races in terms of outcomes and the racial distribution in the groups with and without family planning is different (Table 1).

Table 2 shows that among both whites and blacks, a smaller proportion of family planning participants were under the age of 18, received less than adequate prenatal care as determined by the Kessner Index, and initiated prenatal care after the first trimester compared to their counterparts who did not participate in family planning. All of these differences were statistically significant for whites and blacks.

The birth-to-conception interval, also shown in Table 2, is the amount of time from the previous birth or other pregnancy termination to the calculated date of conception. Among the births that were second or higher-order pregnancies, a smaller proportion of family planning participants had a birth-to-conception interval of six months or less, as compared to nonparticipants. This difference was statistically significant for whites and blacks. In addition, a greater proportion of family planning participants were enrolled in WIC and received maternity care coordination services than those women who had not used family planning services.

Table 3 shows the percentages of women who delivered a low birth weight baby. Among both whites and blacks, a smaller proportion of women who had received family planning services delivered a low birth weight baby than those who had not received services. The difference was significant (p < .05) only for blacks.

A logistic regression analysis was performed to statistically adjust for race and other risk factors in assessing a possible effect of family planning on subsequent birth outcomes. The analysis controlled for six risk factors: black race, education of less than 12 years, unmarried, smoking, presence of at least one medical risk factor, and a previous fetal death or live born who died. Initially, maternal age of 35 years or greater and Medicaid participation were controlled, but were left out of the model since they were shown not to affect it.

Results of the logistic regression are shown in Table 4. With the six risk factors statistically controlled, women who had not received family planning services were 1.09 times as likely to have a low-weight birth as were those who had received family planning services. This association of family planning participation with birth weight was statistically significant. The race-specific odds ratio for low birth weight was statistically significant for blacks, but not for whites.

DISCUSSION

The women who received family planning services in public clinics are comparable to those who did not receive family planning services in terms of education, Medicaid coverage, marital status, smoking history, medical risk factors, and previous fetal death or live born who died. The family planning group, however, had a higher proportion of black women. This is consistent with other studies that show that of all women below the poverty level who seek family planning services, over 50 percent of blacks and about 25 percent of whites obtain family planning services from public clinics.23
### TABLE 1


<table>
<thead>
<tr>
<th></th>
<th>White</th>
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<td>Black race</td>
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<td>—</td>
<td>64.0</td>
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<tr>
<td>Education &lt;12 years</td>
<td>59.2</td>
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<td>37.4</td>
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<td>Unmarried</td>
<td>37.8</td>
<td>37.8</td>
<td>80.6</td>
<td>76.1</td>
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<td>56.2</td>
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<td>Smoker</td>
<td>47.3</td>
<td>43.2</td>
<td>19.1</td>
<td>20.8</td>
<td>29.2</td>
<td>32.4</td>
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<td>≥ 1 medical risk factor</td>
<td>24.0</td>
<td>25.0</td>
<td>28.5</td>
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<td>26.9</td>
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<td>Previous death</td>
<td>27.0</td>
<td>25.0</td>
<td>27.7</td>
<td>26.3</td>
<td>27.4</td>
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<td>Medicaid</td>
<td>80.8</td>
<td>77.8</td>
<td>84.5</td>
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<td>Number of births (n)</td>
<td>5,158</td>
<td>15,962</td>
<td>9,178</td>
<td>14,798</td>
<td>14,338</td>
<td>30,761</td>
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### TABLE 2


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<td>Previous Family Planning</td>
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<td>Age of mother</td>
<td>7.2</td>
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<td>less than 18 yrs.</td>
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<td>WIC Participation</td>
<td>87.9</td>
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<td>Care Coordination</td>
<td>50.2</td>
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<td>Less than adequate prenatal care (Kessner Index)</td>
<td>40.0</td>
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<td>51.6</td>
<td>58.3</td>
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<td>Care not initiated in first trimester</td>
<td>35.4</td>
<td>42.6</td>
<td>&lt;.0001</td>
<td>45.7</td>
<td>52.6</td>
<td>&lt;.0001</td>
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<tr>
<td>Birth-conception interval ≤ 6 months</td>
<td>15.9</td>
<td>20.8</td>
<td>&lt;.0001</td>
<td>18.8</td>
<td>23.0</td>
<td>&lt;.0001</td>
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<tr>
<td>Number of births (n)</td>
<td>5,158</td>
<td>15,962</td>
<td>9,178</td>
<td>14,798</td>
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TABLE 3

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<td>p value</td>
<td>Previous Family Planning</td>
</tr>
<tr>
<td>Low birth weight</td>
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<td>7.9</td>
<td>.24</td>
<td>12.2</td>
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<td>Number of births (n)</td>
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<td>15,958</td>
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<td>9,172</td>
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TABLE 4

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<th>Total (Race Controlled)</th>
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<tr>
<td></td>
<td>OR</td>
<td>95% Confidence Interval</td>
<td>OR</td>
<td>95% Confidence Interval</td>
<td>OR</td>
</tr>
<tr>
<td>Low birth weight</td>
<td>1.10</td>
<td>(.97,1.23)</td>
<td>1.09</td>
<td>(1.01,1.19)</td>
<td>1.09</td>
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<tr>
<td>Number of births (n)</td>
<td>20,982</td>
<td></td>
<td>23,779</td>
<td></td>
<td>44,761</td>
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</table>
Young maternal age has been shown to be a risk factor for poor pregnancy outcomes. In addition, unwanted births to adolescents, which constitute the overwhelming majority of births among this age group, can cause severe damage to their lives and limit future opportunities. Adolescent mothers complete fewer years of education than other teenagers and may live the rest of their lives in poverty because early childbearing limited their opportunities. For these reasons, it is important that family planning services target adolescents in efforts to reduce unwanted childbirth among this age group.

The lower proportion of women under the age of 18 in the family planning group giving birth in 1989 and 1990, compared to the non-family-planning group (7.2% vs. 14.7% for whites and 9.6% vs. 19.7% for blacks), suggests that family planning services are being effectively used by teenagers to avert or postpone pregnancy. This is further supported by the fact that 18.1 percent of the total family planning caseload in North Carolina were under the age of 18 compared to less than 9 percent of the family planning participants who gave birth. These findings suggest that sexually active teens are using family planning services to prevent unwanted pregnancy.

To determine if family planning affects adolescent pregnancy rates, it would be ideal to compare the fertility rate for adolescents in the family planning group to the fertility rate for low-income, sexually active adolescents who were not family planning participants. Unfortunately, there is not a good estimate of the number of sexually active adolescents by income level to use as the denominator of a fertility rate for the non-family-planning group. We are instead comparing the percentage of births to women under age 18 in the family planning and non-family-planning groups. It is possible that the distribution of births and sexually active population across the age and family planning groups could contribute to the observed differences in the percentages. However, it is likely that the lower percentage of women under 18 in the family planning group does to some degree reflect a lower fertility rate.

Inadequate prenatal nutrition increases the likelihood of low birth weight and infant death. The Special Supplementary Food Program for Women, Infants, and Children (WIC) is a program for low income women that allows women to buy particular supplementary foods and offers nutrition education during pregnancy and infancy. WIC participation has been shown to be associated with improved rates of low birth weight and infant mortality.

The increased WIC enrollment of women in the family planning group could be due to their participation in family planning services. During preconceptional health counseling, which is one component of the comprehensive array of services available to women enrolled in family planning, women learn about the importance of good nutrition during pregnancy. This knowledge may motivate them to seek out programs like WIC when they become pregnant. Alternatively, women who seek services for family planning may also be the type who seek additional services such as WIC during pregnancy. However, women who did not receive any prenatal care during their pregnancy were excluded from this study; therefore only women who had some degree of "service-seeking" behavior were included.

Maternity care coordination is a statewide program in North Carolina aimed at eliminating access barriers to use of prenatal services. Maternity care coordinators help eligible women receive services that address not only medical but also nutritional, psychosocial, and resource needs. It has been demonstrated that North Carolina women on Medicaid who receive care coordination are less likely to experience a low weight birth or an infant death.

The higher proportion of family planning participants who received care coordination during pregnancy, compared to the non-family-planning participants, suggests an additional benefit to participation in family planning. Women who receive family planning through the health department may be made aware of other available services and encouraged to seek them. As a result of health education received during family planning visits in the health departments, family planning participants may better understand the importance of adequate medical, nutritional, and psychosocial services during pregnancy. As with WIC participation, some degree of self-selection may be responsible for the differing proportions of women in the family planning and non-family-planning groups who received maternity care coordination.

Prenatal care has been shown to reduce the incidence of low birth weight and infant death, particularly among high-risk populations. Therefore, it is encouraging that women in the family planning group were more likely to get early and adequate prenatal care. Family planning may be a
point of entry into the health care system for some low-income women.

Studies have shown that women are more motivated to get early and adequate prenatal care with wanted and planned pregnancies than with unintended pregnancies. Women in the family planning group would be expected to have a higher proportion of wanted and planned births and this also may account for their beginning care earlier. It was not possible to compare the proportions of women who received no prenatal care since only women who received some prenatal care in a health department were included in the study.

Birth-to-conception intervals of less than six months increase the risk of low birth weight and infant mortality. The higher proportion of family planning participants with a birth-to-conception interval of greater than six months suggests that use of family planning services results in improved spacing of births.

Black family planning participants had a significantly lower rate of low birth weight than did black nonparticipants. For whites this difference was smaller and not statistically significant. This could be due to lower participation by whites in family planning services in public clinics. Studies have shown that among poor women, white women are more likely than black women to receive family planning services from a private physician. This would result in some of these women being classified as non-family-planning participants when in fact they were receiving family planning services in the private sector. Thus the measured effect of family planning on low birth weight is probably understated due to misclassification.

The weaker association of family planning participation with low birth weight, compared to the intermediate measures, could be due to several factors. The provision of family planning services was closer in time to the intermediate outcomes (e.g., early initiation of prenatal care) and therefore might be expected to impact them more strongly. Also, because family planning may affect birth outcomes through increasing the use of prenatal services, which are less than 100 percent effective in preventing adverse birth outcomes, the effect of family planning on low birth weight could be expected to be weaker. In addition, many factors other than health services affect low birth weight, particularly poverty and socioeconomic and educational status. These are risk factors that would not easily be overcome by the provision of health services.

One of the main limitations of this study is that only women who became pregnant and received prenatal care in the health departments were included. Most women in family planning did not give birth in 1989 or 1990. This study does not evaluate overall improvements in women's reproductive health that may have occurred due to enrollment in family planning. Furthermore, the use of family planning services may enable young women to postpone pregnancy until they have completed educational, professional, and personal goals. If a life of poverty and public assistance is thereby averted, the woman might then cease to obtain medical care in the public sector. Since this study does not include women who received prenatal care in the private sector and women who did not become pregnant within two years of receiving family planning services, we expect the effect of family planning on birth outcomes is being underestimated. Furthermore, this study does not evaluate possible maternal benefits of family planning, such as reduced maternal morbidity and mortality. For example, by averting pregnancies for women with high blood pressure, diabetes, and other risk factors, family planning can prevent illness and deaths resulting from medical complications of pregnancy.

In summary, this study demonstrates that low-income pregnant women who previously participated in family planning were more likely to have a birth-to-conception interval of greater than six months, receive early and adequate prenatal care, and be enrolled in prenatal WIC and maternity care coordination than their non-family-planning counterparts. In addition, family planning participants were less likely to be under the age of 18 and less likely to deliver a low birth weight infant than women who were not previous family planning participants.

While the family planning and non-family-planning groups were similar with regard to several measurable demographic and risk characteristics, unmeasured differences in motivation and service-seeking behavior may be contributing to these results. Further, more controlled studies are needed to better assess the effect of family planning participation on prenatal care use and birth outcomes.
REFERENCES


2. Hein HA: Do we have the infant mortality rate we desire? *JAMA* 1991;266:114-115.


- **182,997** Family Planning participants from 4/86 to 5/89
  - **167,300** Family Planning participants WITHOUT a 1989 birth
  - **15,697** Family Planning participants WITH a 1989 birth
    - (13,598 in first match)
    - (2,099 in second match)
  - **16,338** Family Planning participants WITH a 1990 birth
    - (14,152 in first month)
    - (2,186 in second month)

- **188,326** Family Planning participants from 4/87 to 5/90
  - **171,988** Family Planning participants WITHOUT a 1990 birth
  - **16,338** Family Planning participants WITH a 1990 birth
    - **2,961** Family Planning participants with a 1990 birth whose FP visits WERE NOT within 2 years of conception
  - **12,341** Family Planning participants with a 1989 or 1990 birth whose FP visits were within 2 years of conception BUT DID NOT receive prenatal care in a public health department

- **30,761** NON-Family Planning participants with a 1989 or 1990 birth who received prenatal care in a public health department

2 groups that are compared in study