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Effects of Welfare Reform on the Prevalence of Obesity Among Low-Educated Single Mothers

By

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A dissertation submitted to the Graduate Faculty in Economics in partial fulfillment of the requirements for the degree of Doctor of Philosophy, The City of University of New York

2004

This manuscript has been read and accepted for the Graduate Faculty in Economics in satisfaction of the dissertation requirement for the degree of Doctor of Philosophy.

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Abstract

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Welfare reform in the 1990s was anticipated to make welfare recipients become self-sufficient off the welfare roll. There have been remarkable consequences due to the welfare reform: a decrease in the welfare caseload, a decline in welfare participation rate, and an increase in labor market participation. On the other hand, there have been some concerns about the well-being of low-educated single mothers. This paper examines the effects of welfare reform on the prevalence of obesity among low-educated single mothers. I use data from the 1990-2002 Behavioral Risk Factors Surveillance System. Difference-in-differences estimate is the empirical strategy employed in this paper, which is obtained by subtracting effects of control group (low-educated married mothers) on its weight outcome from effects of target group (low-educated single mothers) on its weight. The main findings of this paper are as follows: 1) welfare reform causes the BMI (Body Mass Index) of low-educated single mothers to increase by 0.3 points or 1.2 percent, which means about 2.0 pounds increase in weight, 2) welfare reform is associated with a 1.7 percentage point or 8.1 percent increase in the probability of obesity of low-educated single mothers, and 3) for low-educated black single mothers, the implementation of welfare reforms is also associated with a 0.8 point increase in BMI and a 4.4 percentage point increase in the probability of obesity.

Acknowledgements

I would like to thank my dissertation advisor, Professor Michael Grossman. He was always available to me to figure out my problems concerning this dissertation. I have been helped and encouraged by many members of the Graduate Center's Economics Department. Professor Thom Thurston, Professor Salih Nefci and Professor Henry Saffer were very helpful to me.

On a personal note, I gratefully acknowledge my mother JeongHee Ju and mother-in-law KyungJa Chun's indispensable support. My twin brothers, SungSoo and SungDo Kang, my only sister, SoonHee Kang and my brother-in-law SaeYong Kim provided invaluable inspiration. This dissertation could not have been completed without the many contributions of my wife, MyungHee Kim. She helped me to concentrate more fully on this dissertation. I dedicated this work to her.

Table of Contents

List of Tables

List of Figures

1. Introduction

There had been many statewide welfare waiver programs for Aid to Families with Dependent Children (AFDC) program from 1992. Even though the Secretary of Health and Human Services had waived AFDC program requirements if a state proposed experimental programs that advanced the objective of AFDC from 1962, it was not until 1992 that many statewide waiver programs were implemented. Based on the success of waiver programs since 1992, the AFDC program was replaced with Temporary Assistance for Needy Families (TANF) in 1996 when Personal Responsibility and Work Reconciliation Act (PRWORA) passed Congress. Under TANF, states have been required to implement provisions that are similar to those of the popular state-level waiver programs, while at the same time states have had more authority over the program.

The most distinguished features of welfare waiver programs and TANF (so called 'welfare reform') are 1) work requirement of recipients, 2) time limit, and 3) sanction for non-compliance recipients. [1] The new characteristics of welfare reform are anticipated to make recipients become self-sufficient off the welfare roll. There have been remarkable consequences due to welfare reform. Figure 1 shows the average monthly caseloads for the years 1980 through 2002 in the AFDC and TANF programs, where the upper line demonstrates the average monthly recipients, and the lower line shows the average monthly families respectively. The caseloads were stable during the 1980s, but grew rapidly in the early 1990s. Starting around 1994, the caseloads declined dramatically. The numbers of average monthly recipients dropped about 56.5 percent from 1990

[1] In this paper, welfare reform is said to include both statewide waiver programs and TANF.

(11,694,712) to 2002 (5,088,019), and 64.2 percent from 1993 (14,205,484) when it was the highest year of the period (1980-2002), which means that there are 9,117,446 fewer recipients as of 2002 than in 1993. In the case of families, there is a 49.6 percent drop during the period 1990 (4,056,584) through 2002 (2,044,486), and a 59.4 percent drop during period 1994 (5,032,632) through 2002, which says that there are 2,988,146 fewer families as of 2002 than in 1994.

Figure 2 shows trends in the participation rate as a percentage of the total U.S. population. There is no difference in participation rates of the AFDC program over the 1980s, but rapid growth in the early 1990s is followed by considerable declines that begin about 1994. The fact that there have been rapid fluctuations over the 1990s and the early 2000s is showed more clearly in Figure 2 than in Figure 1. For example, 4.7 percent is the participation rate in 1990, 5.5 percent in 1993 (the highest of the period), and finally 1.8 percent in 2002.

Furthermore, Blank (2003) summaries that welfare reform had positively affected labor market participation of welfare leavers, as well as less-skilled women. On the other hand, there have been some evidence that most of recipients have some potential barriers to employment such as heath, alcohol and drug abuse, and job skill or experience (Olson et al, (1996), Romero et al (2002), Loprest (2002), Pollack, et al. (2002)). Given that the new philosophy of welfare reform emphasizes working of recipients to become self-sufficient, now it is time that policymakers and researchers should pay attention to the potential barriers of poor single mothers beyond leaver study of welfare reform, which might make them not work, and therefore return to TANF, or to be non-recipients with no working job.

There have been a few studies about the relationship between welfare reform and the well-beings of poor single mothers. Most of them investigated only associations between them, but did not examine causal effects of welfare reform on the well-beings of poor single mothers.[2] Furthermore, to date, there is no study about the relationship between welfare reform and the BMI (Body Mass Index) and obesity of low-educated single mothers. Assuming that high BMI or obesity cause health problems, this paper uses high BMI and obesity as a proxy for health of low-educated single mothers, and examines the effects of welfare reform on the BMI and obesity of low-educated single mothers.

This paper uses repeated cross sections data 1990 through 2002 in BRFSS (Behavioral Risk Factors Surveillance System). I limit the sample to the low educated mothers ages 18 to 54 that consist of two groups: the target group is low-educated single mothers, and the control group is low-educated married mothers. Also, I have subgroups by race: white low-educated mothers and black low-educated mothers. The empirical strategy used in this paper is difference-in-difference estimate, which is obtained by subtracting effects of control group (low-educated married mothers) on its weight outcome from effects of target group (low-educated single mothers) on its weight outcome. I experimented 10 alternative policy variables to investigate the effects of welfare reform on the weight outcomes of low-educated single mothers.

My overall conclusion is that there is little consistent evidence that welfare reform has effects on the BMI and obesity of low-educated single mothers, and if any, it would be trivial. Specifically, the findings of this paper are as follows: 1) welfare reform causes

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[2] Exception are Kaestner's two studies that examine casual effects of welfare reform on prenatal care and birth weight (2003b) and health of low educated single mothers

the BMI of 15 years or less educated single mothers to increase by 0.3 points or 1.2 percent, which means about 2.0 pounds increase in weight, 2) welfare reform is also associated with a 1.7 percentage point or 8.1 percent increase in the probability of obesity of 15 years or less educated single mothers, 3) for 12 years or less educated single mothers, there is little evidence that low-educated single mothers are affected by welfare reform except for the fact that the TANF implementation has negative effects on the BMI and obesity of 12 years or less educated single mothers, 4) this study shows no evidence that low-educated white single mothers are affected by welfare reform, and 5) for low-educated black single mothers, the implementation of welfare reform is associated with a 0.8 point increase in BMI and a 4.4 percentage point increase in the probability of obesity, but there is no evidence that welfare reform has causal effects on BMI and obesity of low-educated black single mothers.

The paper proceeds as follows: Section 2 is devoted to review the previous literature. Section 3 introduces the theoretical model that gives rationale to empirical analysis. Section 4 describes the data used in this paper. Section 5 explains the empirical strategy. Finally, in section 6, I test whether welfare reform affects the BMI and obesity of low-educated single mothers.

2. Previous Literature

There have been several pieces of literature that show the health status of welfare recipients. Danziger et al. (2000) showed the prevalence of physical and mental health problems in welfare recipients in an urban Michigan county in 1997. The study found

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(2003a).

that 34.7 percent of the respondents have mental problems, [3] and 18.7 percent of the respondents have physical health problems.[4] Loprest et al (1996) draw the prevalence of health status of welfare recipients using three national survey data: 1) the 1990 Survey of Income and Program Participation (SIPP), 2) the 1990 National Health Interview Survey (NHIS), and 3) 1992 National Longitudinal Survey of Youth (NLSY). The study found that 16.6 to 19.2 percent of welfare women have physical, mental, or other health problems that limit the kind or amount of work they can do. Olson et al (1996) reported that there are great differences in health status between welfare recipients and non-recipients, using the 1991 National Longitudinal Survey for Youth. According to the report, 17.1 percent of welfare recipients have medical problem for which they cannot seek work or medical condition that limits the amounts or kind of work she can do. The same figure of non-recipients is 6.9 percent. In the case of mental health problems, 24.2 percent of welfare recipients and 11.38 percent of non-recipients experience depression between 3 and 7 days a week. As for children's medical problems, 20.7 percent of welfare recipients and 10.9 percent of non-recipients have a child with a chronic medical condition.

Ploit et al. (2001) described the health of welfare recipients (and former recipients) and their children living in 4 large urban counties. The study showed that 25.5 percent of the survey sample rated them as being in fair or poor health, compared with 7.7 percent of women age 18 to 44 nationally. The paper demonstrated that physical

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[3] They defined presence of a mental health problem as the respondent's meeting the screening criteria for at least one of three psychiatric disorders: major depression, generalized anxiety disorder, and PTSD (Posttraumatic Stress Disorder).

[4] Using indicators in the Short Form (SF-36) Health Survey, they defined a women as having physical health problems if she both self-reports fair or poor health and is the lowest age-specific quartile of a physical functional scale.

health and mental health standard scores in the survey are 46.9 points and 47.1 points respectively, which are lower than those (50.0 points) for the general U.S. population for two health problems. Ensminger et al. (2001) demonstrated that there is a relationship between early welfare participation and later health problems through a cohort of African Americans from 1966-67 to 1997-98 on the south side of Chicago.

There have been several studies that investigated relationships between recipients' health status and their welfare dependence. Loprest (2001) showed that an average 21.9 percent of former recipients return to welfare, while 28.1 percent of former recipients who are in poor mental and physical health return to welfare. Earle et al. (2002) found that both having a health limitation and having a child with a health limitation are associated with a significantly increased risk of job loss among women previously on welfare roll. Horwitz et al (2002) showed that women who are in good physical health are more likely to be working than their counterparts through a demonstration program of Connecticut (Jobs First). Danziger et al. (2001) showed that there is an association between employment and psychological well-being among former welfare recipients in the state of Michigan.

There have been a few papers that examined the relationship between welfare reform and health or health behaviors. Kaestner et al. (2003b) investigated the effects of welfare reform on prenatal care and birth weight, using data from the National Natality files in the United States. They used a quasi-experimental research design where the target group is low-educated unmarried women, and the control group is low-educated married women. They found that welfare reform is associated with a small, clinically unimportant decrease in prenatal care use, and not with birth weight. Also, Kaestner et al

(2003a) examined the relationship between changes in the welfare caseload and the health and health behaviors of low-educated mothers. They found that the fall in caseloads is associated with a decline in binge drinking and regular exercise, but not associated with self-reported health status. Joyce et al (2001) investigated the effects of welfare reform on perinatal health and health care use of Latino immigrant women in California, New York, and Texas. Specifically, this paper examined the effects of immigrant eligibility that prevents immigrants from being welfare recipients for at least 5 years from the date when they immigrate to U.S. They used uninsured rate, early initiation of prenatal care, and low birth weight as dependant variables, and exploited the control group who were US-born Latino in 3 states, respectively. There is no evidence that welfare reform might affect the perinatal health and health care use of Latinos.

3. Theoretical Model

In general, when economists analyze welfare recipients' work incentive, they have used a static labor supply model. This model is well illustrated in leisure-income graph (Figure 3). Budget constraint of a non-recipient is line ACE where slope is –w (hourly wage rate). Line ABCE is that of a recipient, if tax rate (t) on the earnings in the welfare program is equal to one. If not, line ABDE is her budget constraint. Line AB is welfare guarantee (G) assuming her non-labor income is zero. Budget constraint of a recipient is $Y = WH + N + G - t\,(WH + N)$, and her benefit formula is $B = G - t\,(WH + N)$. If the tax rate decreases from 1 to some lesser value ($BC \rightarrow BD$), a welfare recipient might be expected to increase her labor supply, because her relative price of leisure will increase.

Figure 4 shows the effects of work requirements on the labor supply of a recipient assuming that she is required to work at least line AH hours in order to be continued on welfare roll. Her budget constraint is line AGFDE. A welfare recipient who now does not work might be anticipated to follow one of four different paths: 1) one who still does not work and is off welfare roll along path 1, 2) following path 2, one who works a little but off welfare because she cannot comply to the minimum working hours required, 3) one who works the minimum hours required and still is on the welfare roll along path 3, or 4) one who works more than the minimum hours required and is off welfare roll along path 4.

In the case of time limit that forces a welfare recipient to be off roll after some point, it would move her to the constraint of non-recipient in figure 3, and so might increase her labor supply because her relative price of leisure will increase.

I will now discuss effects of welfare reform on obesity of a low-educated single mother, which might force her to increase her labor supply in a household production model. Her relative price of time will increase as her working hours increase. She would, therefore, substitute market goods for her scarce time in producing commodities that enter her utility function using market goods and her time. For example, assume that health is one of the commodities that are produced by meals and her time. We can think that obesity may be among the commodities produced, and be thought of as a byproduct in view of that it is not a desired status for most single mothers. Also assume that a single mother increases her labor supply. She will substitute convenient or fast foods that require less time for a time-intensive meal, because her relative price of time increases. This fact, as indicated by Chow et al. (2002), raises caloric consumption by inducing a

substitution toward higher caloric intakes. In view of labor supply, therefore, welfare reform will have positive effects on weight outcomes of single mothers.

On the other hand, a factor that goes in the opposite direction is that reform may raise income (Schoeni et al (2000), Blank (2003)). If health or an appropriate diet is a superior goods, BMI and obesity of single mothers may fall. Hence, taken together, our study leads to the expectation that welfare reform will affect the BMI and obesity of single mothers positively or negatively.

4. Data

Behavioral Risk Factors Surveillance System (BRFSS)

The primary data used in this analysis comes from the BRFSS, which was designed to measure behavioral risk factors in the adult population 18 years of age or older. The BRFSS was initiated in 1984 with 15 states, and the number of states participating in the survey increased to all 50 states and the District of Columbia by 1997.[5] Data are collected from a random sample of adults (one per household) through a telephone survey[6]. Using the repeated cross sections data from 1990 through 2002, I examined the effects of welfare reform on the BMI and obesity of single mothers. I chose 1990 as the starting year of this paper, because a number of states began to participate in the survey from 1990. I limited the sample to the low educated mothers ages 18 to 54 that consist of two

[5] The states that did not participate in the survey over years are as follows; Alaska, Arkansas, Kansas, Nevada, New Jersey, and Wyoming in 1990, Kansas, Nevada, and Wyoming in 1991, Arkansas, and Wyoming in 1992, Wyoming in 1993, Rhode Island in 1994, California, and DC in 1995, Tennessee in 1996. As for 1988 and 1989, 14 states and 11 states did not participate respectively.

[6] Although there is no direct method to compensate for non-telephone coverage in the BRFSS, post-stratification weights are used to correct for any bias by non-telephone coverage.

groups: the target group is low-educated single mothers, and control group is low educated married mothers. Also, I had subgroups by race: white low-educated mothers and black low-educated mothers. The BRFSS contains geographic information that allows us to merge information about state-specific welfare policy and state economic conditions to individual information.

Welfare waivers and TANF

It would be difficult to define welfare waiver programs that vary across states on a standard criterion. Some affect a whole state, while others affect a few counties that were introduced in experimental sites. While some have generally standard provisions, others contain more complex provisions. First of all, in this paper, I define only statewide waivers as waiver programs, and do not include county-specific programs. As criteria to characterize various waivers across states, I used six different types as follows: 1) work requirement, 2) time limit, 3) JOBS work exemption, 4) JOBS sanctions, 5) increases in earnings disregard, and 6) family cap. Most waiver programs contain more than one type among them. These criteria are the standard that the studies of the Council of Economic Advisers (CEA 1997, 1999) and other papers (Schoeni et al, 2000) have used to quantify welfare waiver programs.[7] As a date of welfare waivers in each state, the literature used the earliest date among the dates for six major waivers in order to examine the effects of welfare reform on outcomes such as welfare participation, caseloads, and employment. While the 1997 CEA Technical Report used state approval dates, the 1999 CEA Technical Report employed implementation dates. As the 1999 CEA Technical Report

[7] The ways to define and code welfare waivers are discussed in detail in the appendix, which are quoted from the 1997 Council of Economic Advisers (CEA) Technical Report.

pointed out, although some waivers were initially approved for state-wide implementation, they were implemented in selected areas of the state in the beginning but were eventually phased-in state-wide. Information on the progress of implementation is not available for all states. Therefore, following the 1999 CEA Report, this paper employed implementation dates instead of approval dates as dates to signal implementation. Table 1 contains the dates when the first major welfare waiver was implemented in each state.

Based on the success of waiver programs since 1992, the AFDC program have been replaced with TANF, the goals of which are similar to those of waiver programs across states. Under TANF, states have been required to implement provisions that are similar to those of the popular state-level waiver programs, while at the same time states have had more authority over the program.

Although PRWORA was signed into law in August of 1996, the official implementation dates of the TANF program varied across states, because a given state could not implement its program until the Federal government certified the plan submitted by the state. Furthermore, for the five states California, Mississippi, New Jersey, New York, and Wisconsin, the officially certified dates are different from actual dates because they did not implement TANF until the actual dates even though they had certification. The earliest implementation date was September 1996 and the latest was January 1998. Table 1 also lists the detailed dates for TANF.

Caseload

This paper used the average monthly caseloads for years 1990 through 2002 that are measured as the average monthly number of families in the welfare program. I obtained the data from the Administration for Children and Families of the Department of Health and Human Services (www.acf.dhhs.gov). I cannot find the caseloads for July through September in 1997, so I filled them in using the interpolations method of state-specific linear time trend. As for the data for the fourth quarter of 2002, this paper used the caseloads data from the Center for Law and Social Policy (CLASP), because the data is not yet available in the Administration of Children and Families. CLASP also gathers the caseloads with the cooperation of state TANF agencies, but the data is slightly different from that in the Administration of Children and Families (Rahmanou et al, 2003).

Policy variables

First of all, I constructed three policy dummy variables to indicate whether or not welfare reform is implemented in a specific year by state. The dates that I used as indicators are as follows: 1) dates of first six major waivers or TANF (so called 'welfare policy I'), 2) dates of first five major waivers excluding the family cap program or TANF (so called 'welfare policy II'), and 3) dates of first four major waivers except both family cap and increased earnings disregard program or TANF (so called 'welfare policy III'). Each implementation date of six major waivers is shown in detail in appendix table A1. As for states that did not implement any waiver program under AFDC (21 states), I employed their implementation dates of TANF as welfare reform dates.

As Table 1 shows, there are only three states that have different dates between welfare policy II and I: Arkansas, Maryland, and Mississippi. Both Arkansas and

Mississippi have implemented no waiver program except the family cap program until their implementation dates of TANF. The dates of welfare policy II and III in the two states, therefore, would be their implementation date of TANF. Maryland has implemented other waivers than the family cap program, so its date in welfare policy II and III would be its implementation date of other waiver programs. Generally speaking, the purpose of the family cap program would be different from those of other waiver programs in the sense that the former would keep women from children out of wedlock. Hence, a welfare policy II variable would be meaningful even though there might be a few differences between the dates of welfare policy II and I. In the case of welfare policy III, based on dates of four major waivers that exclude both the increased earnings disregards program and the family cap program, there are six states that have different dates between welfare policy III and I: Arkansas, California, Illinois, Maryland, Michigan, and Mississippi. The increased earnings disregards program would be different in that it only gives an incentive that may induce recipients to work more, instead of any penalties or sanctions that may compel them to be self-sufficient. Therefore, welfare policy III would well represent characteristics of welfare reform such as self-sufficiency more than any other variables.

Second, I used the natural logarithm of the caseloads described above as one of policy variables.

Third, I constructed three policy dummy variables to indicate whether or not waiver programs are implemented in a specific year by state. The dates that I used as indicators are as follows: 1) dates of first six major waivers (so called 'waiver I'), 2) dates of first five major waivers excluding family cap program (so called 'waiver II'),

and 3) dates of first four major waivers except both family cap and increased earnings disregard program (so called 'waiver III').

Fourth, I constructed a TANF dummy variable to indicate whether or not the TANF program is implemented in a specific year by state, based on the implementation dates of TANF in Table 1.

As Table 2 shows, there are only three states that have different dates between waiver II and I: Arkansas, Maryland, and Mississippi. Both Arkansas and Mississippi have implemented no waiver program except the family cap program until their implementation dates of TANF. The two states, therefore, are considered to implement no waiver program in other policy variables (waiver II and III). Maryland has implemented other waivers than the family cap program, so its date in waiver II and III would be its implementation date of other waiver programs. In case of waiver III, based on dates of four major waivers that exclude the increased earnings disregards program in addition to family cap, there are six states that have different dates between waiver III and I: Arkansas, California, Illinois, Maryland, Michigan, and Mississippi.

This paper considered states as having implemented a policy in a given month if the policy was implemented by the end of the previous month. I coded individuals as being under welfare reform or not based on the implementation of policy at the beginning of previous month.

Food prices

I constructed the fast-food price and the food at home price from prices in the ACCRA Cost of Living Index that is published quarterly by the American Chamber of Commerce

Researchers Association (ACCRA) for between 250 and 300 cities.[8] Following Chou's method, I acquired quarterly state-specific prices that are population-weighted averages of city prices, and then obtained annual prices as averages over the four quarters in a given year.

The fast-food price was constructed from three primary fast-food prices that ACCRA reported: Hamburger Sandwich, Pizza, and Fried Chicken.[9] It is a weighted average of these three prices, where the weights are equal to each other during the years for 1990 through 2002. The weights reported by the ACCRA are based on government survey data on expenditure patterns for the professional and executive household in the top quintile.

The food at home price was also constructed from the prices of 13 grocery items in the same source: steak, beef, sausage, chicken, tuna, milk, eggs, margarine, cheese, potato, banana, lettuce, and bread. It is also a weighted average of these items, where the weights are the average expenditure shares of these items as reported by the ACCRA in the period from 1990 to 2002. Finally, I deflated the nominal prices to get real prices used in my analysis. I used as deflator the Consumer Price Index (CPI) of the Bureau of Labor Statistics for the U.S. as a whole (1982-84 =1). There are some missing values for the food prices, so I filled them in using the interpolations or extrapolations method of state-specific linear time trend.[10]

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[8] These two prices are similar to those of Chou's paper (2002).

[9] In the report of ACCRA, there are descriptions for three fast-foods in detail as follows: Hamburger Sandwich is a McDonald's Quarter-Pounder with cheese, Pizza is a thin crusted cheese pizza at Pizza Hut or Pizza Inn, and Fried Chicken is a fried chicken at Kentuckey Fried Chicken or Church's.

[10] Missing observations are as follows: 1991 in Connecticut, 1990 in DC, 1992, 1993, 1994, 1997, 1998, 1999, 2000, 2001 in Hawaii, 2002 in New Hampshire, 1990, 1991, 1992, 1993, 1994, 1996, 1997, 1998 in New Jersey, and 2002 in Vermont. I excluded 2

Cigarettes prices

I obtained state- and year-specific cigarettes prices from the Tax Burden on Tobacco (Orzechowski, et. al, 2002) The price is given a weighted-averaged price per pack, using national weights for type of cigarettes (regular, king, 100-mm) and type of transaction (carton, single pack, and machine). It includes federal and state excise taxes. The Tax Burden on Tobacco gives the price of cigarettes as of November in each year, so I generated annual average prices and adjusted for changes in the state excise tax rate. I also deflated the nominal prices using the CPI (1984-86 = 1).

BMI (Body Mass Index) and obesity

BMI is the standard measurement for weight, which is defined as weight in kilograms divided by height in meters squared (kg/m^2). According to the National Institutes of Health (1998), obesity is defined as a BMI of equal or more than 30 kg/m^2, overweight is between 29.9 and 25.0, normal is between 24.9 and 18.5, and underweight is below 18.5. This paper used two weight outcome variables: 1) BMI and 2) obesity, an indicator variable whether or not an individual is obese (equal or more than a BMI of 30 kg/m^2).

5. Econometric Model

The pooled cross-sections method with fixed effects is the standard econometric model in order to evaluate welfare reform that is implemented over many years and across states,

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states, Maine and Rhode Island in my paper, because prices data for the 2 states were not almost available.

which compares outcomes across different policy regimes (the combination of across states and years). Basically, I will use this standard approach as follows:

$$(1) \qquad Y_{ist} = \beta_s + \beta_t + R_{st}\gamma + Z_{st}\Psi + X_{ist}\Pi + \varepsilon_{ist}$$

i = 1,..., N (Individuals)
s = 1,..., 49 (states)
t = 1990,..., 2002 (years)

In equation (1), Y_{ist} is an indicator of one of two weight outcomes of interest: 1) BMI of individual i in state s and year t and 2) probability of obesity of individual i in state s and year t. I used ordinary least square regression (OLS) in order to estimate all equations in my paper, although probability of obesity is dichotomous. The general weakness of the linear probability model is that standard errors of estimates may be biased because of heteroscedasticity. I obtained robust standard errors of Huber/White/Sandwich in STATA program to correct for this problem. Furthermore, the robust standard errors are calculated under the assumption that observations from the same state by year are not independent (Bertrand et al. 2002). Advantage of linear probability model over logit or probit model is that the OLS estimates are the easiest to interpret.[11]

The β_s term represents state fixed effects, which controls for unobservable influences that vary between states and are constant within a state over time, such as political difference across states. The β_t term stands for year fixed effects, which controls for the time-variant unobservable that similarly apply for all states; for example,

macroeconomic policy environment. Z_{st} is a vector of state-level variables that also control for time-varying state factors: current unemployment rate, one year lags of unemployment rate, fast-food prices, food at home prices, and cigarettes prices. X_{ist} is a vector of demographic characteristics that include the individual age and its square, income, and race and ethnicity. R_{st} is a vector of welfare reform variables. This paper employs ten alternative specifications in welfare reform variables: Model 1) welfare policy I, Model 2) welfare policy II, Model 3) welfare policy III, Model 4) caseload, Model 5) waiver I, TANF, caseload, Model 6) waiver II, TANF, caseload, Model 7) waiver III, TANF, caseload, Model 8) welfare policy I, caseload, Model 9) welfare policy II, caseload, Model 10) welfare policy III, caseload.[12] Therefore, equation (1) can isolate the effects of state and federal welfare reform from other determinants of low-educated single mother's weight outcomes that vary over time, across states, and over time within states.

In case of specification model using caseload, the regression equation will be as follows:

$$(2) \qquad Y_{ist} = \beta_s + \beta_t + \gamma\, Caseload_{st} + Z_{st}\Phi + X_{ist}\Omega + \varepsilon_{ist}$$

Many papers show that the change in the caseload was due to policy as well as other factors such as a strong economy (Blank 2002). Therefore, it should be necessary to differentiate the effect of changes in welfare caseload due to policy and effect of changes

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[11] I also estimate some models using the logit regression procedures and find that the results are very similar to those of the linear probability model. The estimates are shown in the TableA2 through A6 in the appendix.

[12] The value in waiver dummy variable turns into zero when TANF is implemented in the state.

in the welfare caseload due to other factors. The following model would be one that allow for the different effects according to the cause of the change in the caseload.[13]

$$(3)\ Y_{ist} = \beta_s + \beta_t + \gamma_1 C(Policy)_{st} + \gamma_2 C(Others)_{st} + Z_{st}\Phi + X_{ist}\Omega + \varepsilon_{ist}$$

In equation (3), the coefficient on C(Policy), γ_1, shows the effect of welfare reform on weight outcomes, and γ_2 represents the effect of residual factors besides policy. We first must consider the structural model in which the dependent variable is the caseload in order to construct the two variables, as in the following:

$$(4)\ Caseload_{st} = \alpha_s + \alpha_t + \delta_1 Waiver_{st} + \delta_2 TANF_{st} + Z_{st}\Gamma + \mu_{st}$$

Second, we can predict the variables C(Policy) using the coefficients and values of Waiver and TANF variables in equation (4), as in the following.

$$(5)\ C(Policy)_{st} = \delta_1 Waiver_{st} + \delta_2 TANF_{st}$$

Finally, we can obtain the variables C(Factors) using residual factors besides policy as follows:

$$(6)\ C(Factors)_{st} = Caseload_{st} - C(Policy)_{st}$$

It is worth noting that there may be potential problems in this method because it is difficult to separate the effect due to policy from the effect due to other factors in the equation (4). If equation (4) has any specification errors, the errors will be transferred to equation (3), because we construct two caseload variables based on the estimates in the equation (4). We can shun this problem by substituting equation (5) into (6), the result of that into equation (2), and estimating the following model without estimating equation (4) (Kaestner et al, 2003):

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[13] These models (equation (3) through (7)) follow the method by Kaestner et al (2003).

$$(7)\quad Y_{ist} = \beta_s + \beta_t + (\gamma_1 - \gamma_2)\delta_1 Waiver_{st} + (\gamma_1 - \gamma_2)\delta_2 TANF_{st} + \gamma_2 Caseload_{st} + Z_{st}\Phi + X_{ist}\Omega + \varepsilon_{ist}$$

A coefficients of two policy variables, $(\gamma_1 - \gamma_2)\delta_1$, represents the difference between the effect of the caseload due to the welfare waiver program and the effect of the caseload due to other factors. $(\gamma_1 - \gamma_2)\delta_2$ stands for the difference between the effect of the caseload due to TANF and the effect of the caseload due to other factors. Coefficient of caseload variable, γ_2, measures the effect of the caseload only due to other factors. Since caseloads are supposed to be negatively correlated with policy variables in equation (4), signs of δ_1 and δ_2 will be negative, so the coefficients for policy variables will have the reverse sign of the true difference.

The identification assumption of equation (1) is that there is no omitted variable that affect weight outcomes of low-educated single mothers and which are simultaneously correlated with the welfare reform. If this assumption is not valid, estimates of equation (1) will be biased; even if there are any effects of welfare reform on weight outcomes of single mothers, they represent only association but causal relationship. To address the omitted bias, this paper employed control groups who would be unlikely to be affected by welfare reform, but who might be similar to single mothers (target group) if welfare reform is not implemented. It should be very important to choose appropriate control groups. Since this paper focuses on the low-educated single mothers as the target group, the low-educated married mothers would be the control group, because the married women are unlikely to be affected by AFDC or TANF, and their

BMI and obesity would be similar to those of single mothers in the absence of welfare reform.

This approach is commonly referred to as a difference-in-differences (DD) method or quasi-experiments method. The econometric model for control group is as follows:

$$(8) \qquad Y_{ist} = \tilde{\beta}_s + \tilde{\beta}_t + R_{st}\tilde{\gamma} + Z_{st}\tilde{\Phi} + X_{ist}\tilde{\Omega} + \eta_{ist}$$

i = 1,..., N (Individuals)
s = 1,..., 49 (states)
t = 1990,..., 2002 (years)

We can expect that the coefficient on the welfare reform ($\tilde{\gamma}$) in the equation (8) should be zero, because few married women receive AFDC or TANF and are unlikely to be affected by welfare reform.[14] If the coefficient is not zero, the fact implies that there might be omitted variables that affect the BMI and obesity of a low-educated single mother, and which also are correlated with the welfare reform. Therefore, if DD estimate ($\gamma - \tilde{\gamma}$), subtraction of the effects of omitted variables from the effects of welfare reform, is zero, effects of welfare reform might be attribute to omitted variables and at best suggest only an association between welfare reform and BMI and obesity.[15] If not, the estimate means causal effects of welfare reform on BMI and obesity.

[14] Even if married women can be recipients in the AFDC-UP program, there are few married women who participate in the program (www.acf.dhhs.gov).
[15] Standard errors of DD estimates are calculated from estimates of target group and control group, assuming that they are independent each other.

6. Results

Descriptive analysis

Table 3 contains definitions of variables used in this paper. Means and standard deviations of the variables are presented in Table 4 for low-educated mothers, Table 4.1 for white mothers, and Table 4.2 for black mothers. The average BMI and probability of obesity for 15-years or less educated single mothers are 25.9 kg/m^2 and 21.1 percent respectively, which are approximately similar to those (25.6 kg/m^2, 18.5 percent) of their control group. In the case of other samples, those of BMI and obesity for target group are similar overall to those for their control group. Tables 4.1 and 4.2 show that means of BMI and probability of obesity of black women are higher than those of white women.

The average age for 15-years or less educated single mothers is 31.7 years, which is lower than that for their control group (35.4 years). For subgroups by race, average age for the target group is lower than that for the control group. Household incomes of married women are higher than those of unmarried women, but that may be partially due to the fact that the household incomes include spouse's incomes. Household incomes of black women are known to be lower than those of white women.

Regression analysis for 15 years or less educated mothers

Table 5 contains ordinary least squares regression estimates for 15-year or less educated mothers who are age 18 to 54. The dependent variables are listed in the column headings, and the independent policy variables are shown in Column one in which there are shown ten alternative model specifications. OLS estimates are presented in Column two for

target group, Column three for control group, and Column four for difference-in-differences estimates.

Estimates for the target group indicate that there are positive associations of implementation of welfare reform with the BMI and obesity of single mothers in Table 5. In particular, the implementation of welfare policy III (Model 3) is associated with a statistically significant 0.3 point increase in BMI, which represents relative effects of approximately 1.2 percent in terms of sample mean for 15-years or less educated single mothers (25.9). This increase means about 2.0 pounds increase in weight. For example, if the BMI of a single mother whose height is five foot and five inches is 25.9, her weight will be 155.5 pounds. The implementation of welfare policy III is associated with the fact that her weight increases from 155.5 pounds to 157.5 pounds. Welfare policy III is also associated with a 1.7 percentage point increase in the probability of obesity, which mean approximate a 8.1 percent increase in respect of their sample mean (21.1 percentage).

It is worth noting at this time that magnitudes of the estimates in the both welfare policy II and I are smaller than those of welfare policy III, and are mostly not statistically significant. As noted previously, welfare policy III would be stricter than welfare policy II and I in the sense that the primary goal of the family cap program would keep women from children out of wedlock, and the increased earnings disregards program may induce recipients to work more, but not sanction those who do not comply with the provisions or terminate their eligibility. Therefore, estimates of welfare policy III must be distinct from those of other policy variables. Furthermore, there might be few, if any, differences between the estimates of welfare policy II and I. As noted previously, it might be

attributable to the fact that there are only three states that have different dates between welfare policy II and I.

Models 4 through 10 used the natural logarithm of welfare caseload as one of the independent variables. The estimate for the target group in Model 4 indicates that a 1 log point decline in caseload is associated with a 0.1 point increase in BMI, but it is not statistically significant. As described above, there is 59.4 percent drop in caseloads from 1994 (5,032,632 families) to 2002 (2,044,486 families), which means a 0.9 log point decline in caseloads. Hence a decline of this magnitude over these periods is associated with about a 0.1 point increase in BMI. The magnitude is very small, while the standard error is very large. We acknowledge that caseload changes are due to welfare reform as well as to economic factors. As expected in the theoretical model above, welfare reform will have positive effects on BMI and obesity due to increase of relative time price, while welfare reform will have negative effects due to increased income. Since changes in the caseload are affected by welfare reform as well as economic factors such as unemployment, it is supposed that effects of caseload on BMI and obesity would be more ambiguous than those of only welfare reform.

Models 5 through 10 based on equation (7) differentiate the effect of changes in welfare caseload due to policy and effect of changes in the welfare caseload due to other factors. In particular, coefficients of waiver III in Model 7 (0.3953) and welfare policy III in model 10 (0.3379) are both significant. These results means that there are differences between effects on BMI and obesity of changes in the caseload due to the welfare waiver program (γ_1) and effects of changes in the caseload due to other factors (γ_2), and the former (γ_1) is more negatively associated with BMI and obesity than the latter (γ_2) is. To

see why, assume that the effect of the welfare waiver program on the caseload (δ_1) is -0.2.[16] In the case of Model 7, since $(\gamma_1 - \gamma_2)\delta_1$ is equal to 0.3953 and γ_2 is –0.0651,[17] γ_1 would be –2.0407. In case of Model 10, if following these procedures, γ_1 would be –1.7375. This result suggests that one log point decline in the caseload due to welfare policy III is associated with a 1.7 point increase in BMI. If we assume that the 0.9 log point decline in the caseload over the period from 1994 to 2002, and the share of the caseload changes due to welfare policy III is 20 percent, then, decline in the caseload due to welfare policy III will be 0.18 log points over the same period. Hence, the 0.18 log point decline in the caseload are associated with a 0.31 point increases in BMI (0.18 x 1.7). We can know that results of Model 10 are broadly consistent with those of Model 3.

In the case of effects on obesity of policy variable in Model 7, if following the procedures above, γ_1 would be -0.1042. This means that one log point decline in the caseload due to waiver programs is associated with a 10.4 percentage point increase in the probability of obesity. In case of Model 10, γ_1 is –0.0788.

Note that the magnitude of estimates for TANF is very small and insignificant. These findings are surprising, because we expected effects of TANF to be similar to those of waiver programs. There are two ways to read these results. As previous studies point out, there is little variation in dates of TANF implementation that might prevent researchers from identifying the effects of TANF (Schoeni 2000, Moffit 2002). The other

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[16] CEA (1997) showed that share of caseload change due to waivers is 13 to 31 percent. Figlio et al (1999) reported the share is 0 to 24 percent. According to Blank's study (2001), the share is 22 to 28 percent.

interpretation of these results is that TANF might have more negative effects on the BMI and obesity of the single mothers than welfare waiver programs might have.

The difference-in-differences estimates method is primary strategy of this paper in order to evaluate welfare polices. This paper classified low-educated single mothers as a target group, and low-educated married mothers as a control group, primarily because the control group would not be affected by welfare reform. Column 3 in the Table 5 contains estimates for low-educated married mothers.

As expected previously, there are little consistent estimates for the control group. The magnitudes of estimates are in general so small and statistically not significant, except for TANF variables in a few models. Based on the results for the control group in Table 5, we could recognize two important facts: 1) there might be few, if any, omitted variables that would affect weight outcomes, also which would be correlated with welfare reform, and 2) married mothers are not affected by welfare reform.

Column 4 in the Table 5 lists DD estimates, which are obtained by subtracting the effects of the control group on its weight outcome from the effects of target group on its weight outcome. If DD estimates are statistically significant, those results would mean causal effects beyond associations between welfare reform and BMI and obesity. If you look at DD estimates in Column 4, you can know that the results are broadly similar to those for the target group in Column 1. These findings are previously anticipated when we analyze results for the control group, because estimates for the control group show that there are little consistent relationships between welfare reform and BMI and obesity.

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[17] Coefficient for caseload variable in model 7 represents effects of changes in the caseload due to other factors.

DD estimates show that the implementation of welfare policy III (Model 3) causes BMI of single mothers to increase by 0.3 points, which represents relative effects of approximately 1.3 percent in terms of sample mean (25.9). DD estimates in models 7 and 10 are similar to those for the target group in the corresponding models. Coefficients of waiver III in Model 7 (0.4488) and welfare policy III in Model 10 (0.3424) are both significant. Following the same calculation described above, we can know that one log point decline in the caseload due to waiver programs causes the BMI of single mothers to increase by 2.4 points. In the case of Model 10, for welfare policy III the same figure would be 1.9 points.

I looked at the estimates of state level variables and demographic variables roughly, because the main purpose of this paper examines the effects of welfare policy on BMI and the obesity of the single mother. Table 5.1 lists the estimates that are based on the equations where the independent variable for welfare policy is welfare policy III. [18] According to the estimates in Table 5.1, there is a negative association between food at home prices and weight outcomes, the results of which are consistent with findings of previous literature (Chou, 2002, Lakdawalla, 2002). As generally expected, a respondent's household income is negatively associated with weight outcomes, and blacks and Hispanics have higher value in the weight outcomes than whites have.

Regression analysis for 12-years or less educated mothers

Table 6 contains ordinary least squares regression estimates for 12-years or less educated mothers. The results for target group show that there also are positive associations

between weight outcomes and welfare policy variables, but the coefficients are mostly not statistically significant. The implementation of welfare policy III (Model 3) is associated with a 0.2 point increase in BMI, which represents a relative effect of approximately 0.9 percent in terms of sample mean (26.1). Policy III is also associated with a 1.2 percentage point increase in the probability of obesity, which means approximately 5.2 percent in respect of their sample mean (22.2 percentage). The estimate for the target group in Model 4 indicates that one log point decline in caseload is associated with a 0.1 point increase in BMI. Estimates for the target groups in models 5 through 10 are similar to those for the target group (15-years or less educated single mothers) in the Table 5.

A somewhat surprising finding from Table 6 is that the magnitudes of estimates for 12-years or less educated single mothers are smaller than those of estimates for 15-years or less educated single mothers. There are two ways to interpret these results. One might think that 15-years or less educated single mothers have increased their labor supply more than 12-years or less educated single mothers under welfare reform since 1992. This interpretation is due to the fact that most of recipients have many potential barriers to employment such as job experience, heath, and alcohol and drug abuse, and there are negative associations between the barriers and years of education (Olson et al, (1996), Romero et al (2002), Loprest (2002)). Given that the former group (15-years or less educated single mothers) would supply their labor more than the latter group (12-years or less educated single mothers), the former might have higher BMI and be more likely to be obese than its counterpart. As indicated by Chow et al (2002), this is because

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[18] Even though coefficients for demographic or state-level variables are estimated on another model specifications, the results are overall similar to those showed in the table

the former who face relatively higher price of time will substitute convenient or fast foods that require less time for a time-intensive meal, and this fact raises caloric consumption by inducing a substitution toward higher caloric intakes. In fact, Chow's paper showed that there are positive associations between BMI and obesity and hourly wage rate and weekly hours.

The other interpretation of these results is based on the fact that there are negative associations between BMI and job-related exercise (Lakdawalla et al, 2002). In general, it might be expected that a 12-years or less educated single mothers would be likely to be employed in a job that requires more physical activity than a 15-years or less educated single mothers. Therefore, even though the two groups consume the same calories, the weight outcomes of 12-years or less education group would be less positively affected than its counterpart, because a 12-years or less educated single mothers might expand their calories more than a 15-years or less educated single mothers. These interpretations also might give a rationale for the results that the TANF implementation has negative effects on the BMI and obesity of 12-years or less educated single mothers (DD estimate in Model 5).

Regression analysis for subgroups by race

Tables 7 through 9 show estimates for subgroups by race.[19] The results for low-educated white mothers are in tables 7 and 8, which suggest that welfare reform has little effects on BMI and obesity of white single mothers. One thing to note is that there are positive associations between the caseload and weight outcomes in the Model 4, which is contrary

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6.1 in respect of their sign. Another estimates are available on request.

to the results for whole sample (15-years or less educated group or 12-years or less educated group). One might think that their weight outcomes will decline due to increased income that is caused by welfare reform as well as economic factors. However, all estimates in tables 7 and 8 are insignificant, and the magnitudes are very small. These findings can also be interpreted by the fact that offsetting effects may reduce the BMI and obesity of white single mothers due to their higher income.

There are estimates for low-educated black single mothers in Table 9 which show that the black single mothers are much more affected by welfare reform than is the white group, and there are positive associations of implementation of welfare reform with BMI and obesity of black single mothers. Table 9 shows that the implementation of welfare policy III (Model 3) is associated with a statistically significant 0.8 point increase in BMI of 12-years or less educated black mothers, which means about 5.0 pounds increase in weight. The welfare policy III is also associated with a 4.4 percentage point increase in the probability of obesity. Coefficient for the target group in Model 7 in Table 9 shows that if following the procedures used above, one log point decline in the caseload due to waiver programs is associated with a 5.1 point increase in BMI, and a 25.6 percentage point increase in the probability of obesity.

On the other hand, if one look at the estimates for the control group in Table 9, one can acknowledge that there might be omitted variables that would affect weight outcomes, which also would be correlated with welfare reform. Taking in all considerations, DD estimates in Table 9 suggest that welfare reform has no causal effects on the BMI and obesity of low-educated black single mothers.

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[19] These subgroups exclude Hispanic women, so the white group is non-Hispanic white and the black group is also non-Hispanic black.

7. Conclusion

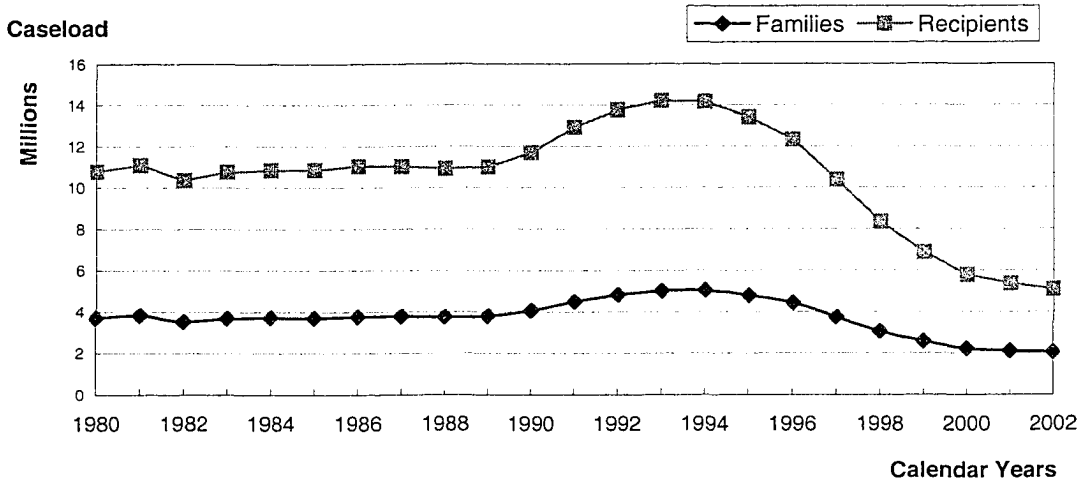
There has been welfare reform since 1992; the purpose of which is that welfare recipients become self-sufficient off welfare roll. There have been remarkable consequences due to the welfare reform: a decrease in caseloads, a decline in welfare participation rate, and an increase in labor market participation. On the other hand, there are some concerns about the well-being of poor single mothers. One might suggest that welfare reform will affect the well-being of poor single mothers negatively. If so, the admirable outcomes may not be sustainable, and ex-welfare recipients who left welfare roll may be back on welfare roll or be non-recipients with no working job.

Assuming that high BMI or obesity will cause health problems, this paper examined the effects of welfare reform on the BMI and obesity of low-educated single mothers. My overall conclusion is that there is little consistent evidence that welfare reform has effects on the BMI and obesity of low-educated single mothers, and, if any, it would be trivial. Specifically, the findings of this paper are as follows: 1) welfare reform causes the BMI of 15-years or less educated single mothers to increase by 0.3 points or 1.2 percent, which means about 2.0 pounds increase in weight, 2) welfare reform is also associated with a 1.7 percentage point or 8.1 percent increase in the probability of obesity of 15-years or less educated single mothers, 3) for 12-years or less educated single mothers, there is little evidence that the low-educated single mothers are affected by welfare reform except the fact that the TANF implementation has negative effects on the BMI and obesity of 12-years or less educated single mothers, 4) this study shows no evidence that low-educated white single mothers are affected by welfare reform, and 5)

for low-educated black single mothers, the implementation of welfare reform is associated with a 0.8 point increase in BMI and a 4.4 percentage point increase in the probability of obesity, but there is no evidence that welfare reform has causal effects on the BMI and obesity of low-educated black single mothers.

These findings are similar to the expectations of the theoretical model in this text: welfare reform will affect the BMI and obesity of single mothers positively or negatively. In short, this paper has little consistent evidence partially due to offsetting effects of welfare reform on the BMI and obesity of low-educated single mothers. This paper show little evidence that there are causal effects of welfare reform on the BMI and obesity of low-educated single mothers. Therefore, results of this paper suggest that there is, so far, little rationale that we must be concerned about health of low-educated single mothers due to welfare reform.

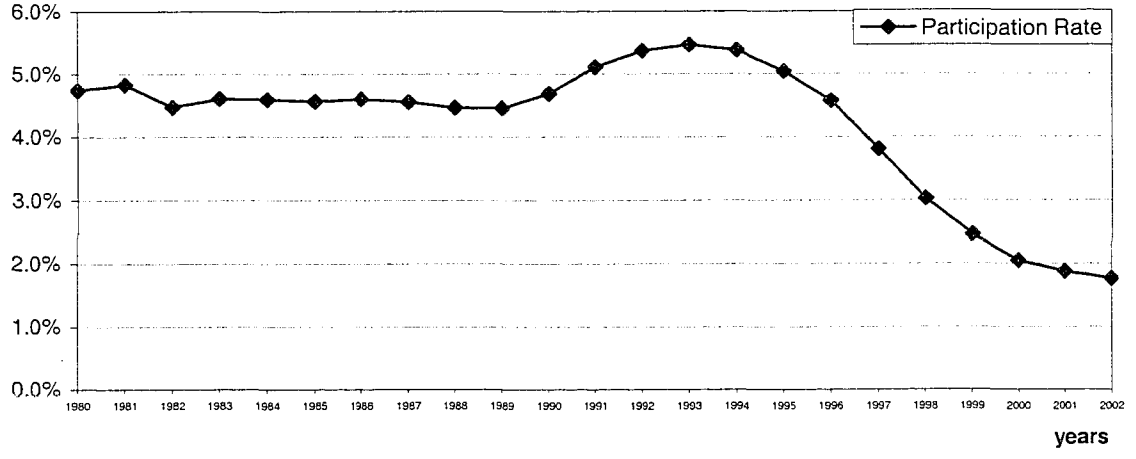
Figure 1. Average Monthly Caseloads
Calendar Years 1980-2002



Source: U.S. DHHS, Administration of Children and Families (www.acf.dhhs.gov), Center for Law and Social Policy (www.clasp.org).

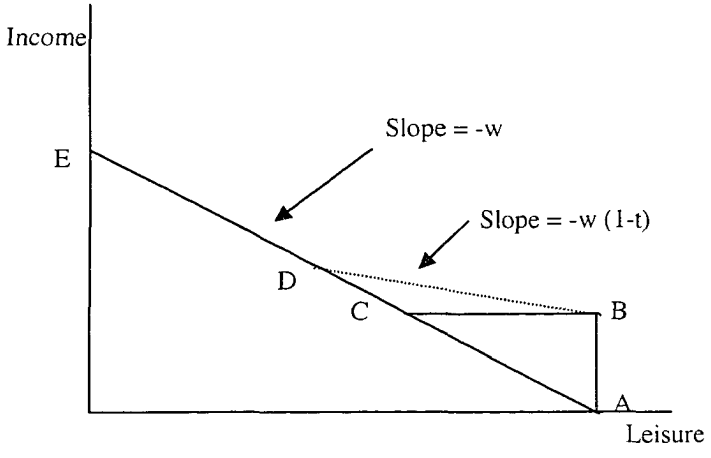
Note: As for families in 2002, this paper used first three quarters data in Administration of Children and Families and the fourth quarter data in Center for Law and Social Policy (CLASP), because data for the fourth quarter of 2002 is not available yet in Administration of Children and Families. CLASP also gathers caseload data with the cooperation of state TANF agencies, but the data is slightly different from that in Administration of Children and Families (Rahmanou et al, 2003). Recipients in 2002 are monthly average over January through September, because CLASP report only families caseloads but recipients.

Figure 2. Recipients as a Percent of U.S. Population
Calendar year 1980-2002



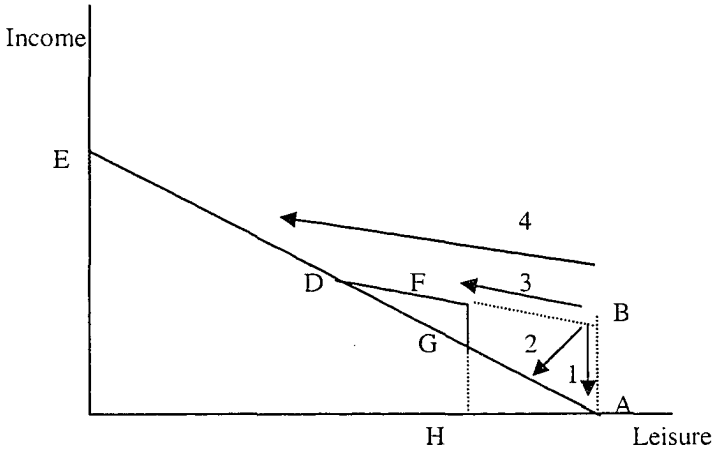
Source: U.S. DHHS, Administration of Children and Families (www.acf.dhhs.gov).
Note: Recipients in 2002 are monthly average over January through September.

Figure 3. Budget Constraint with a Means-Tested Program



Source: Moffitt (2002)

Figure 4. Effects of Work Requirements on Labor Supply



Source: Moffitt (2002)

Table 1. Dates of Waivers, TANF, and Welfare Policies

State	Implementation Date of First Major Waivers	TANF Implementation Date	Welfare Policy I	Welfare Policy II If Different from Welfare Policy I	Welfare Policy III If Different from Welfare Policy I
Alabama		11-15-96	11-15-96		
Alaska		7-1-97	7-1-97		
Arizona	11-1-95	10-1-96	11-1-95		
Arkansas	7-1-94	7-1-97	7-1-94	7-1-97	7-1-97
California	12-1-92	11-26-96(1-1-98) [1)]	12-1-92		9-11-95
Colorado		7-1-97	7-1-97		
Connecticut	1-1-96	10-1-96	1-1-96		
Delaware	10-1-95	3-10-97	10-1-95		
DC		3-1-97	3-1-97		
Florida		10-1-96	10-1-96		
Georgia	1-1-94	1-1-97	1-1-94		
Hawaii	2-1-97	7-1-97	2-1-97		
Idaho		7-1-97	7-1-97		
Illinois	11-23-93	7-1-97	11-23-93		10-1-95
Indiana	5-1-95	10-1-96	5-1-95		
Iowa	10-1-93	1-1-97	10-1-93		
Kansas		10-1-96	10-1-96		
Kentucky		10-18-96	10-18-96		
Louisiana		1-1-97	1-1-97		
Maine		11-1-96	11-1-96		
Maryland	3-1-96	12-9-96	3-1-96	10-1-96	10-1-96
Massachusetts	11-1-95	9-30-96	11-1-95		
Michigan	10-1-92	9-30-96	10-1-92		10-6-94
Minnesota		7-1-97	7-1-97		
Mississippi	10-1-95	10-1-96(7-1-97) [1)]	10-1-95	7-1-97	7-1-97
Missouri	6-1-95	12-1-96	6-1-95		
Montana	2-1-96	2-1-97	2-1-96		
Nebraska	10-1-95	12-1-96	10-1-95		
Nevada		12-3-96	12-3-96		
New Hampshire		10-1-96	10-1-96		

(Table 1 continued)

State	Implementation Date of First Major Waivers	TANF Implementation Date	Welfare Policy I	Welfare Policy II If Different from Welfare Policy I	Welfare Policy III If Different from Welfare Policy I
New Jersey	10-1-92	2-1-97(7-1-97) [1)]	10-1-92		
New Mexico		7-1-97 [2)]	7-1-97 [2)]		
New York		12-2-96(11-1-97) [1)]			
North Carolina	7-1-96	1-1-97	7-1-96		
North Dakota		7-1-97	7-1-97		
Ohio	7-1-96	10-1-96	7-1-96		
Oklahoma		10-1-96	10-1-96		
Oregon	2-1-93	10-1-96	2-1-93		
Pennsylvania		3-3-97	3-3-97		
Rhode Island		5-1-97	5-1-97		
South Carolina		10-12-96	10-12-96		
South Dakota	6-1-94	12-1-96	6-1-94		
Tennessee	9-1-96	10-1-96	9-1-96		
Texas	6-1-96	11-5-96	6-1-96		
Utah	1-1-93	10-1-96	1-1-93		
Vermont	7-1-94	9-20-96	7-1-94		
Virginia	7-1-95	2-1-97	7-1-95		
Washington	1-1-96	1-10-97	1-1-96		
West Virginia	2-1-96	1-11-97	2-1-96		
Wisconsin	1-1-96	9-30-96(9-1-97) [1)]	1-1-96		
Wyoming		1-1-97	1-1-97		

Note: Implementation dates are arbitrarily stated as of the first of month absent specific information to the contrary.

1) There is difference between date of official implementation and date of actual implementation of TANF in five states, and the dates in parenthesis are their actual dates.

2) New Mexico implemented its TANF program in July 1997. It was found unconstitutional in September 1997. A revised TANF program was implemented in April 1998.

Source: 1) Council of Economic Advisers (1999). "The Effects of Welfare Policy and the Economic Expansion on Welfare Caseloads: An Update: Technical Report," Washington, D.C.: Executive Office of the President of the United States.

2) US Dept. of Health and Human Services, Assistant Secretary for Planning and Evaluation, Available at: HTTP://aspe.hhs.gov/waiver-policies99. Accessed Sep.14, 2003.

Table 2. Implementation Dates of Major Waivers and TANF

State	Waiver I	Waiver II If Different from Waiver I	Waiver III If Different from Waiver I	TANF Implementation Date
Alabama				11-15-96
Alaska				7-1-97
Arizona	11-1-95	11-1-95	11-1-95	10-1-96
Arkansas	7-1-94	*	**	7-1-97
California	12-1-92	12-1-92	9-11-95**	11-26-96(1-1-98) [1]
Colorado				7-1-97
Connecticut	1-1-96	1-1-96	1-1-96	10-1-96
Delaware	10-1-95	10-1-95	10-1-95	3-10-97
DC				3-1-97
Florida				10-1-96
Georgia	1-1-94	1-1-94	1-1-94	1-1-97
Hawaii	2-1-97	2-1-97	2-1-97	7-1-97
Idaho				7-1-97
Illinois	11-23-93	11-23-93	10-1-95**	7-1-97
Indiana	5-1-95	5-1-95	5-1-95	10-1-96
Iowa	10-1-93	10-1-93	10-1-93	1-1-97
Kansas				10-1-96
Kentucky				10-18-96
Louisiana				1-1-97
Maine				11-1-96
Maryland	3-1-96	10-1-96*	10-1-96**	12-9-96
Massachusetts	11-1-95	11-1-95	11-1-95	9-30-96
Michigan	10-1-92	10-1-92	10-6-94**	9-30-96
Minnesota				7-1-97
Mississippi	10-1-95	*	**	10-1-96(7-1-97) [1]
Missouri	6-1-95	6-1-95	6-1-95	12-1-96
Montana	2-1-96	2-1-96	2-1-96	2-1-97
Nebraska	10-1-95	10-1-95	10-1-95	12-1-96
Nevada				12-3-96
New Hampshire				10-1-96
New Jersey	10-1-92	10-1-92	10-1-92	2-1-97(7-1-97) [1]

(Table 2 continued)

State	Waiver I	Waiver II If Different from Waiver I	Waiver III If Different from Waiver I	TANF Implementation Date
New Mexico				7-1-97 [2)]
New York				12-2-96(11-1-97) [1)]
North Carolina	7-1-96	7-1-96	7-1-96	1-1-97
North Dakota				7-1-97
Ohio	7-1-96	7-1-96	7-1-96	10-1-96
Oklahoma				10-1-96
Oregon	2-1-93	2-1-93	2-1-93	10-1-96
Pennsylvania				3-3-97
Rhode Island				5-1-97
South Carolina				10-12-96
South Dakota	6-1-94	6-1-94	6-1-94	12-1-96
Tennessee	9-1-96	9-1-96	9-1-96	10-1-96
Texas	6-1-96	6-1-96	6-1-96	11-5-96
Utah	1-1-93	1-1-93	1-1-93	10-1-96
Vermont	7-1-94	7-1-94	7-1-94	9-20-96
Virginia	7-1-95	7-1-95	7-1-95	2-1-97
Washington	1-1-96	1-1-96	1-1-96	1-10-97
West Virginia	2-1-96	2-1-96	2-1-96	1-11-97
Wisconsin	1-1-96	1-1-96	1-1-96	9-30-96(9-1-97) [1)]
Wyoming				1-1-97

Note: Implementation dates are arbitrarily stated as of the first of month absent specific information to the contrary.

1) There is difference between date of official implementation and date of actual implementation of TANF in five states, and the dates in parenthesis are their actual dates.

2) New Mexico implemented its TANF program in July 1997. It was found unconstitutional in September 1997. A revised TANF program was implemented in April 1998.

3) * different dates between Waiver I and Waiver II and ** * different dates between Waiver I and Waiver III

Source: 1) Council of Economic Advisers (1999). "The Effects of Welfare Policy and the Economic Expansion on Welfare Caseloads: An Update: Technical Report," Washington, D.C.: Executive Office of the President of the United States.

2) US Dept. of Health and Human Services, Assistant Secretary for Planning and Evaluation, Available at: HTTP://aspe.hhs.gov/waiver-policies99. Accessed Sep.14, 2003.

Table 3. Definitions of variables

Variable	Definition
Body Mass Index	Weight in Kilograms divided by height in meters squared (kg/m^2)
Obese	Dichotomous variable that equals 1 if BMI is equal to or greater than 30, 0 otherwise.
Welfare policy I	Dichotomous variable that equals 1 if respondent is under welfare policy I, 0 otherwise.
Welfare policy II	Dichotomous variable that equals 1 if respondent is under welfare policy II, 0 otherwise.
Welfare policy III	Dichotomous variable that equals 1 if respondent is under welfare policy III, 0 otherwise.
Log caseload	Natural logarithm of the average numbers of families that are on welfare roll
Waiver I	Dichotomous variable that equals 1 if respondent is under waiver I, 0 otherwise.
Waiver II	Dichotomous variable that equals 1 if respondent is under waiver II, 0 otherwise.
Waiver III	Dichotomous variable that equals 1 if respondent is under waiver III, 0 otherwise.
TANF	Dichotomous variable that equals 1 if respondent is under TANF, 0 otherwise
Fast-food price	Real fast-food meal price in respondent's state of residence in 1982-84 dollars
Food at home price	Real food at home price in respondent's state of residence in 1982-84 dollars
Cigarette price	Real cigarette price in respondent's state of residence in 1982-84 dollars
Unemployment	Unemployment rate in respondent's state of residence
Lagged unemployment	One year lagged unemployment rate in respondent's state of residence
Age	Age of respondent
Age squared	Squared age of respondent
Income 2	Dichotomous variable that equals 1 if respondent's annual household income from all source is $10,000 to less than $15,000. Omitted category is less than $10,000
Income 3	Dichotomous variable that equals 1 if respondent's annual household income from all source is $15,000 to less than $20,000
Income 4	Dichotomous variable that equals 1 if respondent's annual household income from all source is $20,000 to less than $25,000
Income 5	Dichotomous variable that equals 1 if respondent's annual household income from all source is $25,000 to less than $35,000
Income 6	Dichotomous variable that equals 1 if respondent's annual household income from all source is $35,000 to less than $50,000
Income 5	Dichotomous variable that equals 1 if respondent's annual household income from all source is $25,000 to less than $35,000
Income 6	Dichotomous variable that equals 1 if respondent's annual household income from all source is $35,000 to less than $50,000
Income 7	Dichotomous variable that equals 1 if respondent's annual household income from all source is $50,000 or more
Black	Dichotomous variable that equals 1 if respondent is black but not Hispanic. Omitted category is whit, non-Hispanic.
Hispanic	Dichotomous variable that equals 1 if respondent is Hispanic.
Other race	Dichotomous variable that equals 1 if respondent is any other race than white, black, and Hispanic.
Year	12 Dichotomous variables for 1991 through 2002, omitted category is 1990
State	49 Dichotomous variables for 48 states and DC but Maine and Rhode Island[A]

Note: A) I excluded 2 states, namely Maine and Rhode Island in my paper, because prices data for the 2 states were almost missing.

Table 4 Means and Standard Deviations for whole groups

	Single Mothers (Target Group)		Married Mothers (Control Group)	
	15-years or less Education	12-years or less Education	15-years or less Education	12-years or less Education
Body Mass Index	25.8882	26.0965	25.6073	25.8066
	(6.2258)	(6.3285)	(5.5653)	(5.7432)
Obesity	0.2113	0.2222	0.1847	0.1958
	(0.4082)	(0.4157)	(0.3881)	(0.3969)
Age	31.6967	31.5540	35.3652	35.0801
	(9.1940)	(9.3072)	(7.4822)	(7.6463)
Income 2	0.1450	0.1633	0.0505	0.0698
	(0.3521)	(0.3696)	(0.2189)	(0.2548)
Income 3	0.1604	0.1761	0.0761	0.1001
	(0.3671)	(0.3809)	(0.2651)	(0.3002)
Income 4	0.1500	0.1482	0.1080	0.1316
	(0.3571)	(0.3553)	(0.3104)	(0.3380)
Income 5	0.1548	0.1352	0.2005	0.2161
	(0.3617)	(0.3419)	(0.4004)	(0.4116)
Income 6	0.1030	0.0727	0.2435	0.2257
	(0.3040)	(0.2596)	(0.4292)	(0.4180)
Income 7	0.0701	0.0450	0.2416	0.1674
	(0.2553)	(0.2073)	(0.4280)	(0.3733)
Black	0.2629	0.2684	0.0764	0.0718
	(0.4402)	(0.4431)	(0.2656)	(0.2583)
Hispanic	0.1763	0.2020	0.1422	0.1747
	(0.3811)	(0.4015)	(0.3492)	(0.3798)
Other race	0.0388	0.0332	0.0320	0.0293
	(0.1932)	(0.1792)	(0.1761)	(.1687)
Fast-food price	2.7844	2.7816	2.7859	2.7839
	(0.1834)	(0.1830)	(0.1849)	(0.1837)
Food at home price	1.2502	1.2481	1.2420	1.2415
	(0.1369)	(0.1344)	(0.1296)	(0.1266)
Cigarette price	1.5619	1.5504	1.5128	1.4951
	(0.3966)	(0.3921)	(0.3753)	(0.3684)
Unemployment Rate	5.4523	5.4724	5.4611	5.5208
	(1.4002)	(1.4022)	(1.4456)	(1.4442)
One lagged Unemployment rate	5.4971 (1.4781)	5.5161 (1.4715)	5.5021 (1.4938)	5.5583 (1.4863)
Sample size	87,605	52,899	134,727	74,020

Note: Standard deviations are in parentheses. Above are weighted means and standard deviations.

Table 4.1 Means and Standard Deviations for subgroup (white women)

	Single Mothers (Target Group)		Married Mothers (Control Group)	
	15-years or less Education	12-years or less Education	15-years or less Education	12-years or less Education
Body Mass Index	24.8264	24.9080	25.1592	25,2524
	(5.8672)	(5.9880)	(5.3751)	(5.4930)
Obesity	0.1606	0.1664	0.1651	0.1724
	(0.3671)	(0.3724)	(0.3713)	(0.3777)
Age	31.6986	31.3283	35.5202	35.1195
	(9.1829)	(9.2110)	(7.3470)	(7.4772)
Income 2	0.1313	0.1489	0.0387	0.0468
	(0.3377)	(0.3560)	(0.1806)	(0.2112)
Income 3	0.1521	0.1686	0.0588	0.0780
	(0.3591)	(0.3744)	(0.2352)	(0.2681)
Income 4	0.1551	0.1601	0.0971	0.1206
	(0.3620)	(0.3667)	(0.2961)	(0.3256)
Income 5	0.1677	0.1563	0.2045	0.2292
	(0.3736)	(0.3631)	(0.4033)	(0.4203)
Income 6	0.1260	0.1005	0.2628	0.2537
	(0.3318)	(0.3006)	(0.4402)	(0.4351)
Income 7	0.0991	0.0676	0.2757	0.2007
	(0.2987)	(0.2511)	(0.4469)	(0.4005)
Fast-food price	2.7769	2.7721	2.7764	2.7721
	(0.1770)	(0.1749)	(0.1771)	(0.1739)
Food at home price	1.2399	1.2383	1.2358	1.2356
	(0.1269)	(0.1250)	(0.1244)	(0.1217)
Cigarette price	1.5358	1.5182	1.4852	1.4574
	(0.3823)	(0.3772)	(0.3613)	(0.3496)
Unemployment Rate	5.3355	5.3474	5.3918	5.4457
	(1.4175)	(1.4257)	(1.4529)	(1.4493)
One lagged Unemployment rate	5.3917	5.4021	5.4430	5.4915
	(1.5001)	(1.4976)	(1.5059)	(1.4959)
Sample size	52,440	30,124	109,361	58,711

Note: Standard deviations are in parentheses. Above are weighted means and standard deviations.

Table 4.2 Means and Standard Deviations for subgroup (black women)

	Single Mothers (Target Group)	Married Mothers (Control Group)
	12-years or less Education	12-years or less Education
Body Mass Index	27.9483	28.4475
	(6.7771)	(6.5961)
Obesity	0.3134	0.3333
	(0.4639)	(0.4714)
Age	32.1604	35.9809
	(9.3102)	(8.1485)
Income 2	0.1671	0.1025
	(0.3731)	(0.3033)
Income 3	0.1933	0.1546
	(0.3949)	(0.3616)
Income 4	0.1418	0.1460
	(0.3488)	(0.3531)
Income 5	0.1232	0.1975
	(0.3287)	(0.3982)
Income 6	0.0429	0.1842
	(0.2026)	(0.3877)
Income 7	0.0167	0.0852
	(0.1281)	(0.2792)
Fast-food price	2.7432	2.7556
	(0.1634)	(0.1700)
Food at home price	1.2399	1.2460
	(0.1351)	(0.1380)
Cigarette price	1.5005	1.4526
	(0.3860)	(0.3619)
Unemployment Rate	5.4137	5.4178
	(1.2853)	(1.3186)
One lagged Unemployment rate	5.4450	5.4622
	(1.3536)	(1.3650)
Sample size	13,633	4,638

Note: Standard deviations are in parentheses. Above are weighted means and standard deviations.

Table 5. Regression estimates for 15-years or less educated mothers

		Target Group (Single Mother)		Control Group (Married Mother)		Difference-in-Difference	
Policy Variables		BMI	Obesity	BMI	Obesity	BMI	Obesity
Model 1	Welfare Policy I	0.1516	0.0042	0.0907	0.0020	0.0610	0.0023
		(0.1165)	(0.0077)	(0.0869)	(0.0057)	(0.1509)	(0.0096)
Model 2	Welfare Policy II	0.1769	0.0031	0.0873	0.0030	0.0896	0.0001
		(0.1170)	(0.0076)	(0.0869)	(0.0058)	(0.1508)	(0.0095)
Model 3	Welfare Policy III	0.3403**	0.0168*	-0.0073	0.0033	0.3476*	0.0135
		(0.1266)	(0.0079)	(0.1001)	(0.0069)	(0.1640)	(0.0102)
Model 4	Log Caseload	-0.0765	-0.0056	0.0530	-0.0008	-0.1295	-0.0048
		(0.1642)	(0.0108)	(0.1129)	(0.0081)	(0.2051)	(0.0137)
Model 5	Waiver I	0.1906	0.0081	0.0600	0.0015	0.1306	0.0067
		(0.1175)	(0.0080)	(0.0884)	(0.0060)	(0.1526)	(0.0101)
	TANF	-0.0723	-0.0180	0.2930*	0.0046	-0.3653	-0.0225
		(0.2095)	(0.0155)	(0.1409)	(0.0097)	(0.2598)	(0.0186)
	Log Caseload	-0.0628	-0.0060	0.0804	-0.0003	-0.1432	-0.0057
		(0.1643)	(0.0110)	(0.1133)	(0.0083)	(0.2061)	(0.0138)
Model 6	Waiver II	0.2247	0.0075	0.0529	0.0026	0.1718	0.0049
		(0.1189)	(0.0081)	(0.0889)	(0.0061)	(0.1540)	(0.0101)
	TANF	-0.0594	-0.0186	0.2868*	0.0052	-0.3462	-0.0238
		(0.2056)	(0.0153)	(0.1400)	(0.0097)	(0.2550)	(0.0183)
	Log Caseload	-0.0568	-0.0060	0.0794	-0.0001	-0.1362	-0.0060
		(0.1640)	(0.0110)	(0.1134)	(0.0083)	(0.2061)	(0.0138)
Model 7	Waiver III	0.3953**	0.0220**	-0.0535	0.0028	0.4488**	0.0192
		(0.1240)	(0.0083)	(0.1009)	(0.0072)	(0.1590)	(0.0109)
	TANF	0.0759	-0.0081	0.2235	0.0055	-0.1477	-0.0137
		(0.2120)	(0.0142)	(0.1454)	(0.0102)	(0.2593)	(0.0173)
	Log Caseload	-0.0651	-0.0058	0.0680	-0.0003	-0.1331	-0.0055
		(0.1651)	(0.0109)	(0.1139)	(0.0082)	(0.2054)	(0.0137)
Model 8	Welfare Policy I	0.1477	0.0039	0.0965	0.0020	0.0512	0.0019
		(0.1165)	(0.0078)	(0.0879)	(0.0059)	(0.1514)	(0.0097)
	Log Caseload	-0.0519	-0.0050	0.0703	-0.0004	-0.1223	-0.0045
		(0.1633)	(0.0110)	(0.1125)	(0.0083)	(0.2048)	(0.0138)
Model 9	Welfare Policy II	0.1732	0.0027	0.0933	0.0030	0.0799	-0.0003
		(0.1170)	(0.0077)	(0.0879)	(0.0059)	(0.1513)	(0.0096)
	Log Caseload	-0.0463	-0.0051	0.0701	-0.0002	-0.1164	-0.0049
		(0.1632)	(0.0110)	(0.1125)	(0.0083)	(0.2050)	(0.0138)
Model 10	Welfare Policy III	0.3379**	0.0166*	-0.0045	0.0033	0.3424*	0.0133
		(0.1268)	(0.0080)	(0.1007)	(0.0069)	(0.1647)	(0.0103)
	Log Caseload	-0.0480	-0.0042	0.0526	-0.0005	-0.1006	-0.0037
		(0.1636)	(0.0108)	(0.1137)	(0.0082)	(0.2046)	(0.0137)
Sample size		87,605		134,727		222,332	

Note: All regressions include year dummies, state dummies, fast food price, food at home price, cigarette price, unemployment rate, one year lagged unemployment rate, age, age squared, income dummies, and race dummies. Intercepts are not showed. Robust standard errors are in parentheses allowing for state by year clustering. *0.01<p=<0.05, **0.00<p=<0.01

Table 5.1 Regression estimates for low-educated single mothers

	15 years or less education		12 years or less education	
	BMI	Obesity	BMI	Obesity
Welfare Policy III	0.3403**	0.0168*	0.2367	0.0116
	(0.1266)	(0.0079)	(0.2094)	(0.0116)
Fast-food price	0.1380	0.0217	-0.4782	-0.0091
	(0.3281)	(0.0220)	(0.5531)	(0.0365)
Food at home price	-1.2927**	-0.0799*	-1.7890*	-0.1738**
	(0.4925)	(0.0319)	(0.7631)	(0.0489)
Cigarette price	-0.0024	-0.0001	-0.0055	-0.0004
	(0.0028)	(0.0002)	(0.0041)	(0.0003)
Unemployment	-0.0247	-0.0066	-0.0798	-0.0090*
	(0.0525)	(0.0034)	(0.0699)	(0.0044)
Lagged unemployment	-0.0244	0.0005	0.0392	0.0057
	(0.0509)	(0.0036)	(0.0670)	(0.0043)
Age	0.2937**	0.0091**	0.2735**	0.0086**
	(0.0266)	(0.0017)	(0.0292)	(0.0021)
Age squared	-0.0023**	-0.0000	-0.0019**	-0.0000
	(0.0004)	(0.0000)	(0.0004)	(0.0000)
Income 2	-0.3344**	-0.0240**	-0.4320**	-0.0228*
	(0.1148)	(0.0078)	(0.1430)	(0.0098)
Income 3	-0.6274**	-0.0362**	-0.7220**	-0.0400**
	(0.1125)	(0.0070)	(0.1325)	(0.0086)
Income 4	-1.1792**	-0.0724**	-1.2703**	-0.0769**
	(0.1144)	(0.0069)	(0.1498)	(0.0088)
Income 5	-1.4649**	-0.0853**	-1.6272**	-0.0894**
	(0.1188)	(0.0080)	(0.1465)	(0.0107)
Income 6	-1.6354**	-0.0878**	-1.7698**	-0.0966**
	(0.1351)	(0.0087)	(0.1737)	(0.0104)
Income 7	-1.8276**	-0.1003**	-1.4741**	-0.0764**
	(0.1809)	(0.0102)	(0.3204)	(0.0185)
Black	2.5988**	0.1262**	2.6259**	0.1244**
	(0.0913)	(0.0060)	(0.1178)	(0.0075)
Hispanic	1.3782**	0.0594**	1.3230**	0.0549**
	(0.1354)	(0.0086)	(0.1711)	(0.0121)
Other race	0.5889*	0.0251	0.9997**	0.0479*
	(0.2281)	(0.0138)	(0.2625)	(0.0186)
R-square	0.1087	0.0612	0.1113	0.0624
F-statistic	79.89**	43.94**	61.63**	35.59**
Sample size	87,605	87,605	52,899	52,899

Note: All regressions include year dummies and state dummies. Intercepts are not showed. Robust standard errors are in parentheses allowing for state by year clustering. *0.01<p=<0.05, **0.00<p=<0.01

Table 6. Regression estimates for 12-years or less educated mothers

		Target Group (Single Mother)		Control Group (Married Mother)		Difference-in-Difference	
Policy Variables		BMI	Obesity	BMI	Obesity	BMI	Obesity
Model 1	Welfare Policy I	0.0906	-0.0004	0.1148	-0.0010	-0.0188	0.0006
		(0.1804)	(0.0112)	(0.1073)	(0.0079)	(0.1938)	(0.0125)
Model 2	Welfare Policy II	0.1317	-0.0002	0.1056	0.0002	0.0261	-0.0005
		(0.1803)	(0.0111)	(0.1088)	(0.0081)	(0.1957)	(0.0125)
Model 3	Welfare Policy III	0.2367	0.0116	-0.0287	0.0014	0.2654	0.0102
		(0.2094)	(0.0116)	(0.1356)	(0.0096)	(0.2393)	(0.0148)
Model 4	Log Caseload	-0.1167	-0.0085	0.2309	0.0099	-0.3476	-0.0184
		(0.2148)	(0.0138)	(0.1507)	(0.0115)	(0.2514)	(0.0175)
Model 5	Waiver I	0.1384	0.0012	0.0850	-0.0003	0.0534	0.0015
		(0.1852)	(0.0115)	(0.1099)	(0.0085)	(0.1978)	(0.0130)
	TANF	-0.1765	-0.0135	0.4269*	0.0008	-0.6034*	-0.0143
		(0.2480)	(0.0174)	(0.1938)	(0.0134)	(0.2957)	(0.0201)
	Log Caseload	-0.1134	-0.0093	0.2713	0.0099	-0.3848	-0.0192
		(0.2172)	(0.0141)	(0.1530)	(0.0118)	(0.2532)	(0.0175)
Model 6	Waiver II	0.1844	0.0017	0.0700	0.0011	0.1144	0.0006
		(0.1869)	(0.0116)	(0.1118)	(0.0087)	(0.2019)	(0.0132)
	TANF	-0.1542	-0.0133	0.4155*	0.0015	-0.5697	-0.0149
		(0.2435)	(0.0171)	(0.1930)	(0.0132)	(0.2923)	(0.0199)
	Log Caseload	-0.1051	-0.0093	0.2689	0.0101	-0.3739	-0.0194
		(0.2170)	(0.0141)	(0.1529)	(0.0118)	(0.2529)	(0.0175)
Model 7	Waiver III	0.2935	0.0145	-0.0867	0.0019	0.3802	0.0126
		(0.2079)	(0.0115)	(0.1365)	(0.0099)	(0.2346)	(0.0152)
	TANF	-0.0616	-0.0043	0.3218	0.0022	-0.3834	-0.0065
		(0.2721)	(0.0174)	(0.2089)	(0.0143)	(0.3257)	(0.0211)
	Log Caseload	-0.1147	-0.0085	0.2516	0.0101	-0.3663	-0.0186
		(0.2170)	(0.0140)	(0.1506)	(0.0116)	(0.2503)	(0.0175)
Model 8	Welfare Policy I	0.0875	-0.0012	0.1371	-0.0001	-0.0496	-0.0010
		(0.1818)	(0.0113)	(0.1089)	(0.0081)	(0.1949)	(0.0125)
	Log Caseload	-0.1004	-0.0087	0.2575	0.0099	-0.3578	-0.0186
		(0.2162)	(0.0140)	(0.1530)	(0.0118)	(0.2534)	(0.0175)
Model 9	Welfare Policy II	0.1234	-0.0010	0.1283	0.0011	-0.0049	-0.0021
		(0.1818)	(0.0113)	(0.1102)	(0.0083)	(0.1969)	(0.0125)
	Log Caseload	-0.0927	-0.0087	0.2560	0.0101	-0.3487	-0.0188
		(0.2162)	(0.0140)	(0.1529)	(0.0118)	(0.2534)	(0.0175)
Model 10	Welfare Policy III	0.2314	0.0112	-0.0166	0.0019	0.2481	0.0093
		(0.2095)	(0.0116)	(0.1360)	(0.0096)	(0.2383)	(0.0147)
	Log Caseload	-0.0951	-0.0075	0.2294	0.0101	-0.3244	-0.0175
		(0.2151)	(0.0139)	(0.1511)	(0.0116)	(0.2503)	(0.0175)
Sample size		52,899		74,020		126,919	

Note: All regressions include year dummies, state dummies, fast food price, food at home price, cigarette price, unemployment rate, one year lagged unemployment rate, age, age squared, income dummies, and race dummies. Intercepts are not showed. Robust standard errors are in parentheses allowing for state by year clustering. Standard errors of DD estimates are calculated from estimates of target group and control group, assuming that they are independent each other. *0.01<p=<0.05, **0.00<p=<0.01

Table 7. Regression estimates for 15-years or less educated white mothers

		Target Group (Single Mother)		Control Group (Married Mother)		Difference-in-Difference	
Policy Variables		BMI	Obesity	BMI	Obesity	BMI	Obesity
Model 1	Welfare Policy I	0.1047	0.0028	-0.0246	-0.0047	0.1293	0.0076
		(0.1905)	(0.0099)	(0.0966)	(0.0068)	(0.2013)	(0.0111)
Model 2	Welfare Policy II	0.1324	0.0022	-0.0349	-0.0042	0.1674	0.0064
		(0.1909)	(0.0100)	(0.0969)	(0.0069)	(0.2020)	(0.0112)
Model 3	Welfare Policy III	0.1832	0.0098	-0.1017	-0.0028	0.2849	0.0126
		(0.1844)	(0.0102)	(0.1183)	(0.0084)	(0.2133)	(0.0124)
Model 4	Log Caseload	0.1822	0.0175	0.0035	-0.0103	0.1787	0.0278
		(0.2378)	(0.0139)	(0.1102)	(0.0086)	(0.2580)	(0.0162)
Model 5	Waiver I	0.1165	0.0037	-0.0446	-0.0059	0.1612	0.0096
		(0.1851)	(0.0102)	(0.0986)	(0.0067)	(0.1967)	(0.0115)
	TANF	0.1450	0.0075	0.0910	-0.0038	0.0535	0.0113
		(0.3307)	(0.0205)	(0.1660)	(0.0128)	(0.3500)	(0.0245)
	Log Caseload	0.2037	0.0184	0.0063	-0.0111	0.1974	0.0296
		(0.2352)	(0.0139)	(0.1126)	(0.0087)	(0.2563)	(0.0163)
Model 6	Waiver II	0.1479	0.0031	-0.0589	-0.0054	0.2067	0.0085
		(0.1860)	(0.0103)	(0.0994)	(0.0069)	(0.1977)	(0.0117)
	TANF	0.1588	0.0070	0.0857	-0.0032	0.0731	0.0103
		(0.3274)	(0.0203)	(0.1643)	(0.0126)	(0.3467)	(0.0243)
	Log Caseload	0.2083	0.0184	0.0043	-0.0111	0.2040	0.0294
		(0.2351)	(0.0139)	(0.1127)	(0.0087)	(0.2562)	(0.0163)
Model 7	Waiver III	0.1945	0.0107	-0.1322	-0.0036	0.3267	0.0143
		(0.1858)	(0.0109)	(0.1220)	(0.0085)	(0.2118)	(0.0134)
	TANF	0.2009	0.0122	0.0392	-0.0025	0.1616	0.0148
		(0.3329)	(0.0198)	(0.1694)	(0.0133)	(0.3528)	(0.0237)
	Log Caseload	0.2023	0.0187	0.0033	-0.0106	0.1990	0.0293
		(0.2405)	(0.0140)	(0.1117)	(0.0087)	(0.2598)	(0.0162)
Model 8	Welfare Policy I	0.1209	0.1209	-0.0246	-0.0056	0.1456	0.0099
		(0.1884)	(0.1884)	(0.0975)	(0.0068)	(0.1996)	(0.0111)
	Log Caseload	0.2022	0.2022	-0.0007	-0.0112	0.2029	0.0295
		(0.2330)	(0.2330)	(0.1116)	(0.0086)	(0.2550)	(0.0163)
Model 9	Welfare Policy II	0.1497	0.1497	-0.0351	-0.0051	0.1849	0.0088
		(0.1888)	(0.1888)	(0.0979)	(0.0069)	(0.2003)	(0.0111)
	Log Caseload	0.2077	0.2077	-0.0026	-0.0112	0.2103	0.0293
		(0.2330)	(0.2330)	(0.1118)	(0.0087)	(0.2550)	(0.0163)
Model 10	Welfare Policy III	0.1956	0.1956	-0.1021	-0.0034	0.2977	0.0144
		(0.1904)	(0.1904)	(0.1189)	(0.0085)	(0.2153)	(0.0125)
	Log Caseload	0.2019	0.2019	-0.0067	-0.0106	0.2087	0.0293
		(0.2392)	(0.2392)	(0.1108)	(0.0086)	(0.2595)	(0.0162)
Sample size		52,440		109,361		161,801	

Note: All regressions include year dummies, state dummies, fast food price, food at home price, cigarette price, unemployment rate, one year lagged unemployment rate, age, age squared, and income dummies. Intercepts are not showed. Robust standard errors are in parentheses allowing for state by year clustering. Standard errors of DD estimates are calculated from estimates of target group and control group, assuming that they are independent each other. *0.01<p=<0.05, **0.00<p=<0.01

Table 8. Regression estimates for 12-years or less educated white mothers

		Target Group (Single Mother)		Control Group (Married Mother)		Difference-in-Difference	
Policy Variables		BMI	Obesity	BMI	Obesity	BMI	Obesity
Model 1	Welfare Policy I	0.0373	-0.0025	-0.0107	-0.0042	0.0480	0.0017
		(0.2407)	(0.0131)	(0.1268)	(0.0094)	(0.2508)	(0.0145)
Model 2	Welfare Policy II	0.0799	-0.0015	-0.0160	-0.0027	0.0959	0.0011
		(0.2416)	(0.0132)	(0.1277)	(0.0096)	(0.2540)	(0.0147)
Model 3	Welfare Policy III	0.0311	0.0038	-0.1632	-0.0026	0.1943	0.0064
		(0.2770)	(0.0144)	(0.1514)	(0.0113)	(0.2990)	(0.0172)
Model 4	Log Caseload	0.2398	0.0235	0.1058	-0.0056	0.1340	0.0291
		(0.3101)	(0.0172)	(0.1470)	(0.0120)	(0.3422)	(0.0211)
Model 5	Waiver I	0.0650	-0.0021	-0.0440	-0.0073	0.1096	0.0053
		(0.2439)	(0.0138)	(0.1261)	(0.0092)	(0.2536)	(0.0154)
	TANF	0.0261	0.0085	0.2583	0.0118	-0.2322	-0.0033
		(0.4289)	(0.0246)	(0.2739)	(0.0210)	(0.4391)	(0.0279)
	Log Caseload	0.2486	0.0240	0.1212	-0.0054	0.1274	0.0294
		(0.3136)	(0.0174)	(0.1496)	(0.0121)	(0.3465)	(0.0214)
Model 6	Waiver II	0.1138	-0.0010	-0.0558	-0.0061	0.1696	0.0051
		(0.2464)	(0.0140)	(0.1277)	(0.0095)	(0.2587)	(0.0159)
	TANF	0.0523	0.0091	0.2547	0.0128	-0.2025	-0.0037
		(0.4258)	(0.0244)	(0.2709)	(0.0208)	(0.4370)	(0.0276)
	Log Caseload	0.2561	0.0241	0.1195	-0.0053	0.1367	0.0294
		(0.3136)	(0.0174)	(0.1495)	(0.0121)	(0.3463)	(0.0214)
Model 7	Waiver III	0.0530	0.0040	-0.2222	-0.0061	0.2752	0.0101
		(0.2799)	(0.0150)	(0.1512)	(0.0110)	(0.2996)	(0.0179)
	TANF	0.0214	0.0124	0.1587	0.0124	-0.1373	0.0000
		(0.4498)	(0.0252)	(0.2810)	(0.0216)	(0.4729)	(0.0291)
	Log Caseload	0.2430	0.0246	0.1114	-0.0048	0.1317	0.0295
		(0.3150)	(0.0173)	(0.1467)	(0.0119)	(0.3477)	(0.0212)
Model 8	Welfare Policy I	0.0595	-0.0004	-0.0025	-0.0047	0.0620	0.0043
		(0.2423)	(0.0133)	(0.1281)	(0.0095)	(0.2527)	(0.0147)
	Log Caseload	0.2507	0.0234	0.1054	-0.0064	0.1454	0.0298
		(0.3112)	(0.0174)	(0.1492)	(0.0121)	(0.3438)	(0.0214)
Model 9	Welfare Policy II	0.1037	0.0007	-0.0075	-0.0032	0.1112	0.0038
		(0.2435)	(0.0134)	(0.1290)	(0.0097)	(0.2562)	(0.0150)
	Log Caseload	0.2594	0.0236	0.1044	-0.0062	0.1549	0.0298
		(0.3114)	(0.0174)	(0.1491)	(0.0121)	(0.3439)	(0.0214)
Model 10	Welfare Policy III	0.0478	0.0054	-0.1579	-0.0030	0.2057	0.0084
		(0.2796)	(0.0145)	(0.1519)	(0.0113)	(0.3018)	(0.0174)
	Log Caseload	0.2451	0.0241	0.0890	-0.0059	0.1561	0.0300
		(0.3125)	(0.0172)	(0.1464)	(0.0120)	(0.3448)	(0.0212)
Sample size		30,124		58,711		88,835	

Note: All regressions include year dummies, state dummies, fast food price, food at home price, cigarette price, unemployment rate, one year lagged unemployment rate, age, age squared, and income dummies. Intercepts are not showed. Robust standard errors are in parentheses allowing for state by year clustering. Standard errors of DD estimates are calculated from estimates of target group and control group, assuming that they are independent each other. *0.01<p=<0.05, **0.00<p=<0.01

Table 9. Regression estimates for 12-years or less educated black mothers

		Target Group (Single Mother)		Control Group (Married Mother)		Difference-in-Difference	
Policy Variables		BMI	Obesity	BMI	Obesity	BMI	Obesity
Model 1	Welfare Policy I	0.3416	0.0223	1.2506*	0.0360	-0.9090	-0.0138
		(0.3630)	(0.0237)	(0.5670)	(0.0324)	(0.6851)	(0.0402)
Model 2	Welfare Policy II	0.4094	0.0233	1.2237*	0.0369	-0.8143	-0.0137
		(0.3675)	(0.0235)	(0.5800)	(0.0328)	(0.6919)	(0.0402)
Model 3	Welfare Policy III	0.8132	0.0436	1.1699	0.0267	-0.3567	0.0169
		(0.4320)	(0.0257)	(0.6808)	(0.0350)	(0.8160)	(0.0457)
Model 4	Log Caseload	-0.4209	-0.0240	-1.3095	-0.0040	0.8886	-0.0200
		(0.5180)	(0.0313)	(0.9993)	(0.0685)	(1.2167)	(0.0772)
Model 5	Waiver I	0.3810	0.0223	1.0818	0.0406	-0.7009	-0.0183
		(0.3728)	(0.0237)	(0.6284)	(0.0356)	(0.7395)	(0.0421)
	TANF	-0.0246	0.0145	1.7152*	0.0163	-1.7398	-0.0018
		(0.5224)	(0.0420)	(0.8335)	(0.0600)	(0.9108)	(0.0736)
	Log Caseload	-0.3975	-0.0215	-1.1370	-0.0014	0.7396	-0.0201
		(0.5130)	(0.0308)	(0.9965)	(0.0691)	(1.2114)	(0.0772)
Model 6	Waiver II	0.4830	0.0241	1.0351	0.0434	-0.5520	-0.0193
		(0.3887)	(0.0237)	(0.6726)	(0.0378)	(0.7793)	(0.0432)
	TANF	-0.0217	0.0127	1.6108	0.0146	-1.6325	-0.0019
		(0.5088)	(0.0415)	(0.8256)	(0.0589)	(0.8741)	(0.0723)
	Log Caseload	-0.3746	-0.0207	-1.1294	-0.0007	0.7548	-0.0200
		(0.5100)	(0.0307)	(0.9965)	(0.0692)	(1.2108)	(0.0773)
Model 7	Waiver III	0.9488*	0.0472	0.9609	0.0318	-0.0121	0.0155
		(0.4583)	(0.0262)	(0.9395)	(0.0400)	(0.9395)	(0.0495)
	TANF	0.2345	0.0254	1.6044*	0.0100	-1.3698	0.0154
		(0.5387)	(0.0427)	(0.8105)	(0.0589)	(0.8809)	(0.0738)
	Log Caseload	-0.3596	-0.0200	-1.1571	-0.0024	0.7975	-0.0176
		(0.5083)	(0.0308)	(0.9858)	(0.0686)	(1.2021)	(0.0768)
Model 8	Welfare Policy I	0.3211	0.0211	1.1989*	0.0361	-0.8777	-0.0149
		(0.3611)	(0.0235)	(0.5611)	(0.0326)	(0.6835)	(0.0402)
	Log Caseload	-0.3775	-0.0211	-1.1746	0.0000	0.7970	-0.0212
		(0.5147)	(0.0309)	(1.0109)	(0.0692)	(1.2258)	(0.0784)
Model 9	Welfare Policy II	0.3851	0.0219	1.1632*	0.0370	-0.7781	-0.0151
		(0.3647)	(0.0232)	(0.5749)	(0.0331)	(0.6904)	(0.0402)
	Log Caseload	-0.3562	-0.0203	-1.1589	0.0008	0.8027	-0.0211
		(0.5118)	(0.0307)	(1.0103)	(0.0693)	(1.2255)	(0.0774)
Model 10	Welfare Policy III	0.7945	0.0425	1.1130	0.0266	-0.3185	0.0159
		(0.4286)	(0.0256)	(0.6760)	(0.0350)	(0.8162)	(0.0455)
	Log Caseload	-0.3283	-0.0190	-1.1927	-0.0012	0.8644	-0.0178
		(0.5110)	(0.0310)	(0.9991)	(0.0687)	(1.2167)	(0.0770)
Sample size		13,633		4,638		18,271	

Note: All regressions include year dummies, state dummies, fast food price, food at home price, cigarette price, unemployment rate, one year lagged unemployment rate, age, age squared, and income dummies. Intercepts are not showed. Robust standard errors are in parentheses allowing for state by year clustering. Standard errors of DD estimates are calculated from estimates of target group and control group, assuming that they are independent each other. *0.01<p=<0.05, **0.00<p=<0.01

Appendix:

1. Defining and Coding Welfare Waivers

Termination Time Limits

Under AFDC, families were entitled to receive benefits as long as they met the eligibility requirements; states could only impose a time limit on the duration of benefit receipt if they granted a waiver. Several states received such a waiver to implement to two main types of time limits. Termination time limits result in the loss of benefits for the entire family or just for the adult members, depending on the individual state's plan. While most states set a limit of 24 months or so for all recipients, other states had variable time limits. For example, Iowa's plan called for recipients to develop a self-sufficiency plan that included individually-based time limits, and Texas limited benefits to 12, 24, or 36 months depending on the recipient's education and work experience. Illinois provides an example of a state that contained this type of waiver provision but that is not coded as such here because it applied to a small fraction of recipients (those with no children under age 13).

Work-Requirement Time Limit

Work-requirement time limit waivers continue to provide benefits to adult recipients who reach the time limit as long as they comply with mandatory work requirements. For example, Massachusetts requires recipients unemployed after 60 days of AFDC receipt to do community service and job search to earn a cash "subsidy." California requires individuals who received AFDC for 22 of the previous 24 months to participate in a community service program for 100 hours per month. New Hampshire alternates 26

weeks each of job search and work-related activities for recipients. West Virginia's plan only requires participation in its work experience program by one parent in two-parent AFDC-UP cases, which are a small share of the total caseload, so it is not coded as a work-requirement time limit.

JOBS Exemptions

The Job Opportunities and Basic Skills Training Program (JOBS), part of the 1988 Family Support Act, provides education, training and work experience activities to AFDC recipients who did not fall into one of the exemption categories. The exemption categories were rather large, however. For instance, parents with children under age 3 were exempt and those with children under age 6 could only be required to participate if the state guaranteed child care. Some states requested a waiver to narrow the exemption criteria. The most commonly requested waiver required parents with young children (sometimes as young as 12 weeks) to participate in JOBS. Other waivers allowed teen parents attending school and people working 30 hours a week to be considered as JOBS participants. Hawaii had a JOBS waiver approved for a pilot site in Oahu, where a large share of the state's population lives, so it was coded as statewide.

JOBS Sanctions

Some states found that the sanctions for non-compliance with JOBS were not strong enough to motivate unwilling participants; they requested and were granted waivers to impose harsher sanctions. Twenty-two of the states were allowed to impose full-family sanctions (such as suspension of entire family's AFDC grant) after a continued period of

non-compliance. Other states requested tougher sanctions imposed upon the recipient only, leaving the children on the welfare rolls regardless of the parent's behaviors. An informal survey of state welfare agencies conducted by the Council of Economic Advisers indicates that the use of sanctions has varied considerably across states. Some states have been very aggressive, sanctioning large numbers of recipients while others have sanctioned few, if any. For example, over the 1996 fiscal year Missouri reported sanctioning an average of 3,100 people per month, including sanctions of different severity levels. Massachusetts terminated benefits for 1,200 families in 1996 for failure to comply with training/work requirements. On the other hand, Georgia sanctioned few recipients in 1996.

Earnings Disregard

Without a waiver, individual are allowed to keep $30 plus one-third of all additional earnings for the first three months of benefit receipt (the "standard AFDC disregards"). After that almost every dollar of earnings results in a dollar reduction in benefits. Some states received statewide waivers to improve the economic incentives for recipients to work by increasing earning income disregards. The changes ranged from removing the time limit on the standard AFDC disregard to disregarding all earned income up to the poverty line.

Family Caps

Under AFDC, a family's benefit level depended upon its size, so if a recipient had a baby the grant amount rose. Family cap waivers allowed states to eliminate or reduce the increase in benefits when additional child was born.

Table A1. Dates of six Major Welfare Waivers Policies, 1992 - 1996

	Termination/reduction time limit		Changes in JOBS work exemptions		JOBS Sanctions	
State	Approved	Approved	Implemented	Implemented	Approved	Implemented
Alabama						
Alaska						
Arizona	5-22-95	11-1-95			5-22-95	11-1-95
Arkansas						
California						
Colorado						
Connecticut	12-18-95	1-1-96	8-29-94	1-1-96	8-29-94	1-1-96
Delaware	5-8-95		5-8-95		5-8-95	
DC						
Florida			6-26-96			
Georgia					11-1-93	1-1-94
Hawaii	8-16-96	2-1-97	6-24-94	2-1-97		
Idaho			8-19-96		8-19-96	
Illinois		2-1-96	9-30-95		9-30-95	10-1-95
Indiana	12-15-94		12-15-94	5-1-95	12-15-94	5-1-95
Iowa	8-13-93	10-1-93	8-13-93	10-1-93	8-13-93	10-1-93
Kansas						
Kentucky						
Louisiana						
Maine			6-10-96			
Maryland			8-16-96	10-1-96	8-16-96	10-1-96
Massachusetts			8-4-95	11-1-95	8-4-95	11-1-95
Michigan			10-6-94	10-6-94	10-6-94	10-6-94
Minnesota						
Mississippi						
Missouri					4-18-95	6-1-95
Montana			4-18-95		4-18-95	
Nebraska	2-27-95		2-27-95		2-27-95	
Nevada						
New Hampshire			6-18-96		6-18-96	

(Table A1 continued)

	Termination/reduction time limit		Changes in JOBS work exemptions		JOBS Sanctions	
State	Approved	Approved	Implemented	Implemented	Approved	Implemented
New Jersey			7-1-92	10-1-92	7-1-92	10-1-92
New Mexico*						
New York						
North Carolina	2-5-96	7-1-96	2-5-96	7-1-96	2-5-96	7-1-96
North Dakota						
Ohio	3-13-96				3-13-96	7-1-96
Oklahoma						
Oregon	3-28-96	7-1-96	7-15-92	2-1-93	3-28-96	7-1-96
Pennsylvania						
Rhode Island						
South Carolina	5-3-96		5-3-96		5-3-96	
South Dakota					3-14-94	6-1-94
Tennessee	7-25-96		7-25-96	9-1-96	7-25-96	9-1-96
Texas	3-22-96		3-22-96	6-1-96	3-22-96	6-1-96
Utah			10-5-92	1-1-93	10-5-92	7-1-96
Vermont			4-12-93	7-1-94	4-12-93	7-1-94
Virginia	7-1-95		7-1-95		7-1-95	
Washington	9-29-95	1-1-96				
West Virginia					7-31-95	2-1-96
Wisconsin			8-14-95	1-1-96	8-14-95	1-1-96
Wyoming						

Note: Implementation dates are arbitrarily stated as of the first of month absent specific information to the contrary.
Source: 1) Council of Economic Advisers (1999). "The Effects of Welfare Policy and the Economic Expansion on Welfare Caseloads: An Update: Technical Report," Washington, D.C.: Executive Office of the President of the United States.

2) US Dept. of Health and Human Services, Assistant Secretary for Planning and Evaluation, Available at: HTTP://aspe.hhs.gov/waiver-policies99. Accessed Sep.14, 2003.

(Table A1 continued)

	Increased earnigs disregardt		Family Cap		Work requirement Time limit	
State	Approved	Approved	Implemented	Implemented	Approved	Implemented
Alabama						
Alaska						
Arizona			5-22-95	11-1-95		
Arkansas			4-5-94	7-1-94		
California	10-29-92	12-1-92	8-19-96	7-1-97	9-11-95	9-11-95
Colorado						
Connecticut	8-29-94	1-1-96	12-18-95	1-1-96		
Delaware	5-8-95	10-1-95	5-8-95		5-8-95	10-1-95
DC						
Florida			6-26-96			
Georgia	6-24-94		11-1-93	1-1-94		
Hawaii	8-16-96	2-1-97				
Idaho						
Illinois	11-23-93	11-23-93	9-30-95	12-1-95		
Indiana			12-15-94	5-1-95		
Iowa	8-13-93	10-1-93				
Kansas						
Kentucky						
Louisiana						
Maine						
Maryland	8-16-96	10-1-96	8-14-95	3-1-96		
Massachusetts	8-4-95	11-1-95	8-4-95	11-1-95	8-4-95	11-1-95
Michigan	8-1-92	10-1-92			8-1-92	
Minnesota						
Mississippi			9-1-95	9-1-95		
Missouri					4-18-95	
Montana	4-18-95				4-18-95	2-1-96
Nebraska	2-27-95		2-27-95	11-1-96		
Nevada						

(Table A1 continued)

	Increased earnigs disregardt		Family Cap		Work requirement Time limit	
State	Approved	Approved	Implemented	Implemented	Approved	Implemented
New Hampshire	6-18-96				6-18-96	
New Jersey	7-1-92		7-1-92	10-1-92		
New Mexico*						
New York						
North Carolina			2-5-96	7-1-96		
North Dakota						
Ohio	3-13-96	7-1-96				
Oklahoma						
Oregon						
Pennsylvania						
Rhode Island						
South Carolina			5-3-96			
South Dakota					3-14-94	6-1-94
Tennessee	7-25-96	9-1-96	7-25-96			
Texas						
Utah	10-5-92					
Vermont	4-12-93	7-1-94			4-12-93	7-1-94
Virginia	7-1-95		7-1-95	7-1-95	7-1-95	7-1-95
Washington						
West Virginia						
Wisconsin			6-24-94	1-1-96	9-30-96	9-30-96
Wyoming						

Note: Implementation dates are arbitrarily stated as of the first of month absent specific information to the contrary.
Source: 1) Council of Economic Advisers (1999). "The Effects of Welfare Policy and the Economic Expansion on Welfare Caseloads: An Update: Technical Report," Washington, D.C.: Executive Office of the President of the United States.

2) US Dept. of Health and Human Services, Assistant Secretary for Planning and Evaluation, Available at: HTTP://aspe.hhs.gov/waiver-policies99. Accessed Sep.14, 2003.

Table A2. Logit regression estimates for 15-years or less educated mothers

		Target Group (Single Mother)	Control Group (Married Mother)	Difference-in-Difference
Policy Variables		Obesity	Obesity	Obesity
Model 1	Welfare Policy I	0.0302	0.0124	0.0178
		(0.0521)	(0.0421)	(0.0683)
Model 2	Welfare Policy II	0.0237	0.0200	0.0037
		(0.0515)	(0.0425)	(0.0673)
Model 3	Welfare Policy III	0.1073*	0.0218	0.0855
		(0.0528)	(0.0494)	(0.0706)
Model 4	Log Caseload	-0.0152	-0.0129	-0.0023
		(0.0695)	(0.0561)	(0.0909)
Model 5	Waiver I	0.0550	0.0087	0.0463
		(0.0541)	(0.0438)	(0.0708)
	TANF	-0.1000	0.0260	-0.1260
		(0.0954)	(0.0679)	(0.1179)
	Log Caseload	-0.0165	-0.0104	-0.0062
		(0.0704)	(0.0574)	(0.0914)
Model 6	Waiver II	0.0521	0.0167	0.0353
		(0.0545)	(0.0448)	(0.0712)
	TANF	-0.1042	0.0302	-0.1344
		(0.0934)	(0.0672)	(0.1156)
	Log Caseload	-0.0165	-0.0091	-0.0073
		(0.0704)	(0.0575)	(0.0915)
Model 7	Waiver III	0.1390*	0.0186	0.1204
		(0.0546)	(0.0518)	(0.0749)
	TANF	-0.0394	0.0327	-0.0721
		(0.0885)	(0.0707)	(0.1111)
	Log Caseload	-0.0140	-0.0102	-0.0037
		(0.0699)	(0.0572)	(0.0912)
Model 8	Welfare Policy I	0.0294	0.0115	0.0179
		(0.0527)	(0.0429)	(0.0687)
	Log Caseload	-0.0105	-0.0110	0.0004
		(0.0703)	(0.0573)	(0.0913)
Model 9	Welfare Policy II	0.0228	0.0191	0.0036
		(0.0523)	(0.0434)	(0.0678)
	Log Caseload	-0.0113	-0.0095	-0.0018
		(0.0705)	(0.0574)	(0.0915)
Model 10	Welfare Policy III	0.1070*	0.0211	0.0858
		(0.0535)	(0.0502)	(0.0714)
	Log Caseload	-0.0054	-0.0109	0.0055
		(0.0698)	(0.0571)	(0.0913)
Sample size		87,605	134,727	222,332

Note: All regressions include year dummies, state dummies, fast food price, food at home price, cigarette price, unemployment rate, one year lagged unemployment rate, age, age squared, income dummies, and race dummies. Intercepts are not showed. Robust standard errors are in parentheses allowing for state by year clustering. *0.01<p=<0.05, **0.00<p=<0.01

Table A3. Logit regression estimates for 12-years or less educated mothers

		Target Group (Single Mother)	Control Group (Married Mother)	Difference-in-Difference
Policy Variables		Obesity	Obesity	Obesity
Model 1	Welfare Policy I	0.0002	-0.0101	0.0104
		(0.0739)	(0.0554)	(0.0853)
Model 2	Welfare Policy II	0.0024	-0.0011	0.0035
		(0.0731)	(0.0564)	(0.0849)
Model 3	Welfare Policy III	0.0707	-0.0090	0.0617
		(0.0745)	(0.0646)	(0.0969)
Model 4	Log Caseload	-0.0400	0.0591	-0.0992
		(0.0877)	(0.0765)	(0.1138)
Model 5	Waiver I	0.0109	-0.0050	0.0159
		(0.0754)	(0.0586)	(0.0881)
	TANF	-0.0780	-0.0040	-0.0740
		(0.1090)	(0.0892)	(0.1282)
	Log Caseload	-0.0440	0.0583	-0.1023
		(0.0890)	(0.0784)	(0.1135)
Model 6	Waiver II	0.0152	0.0051	0.0101
		(0.0756)	(0.0604)	(0.0889)
	TANF	-0.0759	0.0019	-0.0778
		(0.1066)	(0.0882)	(0.1259)
	Log Caseload	-0.0432	0.0599	-0.1032
		(0.0891)	(0.0785)	(0.1137)
Model 7	Waiver III	0.0877	0.0138	0.0739
		(0.0739)	(0.0667)	(0.0994)
	TANF	-0.0232	-0.0079	-0.0311
		(0.1097)	(0.0939)	(0.1339)
	Log Caseload	-0.0386	0.0602	-0.0988
		(0.0889)	(0.0773)	(0.1141)
Model 8	Welfare Policy I	-0.0032	-0.0049	0.0017
		(0.0747)	(0.0566)	(0.0854)
	Log Caseload	-0.0406	0.0582	-0.0989
		(0.0888)	(0.0784)	(0.1137)
Model 9	Welfare Policy II	-0.0013	0.0045	-0.0058
		(0.0741)	(0.0577)	(0.0850)
	Log Caseload	-0.0403	0.0600	-0.1003
		(0.0890)	(0.0786)	(0.1139)
Model 10	Welfare Policy III	0.0687	0.0128	0.0559
		(0.0750)	(0.0650)	(0.0970)
	Log Caseload	-0.0331	0.0605	-0.0936
		(0.0885)	(0.0773)	(0.1144)
Sample size		52,899	74,020	126,919

Note: All regressions include year dummies, state dummies, fast food price, food at home price, cigarette price, unemployment rate, one year lagged unemployment rate, age, age squared, income dummies, and race dummies. Intercepts are not showed. Robust standard errors are in parentheses allowing for state by year clustering. *0.01<p=<0.05, **0.00<p=<0.01

Table A4. Logit regression estimates for 15-years or less educated white mothers

		Target Group (Single Mother)	Control Group (Married Mother)	Difference-in-Difference
Policy Variables		Obesity	Obesity	Obesity
Model 1	Welfare Policy I	0.0222	-0.0364	0.0586
		(0.0796)	(0.0536)	(0.0893)
Model 2	Welfare Policy II	0.0175	-0.0325	0.0500
		(0.0799)	(0.0541)	(0.0898)
Model 3	Welfare Policy III	0.0596	-0.0234	0.0830
		(0.0839)	(0.0650)	(0.1012)
Model 4	Log Caseload	0.1466	-0.0752	0.2218
		(0.1069)	(0.0644)	(0.1252)
Model 5	Waiver I	0.0313	-0.0455	0.0769
		(0.0816)	(0.0529)	(0.0928)
	TANF	0.0517	-0.0298	0.0815
		(0.1553)	(0.0976)	(0.1861)
	Log Caseload	0.1531	-0.0817	0.2348
		(0.1070)	(0.0655)	(0.1264)
Model 6	Waiver II	0.0267	-0.0425	0.0691
		(0.0829)	(0.0540)	(0.0947)
	TANF	0.0481	-0.0259	0.0741
		(0.1536)	(0.0961)	(0.1840)
	Log Caseload	0.1526	-0.0814	0.2340
		(0.1071)	(0.0656)	(0.1264)
Model 7	Waiver III	0.0687	-0.0302	0.0989
		(0.0886)	(0.0658)	(0.1084)
	TANF	0.0786	-0.0215	0.1000
		(0.1519)	(0.1010)	(0.1821)
	Log Caseload	0.1549	-0.0779	0.2328
		(0.1077)	(0.0653)	(0.1258)
Model 8	Welfare Policy I	0.0346	-0.0432	0.0778
		(0.0795)	(0.0537)	(0.0894)
	Log Caseload	0.1522	-0.0824	0.2345
		(0.1066)	(0.0651)	(0.1262)
Model 9	Welfare Policy II	0.0304	-0.0398	0.0702
		(0.0798)	(0.0543)	(0.0900)
	Log Caseload	0.1517	-0.0821	0.2338
		(0.1067)	(0.0653)	(0.1263)
Model 10	Welfare Policy III	0.0704	-0.0287	0.0991
		(0.0847)	(0.0655)	(0.1021)
	Log Caseload	0.1543	-0.0783	0.2327
		(0.1074)	(0.0650)	(0.1257)
Sample size		52,440	109,361	161,801

Note: All regressions include year dummies, state dummies, fast food price, food at home price, cigarette price, unemployment rate, one year lagged unemployment rate, age, age squared, and income dummies. Intercepts are not showed. Robust standard errors are in parentheses allowing for state by year clustering. *0.01<p=<0.05, **0.00<p=<0.01

Table A5. Logit regression estimates for 12-years or less educated white mothers

		Target Group (Single Mother)	Control Group (Married Mother)	Difference-in-Difference
Policy Variables		Obesity	Obesity	Obesity
Model 1	Welfare Policy I	-0.0131	-0.0317	0.0187
		(0.1016)	(0.0704)	(0.1129)
Model 2	Welfare Policy II	-0.0052	-0.0202	0.0150
		(0.1021)	(0.0717)	(0.1144)
Model 3	Welfare Policy III	0.0209	-0.0169	0.0377
		(0.1165)	(0.0824)	(0.1364)
Model 4	Log Caseload	0.1860	-0.0361	0.2221
		(0.1288)	(0.0858)	(0.1580)
Model 5	Waiver I	-0.0056	-0.0552	0.0496
		(0.1062)	(0.0693)	(0.1192)
	TANF	0.0525	0.0932	-0.0408
		(0.1875)	(0.1600)	(0.2123)
	Log Caseload	0.1896	-0.0359	0.2255
		(0.1312)	(0.0866)	(0.1603)
Model 6	Waiver II	0.0028	-0.0466	0.0493
		(0.1077)	(0.0713)	(0.1224)
	TANF	0.0578	0.1008	-0.0430
		(0.1858)	(0.1580)	(0.2102)
	Log Caseload	0.1909	-0.0348	0.2257
		(0.1312)	(0.0868)	(0.1604)
Model 7	Waiver III	0.0272	-0.0436	0.0709
		(0.1202)	(0.0815)	(0.1409)
	TANF	0.0751	0.0998	-0.0248
		(0.1963)	(0.1627)	(0.2243)
	Log Caseload	0.1930	-0.0317	0.2246
		(0.1298)	(0.0857)	(0.1588)
Model 8	Welfare Policy I	0.0031	-0.0353	0.0383
		(0.0033)	(0.0714)	(0.1149)
	Log Caseload	0.1865	-0.0424	0.2289
		(0.1310)	(0.0870)	(0.1605)
Model 9	Welfare Policy II	0.0116	-0.0238	0.0354
		(0.1038)	(0.0728)	(0.1166)
	Log Caseload	0.1881	-0.0405	0.2287
		(0.1311)	(0.0873)	(0.1608)
Model 10	Welfare Policy III	0.0347	-0.0196	0.0543
		(0.1177)	(0.0828)	(0.1378)
	Log Caseload	0.1901	-0.0385	0.2285
		(0.1295)	(0.0862)	(0.1589)
Sample size		30,124	58,711	88,835

Note: All regressions include year dummies, state dummies, fast food price, food at home price, cigarette price, unemployment rate, one year lagged unemployment rate, age, age squared, and income dummies. Intercepts are not showed. Robust standard errors are in parentheses allowing for state by year clustering. *0.01<p=<0.05, **0.00<p=<0.01

Table A6. Logit regression estimates for 12-years or less educated black mothers

		Target Group (Single Mother)	Control Group (Married Mother)	Difference-in-Difference
Policy Variables		Obesity	Obesity	Obesity
Model 1	Welfare Policy I	0.1157	0.1666	-0.0509
		(0.1191)	(0.1602)	(0.1984)
Model 2	Welfare Policy II	0.1191	0.1715	-0.0525
		(0.1172)	(0.1631)	(0.1991)
Model 3	Welfare Policy III	0.2201	0.1239	0.0962
		(0.1276)	(0.1746)	(0.2271)
Model 4	Log Caseload	-0.1120	0.0312	-0.1433
		(0.1541)	(0.3285)	(0.3710)
Model 5	Waiver I	0.1149	0.1902	-0.0754
		(0.1184)	(0.1739)	(0.2057)
	TANF	0.0846	0.0689	0.0157
		(0.2088)	(0.2972)	(0.3653)
	Log Caseload	-0.9916	0.0414	-0.1406
		(0.1515)	(0.3315)	(0.3711)
Model 6	Waiver II	0.1220	0.2068	-0.0848
		(0.1175)	(0.1865)	(0.2123)
	TANF	0.0731	0.0603	0.0127
		(0.2052)	(0.2905)	(0.3581)
	Log Caseload	-0.0946	0.0466	-0.1412
		(0.1509)	(0.3325)	(0.3718)
Model 7	Waiver III	0.2354	0.1536	0.0817
		(0.1290)	(0.1984)	(0.2435)
	TANF	0.1371	0.0387	0.0984
		(0.2119)	(0.2906)	(0.3660)
	Log Caseload	-0.0888	0.0402	-0.1290
		(0.1519)	(0.3294)	(0.3693)
Model 8	Welfare Policy I	0.1105	0.1686	-0.0581
		(0.1179)	(0.1608)	(0.1979)
	Log Caseload	-0.0976	0.0480	-0.1456
		(0.1517)	(0.3319)	(0.3717)
Model 9	Welfare Policy II	0.1125	0.1744	-0.0619
		(0.1157)	(0.1644)	(0.1988)
	Log Caseload	-0.929	0.0531	0.1459
		(0.1511)	(0.3327)	(0.3722)
Model 10	Welfare Policy III	0.2147	0.1263	0.0884
		(0.1272)	(0.1745)	(0.2258)
	Log Caseload	-0.0848	0.0453	-0.1302
		(0.1527)	(0.3297)	(0.3701)
Sample size		13,628	4,634	18,262

Note: All regressions include year dummies, state dummies, fast food price, food at home price, cigarette price, unemployment rate, one year lagged unemployment rate, age, age squared, and income dummies. Intercepts are not showed. Robust standard errors are in parentheses allowing for state by year clustering. *0.01<p=<0.05, **0.00<p=<0.01

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