

# Prenatal Care and Pregnancy Outcomes during the Recession: The Washington State Experience

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**Abstract:** To determine whether changes in prenatal care utilization and adverse pregnancy outcomes occurred among poor residents of Washington State during the recent recession, we examined all births occurring from 1980 to 1983 to women in the poorest census tracts of the three major metropolitan counties in Washington State (N = 15,735). A comparison sample consisted of all births occurring in the highest income census tracts (N = 16,295). Because the impact of the recession was hypothesized to be greatest in 1982, rates in 1982 were compared with rates in 1980. The proportion of births receiving late or no prenatal care increased in both the low-income tracts (6.2 per cent to 8.2 per cent) and the

high-income tracts (1.6 per cent to 2.3 per cent). The proportion of low birthweight infants increased only in the low-income tracts (6.3 per cent to 7.4 per cent). The prevalence of maternal anemia (hematocrit < 30) also increased only in the low-income tracts (0.7 per cent to 1.7 per cent). While we were unable to ascertain the financial status of the individuals who suffered the adverse outcomes, the findings for the low-income census tracts are consistent with the hypothesis that an increase in adverse pregnancy outcomes occurred among the poor in Washington State during the recent recession. (*Am J Public Health* 1985; 75:866-869.)

## Introduction

Pregnancy outcomes have long been used both to measure the quality of medical care for mothers and infants and to evaluate overall health and social programs. In the United States, infant mortality rates fell from 24.7 per 1,000 in 1965 to 12.6 per 1,000 in 1980; most of the decline has been attributed to the costly gains achieved through improved perinatal care.<sup>1-4</sup> Low birthweight remains the most powerful predictor of infant mortality and is strongly associated with subsequent disability.<sup>5,6</sup> Recent editorial and public policy statements have emphasized that further efforts to improve pregnancy outcomes should be directed at the causes of low birthweight.<sup>7-9</sup> For such efforts to be effective, the prevalence of low birthweight must be monitored in that portion of the population that is at greatest risk. Among those risk factors associated with low birthweight, financial status is the major determinant of access to health care, nutrition, and social support. A method that monitors pregnancy outcomes among the poor might detect significant changes that may not be apparent in rates for the population as a whole during periods of economic and policy change.

In Washington State the recent severe recession coincided with decreased funding for Medicaid and other public programs. The recession and funding limitations were most severe in 1982. However, the rate of low birthweight infants was 5.1 per cent in both 1980 and 1982. Concerned that the overall rates may have obscured changes that occurred among those most vulnerable to unemployment or medical assistance cutbacks, we designed a study to evaluate changes among the poor in prenatal care utilization and pregnancy outcomes during this period. While individual financial status is not recorded on the birth certificate, census tracts are recorded in some metropolitan counties. We hypothesized that census tracts could be used to identify a population at risk of adverse change during a period of economic and policy change.

## Methods

### Study Setting

Since 1980, census tract of maternal residence has been coded on birth records from each of the three largest metropolitan counties in Washington State. King County (which includes Seattle), Pierce County (which includes Tacoma), and Spokane County. King and Pierce are adjacent counties in western Washington while Spokane is the largest metropolitan county in eastern Washington. Approximately half of the 68,000 annual births in Washington State occur to mothers who reside in these three counties. Table 1 presents data on statewide Medicaid enrollment, county unemployment rates, and funding for specific county programs targeted at low-income women. Unemployment increased in all three counties between 1980 and 1982, then decreased slightly in 1983.<sup>10</sup> Medicaid eligibility, which would affect populations in all three counties similarly, declined between 1980 and 1982, in large part because of the elimination in mid-1981 of coverage for 26,000 individuals under the Aid for Families with Dependent Children (AFDC) program. Some coverage under this program was restored in 1983. Much smaller in terms of their overall impact are the Maternal and Child Health (MCH) and the Womens, Infants, and Children (WIC) grant programs. Funding for these programs varied among the counties. Because funding levels do not necessarily reflect service provision for low-income pregnant women, we interviewed program and fiscal officers from each county to determine estimates of the level of county and voluntary health care services provided to low-income pregnant women. In both Spokane and King Counties, service levels declined in 1981 and 1982. Pierce County staff estimated that the number of low-income women receiving prenatal and obstetric care increased steadily from 150 in 1980 to more than 450 in 1982. With the ending of the recession, all three counties increased locally funded care for low-income pregnant women in 1983.

### Selection of the Study Population

All singleton births that occurred during the years 1980-83 to mothers living in King, Pierce, or Spokane Counties and which had valid codes for 1980 United States census tracts on the computer file of birth records were eligible for inclusion in the study. Using data from the 1980 United States Census we ranked all census tracts by the proportion of individuals under 200 per cent of the federally

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**TABLE 1—Unemployment, Medicaid Enrollment, and Funding for County Programs, Washington State, 1980–83**

	1980	1981	1982	1983
Unemployment				
King	6.3	7.8	10.3	9.8
Spokane	8.1	10.1	12.3	10.2
Pierce	7.9	10.1	12.4	12.2
Statewide Medicaid Enrollees (thousands)	298	278	248	257
County Maternal and Child Health and Women, Infants, Children Funding: (X 1,000, Constant Dollars)**				
King	3,218	3,248	3,086	2,991
Spokane	528	389	391	709
Pierce	667	815	738	940

\*Source: Untitled Report of Population Eligible for Medical Assistance by Month, Washington State Department of Social and Health Services, Olympia, WA, 1984. Numbers shown represent average of monthly enrollment.

\*\*Data obtained from special reports prepared for the study by county staff. King and Pierce figures are for budgeted expenditures, Spokane figures for actual expenditures. All three reports used consistent accounting practices during the study period. For consistency, the figure for Pierce in 1980 excludes \$52,000 estimated administrative expenses that were not included in budgets for subsequent years. 1980 data for King County are the best estimate of the county fiscal officer.

**TABLE 2—Percent of Population Below 200 Per Cent of Poverty in 1980 in Study Samples**

	Low-Income Census Tracts	High-Income Census Tracts
	%	%
All counties combined	51.4	9.6
King County	45.8	8.2
Spokane County	59.0	10.3
Pierce County	70.0	14.1

designated poverty level residing in the tract (200 per cent of poverty for a family of four at the time of the census was \$14,824).<sup>11</sup> To select the low-income sample in each county, we began with the census tract with the highest proportion of individuals under 200 per cent of poverty and added census tracts to the sample until approximately 10 per cent of the births occurring in the county had been included. Similarly, for the high-income sample in each county, we began with the census tract with the lowest proportion of individuals under 200 per cent of poverty and added census tracts until we had included 10 per cent of the births. The census tracts were selected without any *a priori* knowledge of the prenatal care or birthweight distributions associated with pregnancies from those tracts. The proportion of the population under 200 per cent of poverty living in each census tract group is shown in Table 2.

Having identified the census tracts of interest based on 1980 income and birth data, all singleton births occurring to mothers in those tracts during the study period were analyzed using the Washington State birth tapes.

#### Variables Examined

The outcome variables available on the birth record that we examined were: timing of first prenatal visit, low birthweight (less than 2501 grams), very-low birthweight (less than 1501 grams), intrauterine growth retardation (birthweight less than 2501 grams among births with gestations longer than 36 weeks), anemia (defined as a hematocrit less than 30), complications of labor, birth injuries, and diseases of the newborn. Because of its widespread use and recognized association with mortality, the most important of these was birthweight. Variables available on the birth record

that are recognized as associated with these outcomes were also selected to allow us to evaluate their potential role as confounding factors. Linked birth-death data were not yet available for 1982 or 1983; we were thus unable to examine possible changes in the infant mortality rate.

#### Quality of the Data

The Washington State Center for Health Statistics provided the birth tapes. We independently evaluated the quality of the data through an examination of the rates of missing values and the internal consistency of the data. Fewer than 0.3 per cent of the birthweights were missing in any year. Parity is a constructed variable summing the numbers of children now living (0.3 per cent missing values) and children now dead (0.8 per cent missing values). Time of first prenatal visit was less completely coded, with up to 4.3 per cent missing in one year. While most of the missing values occurred in one county, our findings in the other two counties were similar to those in the county with the higher proportion of missing values. Gestational age was calculated from the date of birth and the date of the last menstrual period. If the day of the last menstrual period was missing, we attributed the 15th of the month to that birth. If any other of the variables necessary to calculate gestational age were missing, the case was not included in the analysis of intrauterine growth retardation (2.9 per cent of cases had missing values for this variable). Anemia, complications of labor, and newborn injuries appear as items on the birth record which are to be checked if present. Thus we could not examine rates of missing values for these variables. The overall prevalence of anemia was relatively stable during this period in the state as a whole and in the high-income census tracts, giving us relative confidence in this variable. However, because of marked year-to-year variations in the rates of complications of labor and newborn injuries in both the low- and high-income census tracts, we decided not to include our findings for these variables in our results. Discussion with the Health Statistics Department revealed that coding changes occurred in these two variables during the period of the study. For all of the variables examined, our analysis depends upon comparisons between different years but within census tract groups; we have no evidence to suggest that changes in coding reliability might have occurred during the study period that would have introduced any systematic bias into our results.

#### Analysis

The data available on unemployment and cutbacks in Medicaid showed maximal unemployment and lowest levels of Medicaid eligibility in 1982 (Table 1). Brenner found that increased unemployment and decreased Medicaid funding are both associated with an increase in infant mortality in the same year.<sup>12</sup> Therefore, prior to data analysis, we hypothesized that the incidence of adverse outcomes would be greatest in 1982, and comparisons were made between the rates of the outcome variables in 1982 and the rates in 1980.

Stratified analysis controlling individually for each of the risk factors associated with delayed prenatal care, low birthweight, or anemia was carried out. In the stratified analysis of delayed prenatal care, four potential confounders were examined: maternal age (strata: 15 years and under, 16 to 19, 20 to 35, 36 and over); maternal race (White, Black, Southeast Asian, Other Asian, Other non-White); marital status (single, married); and parity (nulliparous, one previous birth, two or more previous births). These were the only variables available on the birth record that may be associated with prenatal care utilization. In the stratified analysis of low

**TABLE 3—Prenatal Care Delivery and Health Status, 1980–83, Low-Income Census Tracts (Per cent with characteristic)**

Outcome	1980	1981	1982	1983	Relative Risk 1982/1980	95% Confidence Interval
Late or No Prenatal Care	6.2	6.8	8.2	7.8	1.34	1.14–1.57
No First Trimester Care	31.4	32.3	36.9	33.8	1.18	1.10–1.25
Birthweight < 2501 grams	6.3	6.5	7.4	7.1	1.18	1.00–1.25
Birthweight < 1501 grams	1.0	1.1	1.0	1.0	1.06	0.68–1.38
Birthweight < 2501, grams gestation ≥ 37 weeks	3.7	4.0	4.3	4.0	1.18	0.93–1.50
Maternal Anemia	0.7	1.9	1.7	1.0	2.59	1.68–3.98

**TABLE 4—Prenatal Care Delivery and Health Status, 1980–83, High-Income Census Tracts, (Per cent with characteristic)**

Outcome	1980	1981	1982	1983	Relative Risk 1982/1980	95% Confidence Interval
Late or No Prenatal Care	1.6	2.0	2.3	2.1	1.47	1.07–2.04
No First Trimester Care	12.0	12.6	13.8	15.1	1.15	1.02–1.29
Birthweight < 2501 grams	3.2	3.5	3.2	3.4	0.98	0.77–1.25
Birthweight < 1501 grams	0.4	0.5	0.5	0.6	1.29	0.68–2.47
Birthweight < 2501, grams gestation ≥ 37 weeks	1.7	2.2	1.7	1.6	0.96	0.67–1.37
Maternal Anemia	0.3	0.3	0.2	0.2	0.84	0.34–2.12

birthweight and anemia, additional potential confounders were examined: time since last birth (no previous births, interval under two years, two or more years) and previous infant or fetal loss (none, one or more). Mantel-Haenszel adjusted risk ratios across all of the strata were calculated and compared with the crude risk ratios.<sup>13</sup> No evidence of interaction or confounding was detected in this analysis. Because the crude and adjusted risk ratios were virtually identical, we present only the crude risk ratios in the tables.

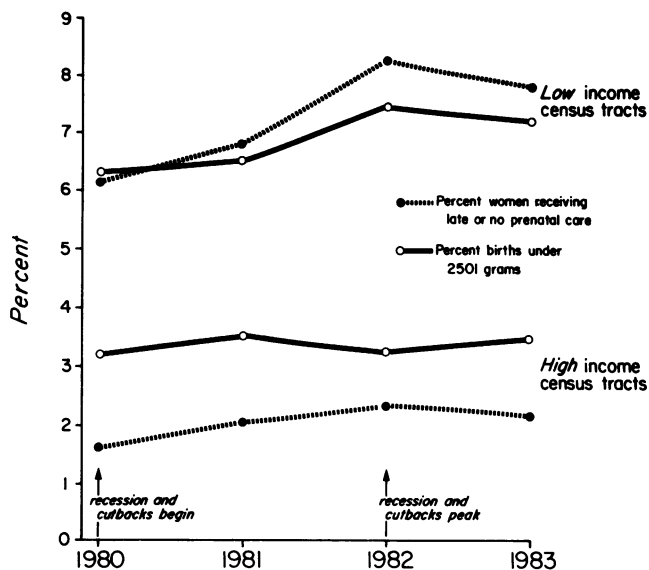
## Results

### Prenatal Care Utilization

Prenatal care utilization declined in both the low-income and high-income census tracts (Tables 3 and 4). In the low-income census tracts, the proportion of women who received either no prenatal care or whose care began only in the third trimester increased from 6.2 per cent in 1980 to 8.2 per cent in 1982 and the proportion who received no first trimester care increased from 31.4 per cent in 1980 to 36.9 per cent in 1982. Increases also occurred to women residing in the high-income census tracts. The relative increases were similar in the low- and the high-income census tracts, but the absolute increase in the low-income census tracts was larger. In both the low- and high-income census tracts, the proportion of women with late or no prenatal care decreased slightly in 1983.

### Birthweight and Anemia

In the low-income census tracts, the proportion of low birthweight infants increased significantly from 6.3 per cent in 1980 to 7.4 per cent in 1982 (Table 3). The proportion of very low birthweight infants remained unchanged. No increase occurred in the proportion of low birthweight infants in the high-income census tracts (Table 4). The incidence of maternal anemia, defined as a hematocrit <30, increased significantly in the low-income census tracts from 0.7 per cent in 1980 to 1.7 per cent in 1982. In the high-income census tracts, no significant

**FIGURE 1—Prenatal Care and Birthweight in Residents of Selected Census Tracts, Washington State, 1980–83**

increases occurred between 1980 and 1982. When the prenatal care and birthweight findings in the low-income census tracts are stratified by county of residence (Table 5), increases occurred in all counties. No increases in the proportion of low birthweight infants were found among the high-income census tracts of any county (data not shown).

## Discussion

The major findings of our study are summarized in Figure 1. During a period of increasing unemployment and decreased Medicaid eligibility, more women residents of low-income census tracts in Washington State received delayed prenatal care or none at all and delivered propor-

TABLE 5—Prenatal Care and Birthweight Results in the Counties, Low-Income Census Tracts, 1980 vs 1982

Counties	1980	1982	Relative Risk 1982/1980	95% Confidence Interval
King County	(n=2072)	(n=2189)		
Late or no prenatal care	5.4	8.4	1.56	1.23–1.97
Birthweight < 2501 grams	6.6	7.9	1.20	0.96–1.48
Spokane County	(n=679)	(n=710)		
Late or no prenatal care	2.5	3.1	1.24	0.66–2.31
Birthweight < 2501 grams	4.7	6.8	1.43	0.93–2.21
Pierce County	(n=1127)	(n=1140)		
Late or no prenatal care	9.7	11.1	1.15	0.90–1.47
Birthweight < 2501 grams	6.7	6.9	1.03	0.76–1.39

tionately more infants of low birthweight. The incidence of maternal anemia may also have increased. At the same time, women living in high-income census tracts experienced a small increase in the proportion receiving delayed or no prenatal care, but had no change in the incidence of low birthweight. These findings must be interpreted carefully in the light of our study's design.

First, our samples were defined geographically, because we were unable to ascertain individual financial status from the birth record. An unknown proportion of the births occurring in the low-income census tracts are likely to have occurred to women with incomes over 200 per cent of poverty. Similarly, some of the births in the high-income census tracts are likely to have occurred to low-income women. This may explain the otherwise puzzling finding of an increase in the proportion of women receiving delayed prenatal care in the high-income census tracts (the similarities of the relative increases found in the high- and low-income tracts are consistent with this hypothesis). Also, the absence of specific financial information about each mother prevents us from being able to estimate precisely the magnitude of the changes that occurred among the poor within our samples. If the increase in adverse outcomes that we detected was restricted to the poor within these census tracts, then our findings would represent an underestimate of the actual increases that occurred among the poor during this period.

Second, our findings reflect changes that occurred in the low-income census tracts of three counties of one state. Generalizing our results to other areas would be premature and should await confirmation in other studies from diverse settings. Nevertheless, the finding of an increase in the proportion of low birthweight infants in any population is cause for serious concern. Unfortunately, because census tracts were not consistently coded on birth records from the study counties before 1980, we were unable to extend our analysis to earlier years.

Third, our study demonstrates only that an increase in the prevalence of low birthweight and maternal anemia in low-income census tracts occurred and that the increase coincided with several economic and policy changes that might have affected low-income mothers. The association in time does not prove the existence of a causal relationship between the policy changes and the outcomes. That the increase in adverse outcomes occurred only in the low-income census tracts suggests that poverty was associated with the increased risk. However, many aspects of maternal behavior that may influence birthweight or the development of anemia also vary during periods of economic stress. These include nutrition, smoking, alcohol consumption, and the utilization of abortion.<sup>14–16</sup> We were unable to control for these factors in our analysis.

Our findings confirm our hypothesis that during the

recent recession stable statewide rates of pregnancy outcomes obscured significant increases in adverse outcomes in a vulnerable subpopulation. Although census tracts are not recorded on all birth records, a high proportion of the poor live in metropolitan areas where census tracts are recorded. Our study suggests that the identification of high-risk births through census tract coding may provide a relatively simple and inexpensive method to monitor changes in pregnancy outcomes during periods of economic or policy change.

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