The Health of Poor Women Under Welfare Reform

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Objectives. We compared the health of single mothers affected by welfare reform with the health of a nationally representative sample of women to document the prevalence of poor health as single mothers experience the effects of welfare reform.

Methods. We compared risk factors and measures of health among women randomly sampled from the welfare rolls with similar data from a nationally representative sample of women.

Results. Women in our welfare recipient sample had higher rates of elevated glycosylated hemoglobin (≥6%; prevalence ratio [PR] = 4.87; 95% confidence interval [CI] = 2.69, 7.04), hypertension (systole ≥140 or diastole ≥90; PR = 2.36; 95% CI = 1.47, 3.24), high body mass index (≥30; PR = 1.78; 95% CI = 1.49, 2.08), and high-density lipoprotein cholesterol (≤35 mg/dL; PR = 1.91; 95% CI = 1.17, 2.65); lower peak expiratory flow; and less physical functioning. Current smoking rates were higher (PR = 1.85; 95% CI = 1.50, 2.19) and smoking cessation rates were lower (PR = 0.62; 95% CI = 0.37, 0.86) than in the national sample.

Conclusions. Current and former welfare recipients bear a substantial burden of illness. Further studies are necessary to interpret our findings of worsened health in the wake of welfare reform. (*Am J Public Health.* 2005;95:1252–1258. doi:10.2105/AJPH.2004.037804)

Despite previous research indicating that people who are poorer have worse health, and a recent exponential increase in such research,[1,2] relatively little attention has been given to the health of one of the poorest segments of the population—single mothers receiving welfare. Because these women experience chronic exposure to economic, social, and environmental stresses and have few resources with which to reduce these stresses, we have every reason to believe that their health is at risk. The introduction of the Personal Responsibility and Work Opportunity Reconciliation Act in 1996, which dramatically altered cash assistance for poor families with children, may have led to changes in the health of that population.

Welfare reform has been touted as a great success by its proponents. Welfare caseloads more than halved between 1996 and 2000.[3] This reduction has been attributed to the introduction of a new program called Temporary Aid to Needy Families (TANF) and its associated "welfare-to-work" provisions, as well as to a period of rapid economic expansion.[4,5] Still, the economic and social status of many current and former welfare recipients and their children, who all are part of this "natural experiment," remains deeply at risk.[6,7] Although the proportion of poor women who are working has dramatically increased, many such women remain below the poverty level and in need of government assistance.[8] Typically, the new jobs held by these women involve constantly changing work schedules, less than full-time work opportunities, few or no fringe benefits, and long commutes.[9–11] Employment gains often are constrained by low levels of skill and lack of prior work experience, as well as by child care and transportation needs.[12] We know very little about the health of these women, let alone the effects of welfare reform on their health. The existing evidence generally suggests a population that is not as healthy as the general population.[13–17] Previous studies, however, were based on self-reported measures of physical health or self-reported medical diagnoses, either of which may cause many interpretive problems.

In our study, we estimated the prevalence of measured health problems, disease markers, and important risk factors, as well as of self-reported medical conditions, in a population-based sample of poor mothers who were receiving cash assistance immediately following implementation of TANF, and we compared these prevalence levels with levels in a contemporary, nationally representative sample of women matched for age and race. We also compared health indicators in the welfare sample with indicators in a comparable nationally based sample surveyed before welfare reform was enacted.

METHODS

Study Sample

The participants in this ongoing panel study came from the Women's Employment Study (WES), a random sample (n = 753) of all single mothers with children who were receiving cash benefits in an urban county in Michigan in February of 1997.[18] To participate in the study, women were required to have been county residents enrolled in welfare in February 1997, to be single mothers with children, to be US citizens aged 18–54 years, and to report a racial identity of White or African American. The response rate was 86.2% among the first wave (753 of 874). The original data collection was conducted from September through December of 1997, with a second wave of data collection during the fall of 1998, a third wave during the fall of 1999, and a fourth wave during the fall of 2001. The number of respondents and response rates among the last 3 waves were 693 (92%), 632 (92%), and 577 (91%).

Face-to-face interviews of approximately 60–90 minutes' duration were conducted in the respondent's home and gathered information on employment histories, income from various sources, barriers to work, child- and family-related stressors, trauma, neighborhood circumstances and living conditions, mental health, self-report of health, self-report of diagnoses of a variety of health conditions, smoking behavior, and physical functioning.

In June 2000, after completion of the third wave of WES data collection, a health supplement (WES-HS) was administered to the survey respondents. Of the 632 eligible respondents, 299 completed the survey. After those who had moved out of the county (n=19) or could not be located (n=35) were excluded, the response rate was calculated as 52% (299 of 578). Demographics, self-reported health status, and physical limitations of the 299 respondents were quite similar to data for the full Wave 3 sample, although respondents were slightly younger (mean age=30.0 vs 31.4 years, $P<.05$). A comparison of the Wave 1 sample with the Wave 3 sample and with the WES-HS sample did not indicate any important differences.

Measures

Blood pressure, body measurements, and peak expiratory flow were recorded. Blood pressure and pulse were obtained with an automated oscillographic device (Omron HEM-737; Omron Healthcare Inc, Kyoto, Japan). Readings with this device have been found to be highly comparable to those obtained with mercury devices.[19] Three readings, 1 minute apart, were obtained after a 5-minute rest. Hip and waist circumferences, weight in light clothing, and height without shoes were obtained with standard techniques. Approximately 30 mL of blood were drawn, either in a laboratory (57%) or at the home of the participant (43%). Glycosylated hemoglobin, total cholesterol, high-density lipoprotein cholesterol (HDLC), and high-sensitivity C-reactive protein were assayed as milligrams per deciliter. Peak expiratory flow was measured 3 times with a full-range peak flowmeter (Zoey Personal Best Peak Flow Meter Standard Range; Zoey L.P., San Antonio, Texas).

Clinical Indicators

Hypertension (systolic blood pressure ≥140 or diastolic pressure ≥90), high cholesterol (≥240 mg/dL), low HDLC (<35 mg/dL), high C-reactive protein (≥1 mg /dL), and high glycosylated hemoglobin (≥6%) were measured. *Obesity* was defined as a body mass index (BMI; weight in kilograms divided by height in meters squared) of 30.0 or more, and *overweight* was defined as a BMI of 26.0 or more.[20] A waist–hip ratio equal to or greater than 0.8 was classified as a risk factor. Physical functioning was assessed with the SF-36 subscale[21] and compared with national standards scored by the RAND method.[22] Peak expiratory flow (highest of 3 expirations) was compared with national norms.[23]

Self-Reported Measures of Health

WES respondents were asked whether they had ever been diagnosed by a doctor as having hypertension, diabetes, breathing problems, arthritis/rheumatism, or bone problems. The WES questions were less specific about particular health conditions than were the National Health and Nutrition Examination Survey (NHANES) questions, and NHANES questions that were comparable to the WES items were combined. Thus, a measure equivalent to a WES physician diagnosis of breathing problems was obtained by combining information from NHANES responses to 3 separate questions about asthma, chronic bronchitis, and emphysema. The WES survey question, "Has a doctor or health professional ever told you that you had arthritis, rheumatism, or bone problems?" was approximated by combining responses to 2 questions from NHANES that asked about arthritis and osteoporosis. The global measure of self-rated health (excellent, very good, good, fair, or poor) was identically worded in the NHANES and WES surveys.

Analyses

We compared data from WES-HS respondents with data from women of the same age and race in NHANES 1999–2000 or NHANES III. Measures for waist–hip ratio and HDLC were taken from the second phase (1991–1994) of NHANES III, because this phase could provide the most recent available measures. For analyses that compared the WES-HS women with the pre-TANF welfare population in NHANES, we used both phases of NHANES III (1988–1994) to ensure adequate numbers. All comparisons with NHANES were standardized by age to the 2000 census with the direct method. The ratios of age- and race-standardized prevalences (i.e., the prevalence ratios) were used to compare the 2 samples. The prevalence ratio is simply the ratio of prevalence in the 2 groups and is the appropriate parameter with which to express a cross-sectional comparison of 2 groups.

For peak expiratory flow, comparable information was not available in NHANES, so comparisons were made with age- and height-adjusted norms. For comparisons of physical function, we used the national standards for women aged 20–54 years reported in the Medical Outcomes Study.[21,22]

We used SUDAAN software (Research Triangle Institute, Research Triangle Park, NC) to compute standard errors, and corrected for spatial correlations in NHANES 1999–2000 data with a jackknife "leave-one-out" procedure with 52 replicate weights[24] that accompanied the data. For analyses that used NHANES III, design-consistent estimates of variance were obtained with a Taylor-series linearization procedure implemented with Stata (Stata Corp, College Station, Tex). All estimates were derived with weights provided by the National Center for Health Statistics to account for unequal probabilities of selection and nonresponse.

RESULTS

Table 1 presents the age and racial distributions of the WES-HS sample and the NHANES 1999–2000 sample and NHANES III respondents who reported receipt of welfare.

Table 2 presents the age-specific prevalence of risk factors and disease. WES-HS women were 1.35 times more likely than women in NHANES 1999–2000 to have ever smoked (63% vs 47%; 95% confidence interval [CI]=1.18, 1.52) and 1.85 times more likely to be current smokers (51% vs 27%; 95% CI=1.50, 2.19), an indication of lower levels of smoking cessation within the WES-HS population. Black women were generally less likely than White women to be current smokers or to have ever smoked.

With regard to anthropometric measurements, BMI was 16% greater in the WES-HS sample (32.6) than in the NHANES population (28.0). Women in the WES-HS were also 1.8 times more likely than those in NHANES to be obese (56% vs 32%; prevalence ratio [PR]=1.78; 95% CI=1.49, 2.08). Obesity levels among White WES-HS participants

TABLE 1—Age and Race Distributions for Women in the Health Supplement to the Women's Employment Study (WES-HS) 2000–2001, and the National Health and Nutrition Examination Survey (NHANES) 1999–2000, and for Women Reporting Welfare Receipt in NHANES III for 1998–1994

	WES-HS, % (n = 299)	NHANES, % (n = 973)	NHANES III Welfare Population, % (n = 359)
Age, y			
20–29	35	26	46
30–39	43	31	35
40–56	21	43	19
Race			
White	47	84	55
Black	53	16	45
Age, y, by race			
White			
20–29	32	26	48
30–39	46	30	39
40–56	22	44	13
Black			
20–29	38	25	43
30–39	42	37	31
40–56	21	37	26

(55%) were nearly twice those among White NHANES participants (28%). By contrast, a much smaller difference was found between Black WES-HS and Black NHANES participants (58% vs 49%; PR=1.18; 95% CI=0.95, 1.41). Waist–hip ratios did not vary between the 2 populations.

Hypertension was 2.4 times more likely in the WES-HS sample (95% CI=1.47, 3.24), with White women mainly accounting for the difference. Prevalence of elevated levels of total cholesterol (≥240 mg/dL) was similar in the 2 populations (11% vs 14%; 95% CI=0.38, 1.12), but the prevalence of low levels of HDLC was significantly higher in the WES-HS sample (PR=1.91; 95% CI=1.17, 2.65) relative to the NHANES sample. White women in the WES-HS sample were 3 times as likely as White women nationally to have low levels of HDLC (PR=3.45; 95% CI=2.01, 4.90). No statistically significant differences were found in C-reactive protein levels

TABLE 2—Prevalence of Risk Factors and Health Status Indicators Among Women in the Health Supplement to the Women's Employment Study (WES-HS) 2000–2001 and in the National Health and Nutrition Examination Survey (NHANES) 1999–2000[a]

	Age-Standardized Prevalence Rate (95% CI)		Prevalence Ratio (WES-HS/NHANES) (95% CI)
	All women		
	NHANES (n = 973)	WES-HS (n = 299)	
Smoking status			
Ever	0.47 (0.43, 0.50)	0.63 (0.57, 0.69)	1.35 (1.18, 1.52)
Past	0.19 (0.16, 0.22)	0.12 (0.08, 0.16)	0.62 (0.37, 0.86)
Current	0.27 (0.24, 0.31)	0.51 (0.44, 0.57)	1.85 (1.50, 2.19)
Obesity and overweight			
BMI, mean	28.0 (27.4, 28.7)	32.6 (31.5, 33.7)	1.2 (1.1, 1.2)
Obese (BMI ≥ 30)	0.32 (0.28, 0.35)	0.56 (0.50, 0.63)	1.78 (1.49, 2.08)
Overweight (BMI ≥ 25)	0.57 (0.53, 0.61)	0.79 (0.74, 0.84)	1.38 (1.24, 1.51)
Waist–hip ratio > 0.8	0.74 (0.72, 0.76)	0.72 (0.66, 0.78)	0.97 (0.89, 1.05)
Hypertension (systolic ≥ 140 or diastolic ≥ 90)	0.09 (0.07, 0.12)	0.22 (0.16, 0.27)	2.36 (1.47, 3.24)
High cholesterol (≥ 240 mg/dL)	0.14 (0.10, 0.18)	0.11 (0.06, 0.15)	0.75 (0.38, 1.12)
Low HDL (≤ 35 mg/dL)	0.06 (0.05, 0.07)	0.11 (0.07, 0.15)	1.91 (1.17, 2.65)
C-reactive protein (≥ 1 mg/dL)	0.14 (0.11, 0.16)	0.18 (0.13, 0.23)	1.30 (0.86, 1.74)
Glycosylated hemoglobin ≥ 6%	0.05 (0.03, 0.06)	0.22 (0.17, 0.28)	4.87 (2.69, 7.04)
Doctor's diagnosis of			
Hypertension	0.17 (0.14, 0.19)	0.19 (0.14, 0.25)	1.14 (0.78, 1.50)
Diabetes	0.03 (0.02, 0.04)	0.08 (0.04, 0.11)	2.95 (1.17, 4.73)
Breathing problems	0.20 (0.17, 0.23)	0.25 (0.19, 0.31)	1.27 (0.92, 1.62)
Arthritis	0.16 (0.13, 0.19)	0.37 (0.31, 0.44)	2.37 (1.76, 2.98)
Self-reported health poor/fair	0.14 (0.11, 0.17)	0.39 (0.33, 0.46)	2.79 (2.10, 3.49)
	White women		
	NHANES (n = 650)	WES-HS (n = 140)	
Smoking status			
Ever	0.49 (0.45, 0.53)	0.67 (0.58, 0.76)	1.37 (1.15, 1.59)
Past	0.21 (0.17, 0.24)	0.10 (0.05, 0.16)	0.50 (0.23, 0.78)
Current	0.28 (0.24, 0.33)	0.57 (0.48, 0.66)	2.00 (1.55, 2.45)
Obesity and overweight			
BMI, mean	27.4 (26.7, 28.1)	31.8 (30.3, 33.4)	1.2 (1.1, 1.2)
Obese (BMI ≥ 30)	0.28 (0.24, 0.33)	0.55 (0.45, 0.64)	1.93 (1.48, 2.37)
Overweight (BMI ≥ 25)	0.54 (0.49, 0.58)	0.75 (0.66, 0.83)	1.39 (1.19, 1.59)
Waist–hip ratio > 0.8	0.72 (0.70, 0.74)	0.69 (0.60, 0.77)	0.95 (0.83, 1.08)
Hypertension (systolic ≥ 140 or diastolic ≥ 90)	0.08 (0.05, 0.10)	0.19 (0.11, 0.26)	2.45 (1.10, 3.80
High cholesterol (> 240 mg/dL)	0.14 (0.10, 0.18)	0.13 (0.06, 0.20)	0.91 (0.35, 1.47)
Low HDL (≤ 35 mg/dL)	0.06 (0.05, 0.06)	0.19 (0.12, 0.27)	3.45 (2.01, 4.90)
C-reactive protein (≥ 1 mg/dL)	0.14 (0.11, 0.16)	0.14 (0.08, 0.21)	1.04 (0.51, 1.57)
Glycosylated hemoglobin ≥ 6%	0.03 (0.01, 0.05)	0.03 (0.00, 0.06)	0.93 (0.22, 2.08)
Doctor's diagnosis of			
Hypertension	0.15 (0.12, 0.18)	0.18 (0.10, 0.25)	1.17 (0.64, 1.70)
Diabetes	0.02 (0.01, 0.03)	0.12 (0.05, 0.18)	6.99 (1.19, 12.79)
Breathing problems	0.20 (0.16, 0.23)	0.31 (0.22, 0.40)	1.57 (1.04, 2.09)
Arthritis	0.16 (0.12, 0.19)	0.46 (0.37, 0.56)	2.98 (2.08, 3.88)
Self-reported health poor/fair	0.12 (0.09, 0.15)	0.38 (0.29, 0.47)	3.06 (2.01, 4.10)

Continued

TABLE 2—*Continued*

	Black women		
	NHANES (n = 323)	WES-HS (n = 159)	
Smoking status			
Ever	0.34 (0.29, 0.39)	0.59 (0.51, 0.67)	1.75 (1.38, 2.12)
Past	0.12 (0.08, 0.15)	0.14 (0.07, 0.20)	1.18 (0.48, 1.87)
Current	0.22 (0.18, 0.27)	0.45 (0.36, 0.54)	2.03 (1.44, 2.62)
Obesity and overweight			
BMI, mean	31.7 (30.7, 32.7)	33.4 (31.8, 35.0)	1.1 (1.0, 1.1)
Obese (BMI ≥ 30)	0.49 (0.43, 0.55)	0.58 (0.49, 0.67)	1.18 (0.95, 1.41)
Overweight (BMI ≥ 25)	0.76 (0.71, 0.81)	0.83 (0.77, 0.89)	1.09 (0.98, 1.20)
Waist–hip ratio > 0.8	0.81 (0.80, 0.83)	0.75 (0.68, 0.83)	0.93 (0.84, 1.02)
Hypertension (systolic ≥ 140 or diastolic ≥ 90)	0.20 (0.14, 0.25)	0.25 (0.17, 0.33)	1.28 (0.74, 1.81)
High cholesterol (≥ 240 mg/dL)	0.14 (0.07, 0.20)	0.08 (0.03, 0.14)	0.62 (0.10, 1.13)
Low HDL (≤ 35 mg/dL)	0.07 (0.06, 0.08)	0.04 (0.01, 0.08)	0.63 (0.09, 1.17)
C-Reactive protein (≥ 1 mg/dL)	0.16 (0.11, 0.21)	0.22 (0.14, 0.30)	1.41 (0.72, 2.09)
Glycosylated hemoglobin ≥ 6%	0.13 (0.09, 0.17)	0.40 (0.32, 0.49)	3.14 (1.94, 4.34)
Doctor's diagnosis of			
Hypertension	0.27 (0.22, 0.33)	0.21 (0.13, 0.29)	0.77 (0.44, 1.10)
Diabetes	0.08 (0.04, 0.11)	0.04 (0.01, 0.07)	0.53 (0.03, 1.02)
Breathing problems	0.20 (0.15, 0.25)	0.20 (0.12, 0.28)	1.01 (0.55, 1.47)
Arthritis	0.17 (0.13, 0.21)	0.29 (0.21, 0.38)	1.72 (1.08, 2.36
Self-reported health poor/fair	0.24 (0.19, 0.28)	0.41 (0.32, 0.49)	1.72 (1.23, 2.21)

Note. CI = confidence interval; BMI=body mass index; HDL=high-density lipoprotein cholesterol.
[a]For the waist-hip ratio and low HDL measures, the most recent available data were from the second phase of NHANES III (1991–1994). The sample sizes of all women, White women, and Black women for these 2 measures were n = 2891, n = 1740, and n = 1151, respectively.

overall; however, Black women in the WES-HS sample tended to have (nonsignificantly) higher levels compared with Black women in NHANES (22% vs 16%; PR=1.41; 95% CI=0.72, 2.09). Twenty-two percent of WES-HS participants had glycosylated hemoglobin levels greater than 6%, almost 5 times the prevalence observed in the NHANES population (PR=4.87; 95% CI=2.69, 7.04). This elevation was a product of higher levels among Black women in the WES-HS, of whom 40% had elevated levels, compared with 13% of Black women in the NHANES sample (PR=3.14; 95% CI=1.94, 4.34).

Similar differences in burden of illness were found for the self-reported measures of health. A self-reported physician diagnosis of diabetes was nearly 3 times more common in the WES-HS population than in the NHANES population (8% vs 3%; PR=2.95; 95% CI=1.17, 4.73). In general, White women in the WES-HS were much more likely than the NHANES population to report a physician diagnosis of diabetes. Only in the case of arthritis did Black women in the WES-HS have a higher prevalence of reported diagnoses than their NHANES counterparts. White women in the WES-HS survey were almost 3 times as likely as White women in NHANES to describe their health as poor or fair (PR=2.79; 95% CI=2.10, 3.49), and the WES-HS–to–NHANES ratio for White women was almost twice as large as that for Black women (3.1 vs 1.7). Overall, the WES-HS–to–NHANES ratios of poor-health self-report and medical diagnoses were much larger for White women than for Black women.

More than half of women in the WES-HS sample aged 40 to 56 years old had compromised peak expiratory flow (<80% of age-specific norms) (Table 3). However, because the peak expiratory flow norms are based on 1983 data, caution in interpreting this result is warranted. Women older than 24 years in the WES-HS sample also had significantly lower levels of physical functioning on the SF-36 subscale compared with national norms.

Comparison of WES-HS and NHANES Welfare Populations

Table 4 shows characteristics of the WES-HS population and those of women in NHANES who reported receiving welfare. Compared with the women in NHANES who reported having received Aid to Families with Dependent Children benefits in the past month, women in WES-HS were more likely to have ever smoked (63% vs 49%; PR=1.29; 95% CI=1.02, 1.55) or to be current smokers (51% vs 40%; PR=1.27; 95% CI=0.95, 1.60), to have higher BMIs (32.6 vs 29.2; PR=1.1; 95% CI=1.05, 1.18), to be obese (42% vs 56%; PR=1.33; 95% CI=

TABLE 3—Physical Function and Peak Expiratory Flow Among Women in the Health Supplement to the Women's Employment Study (WES-HS) and National Reference Populations

	Physical Functioning (SF-36)			Peak Expiratory Flow, %[a]		
Age, y	US Norm[b]	WES-HS	*P*	Normal[c] (>80% of US Norm)	Moderate Problem (60%–80% of US Norm)	Severe Problem (<60% of US Norm)
18–24	90.2	82.4				
24–34	89.1	83.3	<.05			
34–44	88.1	74.7	<.05			
44–54	82.9	60.2	<.05			
20–29				67	29	4
30–39				53	34	13
40–56				48	44	8

Note. SF-36 = Medical Outcomes Study 36-item short-form health survey.[21]
[a]Numbers are percentages of women in the WES-HS who exhibited the indicated peak expiratory flows.
[b]Norms from baseline Medical Outcomes Study[22] (n = 2471), by age.
[c]Norms based on height and age.[23]

TABLE 4—Prevalence of Risk Factors and Health Status Indicators Among Women in the Health Supplement to the Women's Employment Study (WES-HS) 2000–2001 and in the Welfare Subpopulation of the National Health and Nutrition Examination Survey (NHANES) III, 1988–1994

	Age-Standardized Prevalence (95% CI)		
	NHANES (n = 359)	WES-HS (n = 299)	Prevalence Ratio (WES-HS/NHANES) (95% CI)
Smoking status			
Ever	0.49 (0.40, 0.57)	0.63 (0.57, 0.69)	1.29 (1.02, 1.55)
Past	0.09 (0.03, 0.15)	0.12 (0.08, 0.16)	1.32 (0.30, 2.34)
Current	0.40 (0.31, 0.48)	0.51 (0.44, 0.57)	1.27 (0.95, 1.60)
Obesity and overweight			
BMI, mean	29.2 (27.84, 30.62)	32.6 (31.49, 33.74)	1.1 (1.05, 1.18)
Obese (BMI ≥ 30)	0.42 (0.34, 0.51)	0.56 (0.50, 0.63)	1.33 (1.02, 1.65)
Overweight (BMI ≥ 25)	0.62 (0.53, 0.70)	0.79 (0.74, 0.84)	1.28 (1.08, 1.47)
Waist–hip ratio > 0.8	0.82 (0.75, 0.89)	0.72 (0.66, 0.78)	0.88 (0.77, 0.98)
Hypertension (systolic ≥ 140 or diastolic ≥ 90)	0.15 (0.09, 0.21)	0.22 (0.16, 0.27)	1.47 (0.78, 2.16)
High cholesterol (≥ 240 mg/dL)	0.09 (0.04, 0.14)	0.11 (0.06, 0.15)	1.18 (0.31, 2.06)
Low HDL (≥ 35 mg/dL)	0.09 (0.03, 0.16)	0.11 (0.07, 0.15)	1.18 (0.27, 2.10)
C-reactive protein (≥ 1 mg/dL)	0.20 (0.13, 0.27)	0.18 (0.13, 0.23)	0.90 (0.49, 1.30)
Glycosylated hemoglobin ≥ 6%	0.15 (0.10, 0.20)	0.22 (0.17, 0.28)	1.50 (0.82, 2.17)
Doctor's diagnosis of			
Hypertension	0.27 (0.20, 0.34)	0.19 (0.14, 0.25)	0.73 (0.45, 1.01)
Diabetes	0.05 (0.03, 0.08)	0.08 (0.04, 0.11)	1.41 (0.45, 2.37)
Breathing problems	0.29 (0.20, 0.38)	0.25 (0.19, 0.31)	0.89 (0.54, 1. 23)
Arthritis	0.13 (0.09, 0.18)	0.37 (0.31, 0.44)	2.76 (1.66, 3.87)
Self-reported health poor/fair	0.30 (0.22, 0.38)	0.39 (0.33, 0.46)	1.31 (0.90, 1.72)

Note. CI = confidence interval; BMI = body mass index; HDL = high-density lipoprotein cholesterol.

1.02, 1.65), and to report a physician diagnosis of arthritis (37% vs 13%; PR=2.76; 95% CI=1.66, 3.87). Women in the WES-HS sample also had a higher prevalence of elevated glycosylated hemoglobin levels (22% vs 15%; PR=1.50; 95% CI=0.82, 2.17), hypertension (22% vs 15%; PR=1.47; 95% CI= 0.78, 2.16), and poor self-rated health (39% vs 30%; PR=1.31; 95% CI=0.90, 1.72). However, women in the WES-HS sample had a lower prevalence of waist–hip ratio ≥ 0.8 (0.72 vs 0.82; PR=0.88; 95% CI=0.77, 0.98) and were less likely to report a physician diagnosis of hypertension (19% vs 27%; PR=0.73; 95% CI=0.45, 1.01).

DISCUSSION

In this sample of current and former welfare recipients, we found significantly higher rates of hypertension, obesity, elevated glycosylated hemoglobin levels, low HDLC levels, low peak expiratory flow, low levels of physical functioning, and higher levels of C-reactive protein compared with the national sample. In addition, rates of current smoking were higher and rates of smoking cessation were lower than those in a national sample of women the same age. Against this backdrop of poor health, fewer physician diagnoses were reported than would be expected from the measured values.

Although a single measure of glycosylated hemoglobin or C-reactive protein, or measures of blood pressure on a single occasion, is not sufficient to diagnose diabetes, hypertension, or other diseases, in prospective epidemiological studies, single measures have been shown to be predictive of high risk of adverse health outcomes. Nevertheless, single measures cannot definitively characterize the clinical status of this sample of women under welfare reform. Our definition of hypertension was based solely on 3 measurements of blood pressure and did not include information on use of antihypertensive drugs. The decision to exclude this information was made on the basis of previous findings suggesting that socioeconomic status and race can influence the likelihood of a physician diagnosis.[25]

Because the NHANES sample was wealthier than the WES-HS sample, it is likely that a larger proportion of NHANES participants with hypertension than of WES-HS participants with hypertension would have had access to medical care that would lead to their being diagnosed with hypertension. Comparing 2 groups with unequal access to medical care and thus unequal likelihood of diagnosis could lead to misleading conclusions. We chose to use a classification in both NHANES and WES-HS that was based only on measured blood pressure. Thus, our classification actually misclassifies as nonhypertensive those participants in both samples whose blood pressure was controlled with medications. In the same fashion, some of those participants we classified as not having elevated levels of glycosylated hemoglobin may actually have well-treated diabetes. To some extent, this approach may exaggerate the differences between the 2 groups. However, the higher prevalence of obesity in the WES sample is consistent with elevated rates of hypertension and glycosylated hemoglobin.

We compared welfare recipients in NHANES before enactment of welfare reform and welfare recipients in WES-HS to provide some insight into possible changes in the health status of welfare recipients before and after welfare reform. Although our data are consistent with a worsening of health status after welfare reform, 2 limitations to our study should be considered before such a conclusion is firmly drawn. First, the small number of NHANES participants who were welfare recipients forced us to combine data collected over 6 years (1988–1994), thereby masking any ongoing secular trends.

Second, we compared a national sample (NHANES) with a sample from a single urban county in a Midwestern state (WES-HS). Other factors aside from welfare reform may differ between these groups. For example, at the time the sample was drawn, WES-HS par-

ticipants had been receiving cash assistance for an average of 7.4 years; however, we do not have similar information on length of welfare receipt for the NHANES sample. It is also possible that the declining welfare caseload before 1997 resulted in a pool of recipients who, in comparison with the 1988–1994 NHANES respondents who reported being recipients of welfare, were essentially self-selected for poor health. Thus, the comparison between WES-HS and NHANES samples is not without problems. We do find, however, that despite some economic improvement among the total WES sample since the introduction of TANF, a 36% increase occurred between 1997 and 1999 in the percentage of WES respondents who self-reported poor or fair health (from 23.9% to 32.5%).

The results of this study suggest that the health of poor women who have previously received cash assistance under welfare reform is worse than that of a national sample of women of the same age and race. Although some welfare recipients may have made social and economic gains after welfare reform, many still lead lives characterized by economic deprivation and demanding work, family, and neighborhood conditions, with few resources to alleviate any of these problems. It is possible that welfare recipients who have economically and socially benefited from welfare reform's large social policy changes have also experienced improvements in their health. However, it is equally possible that, in a context characterized by existing poor health and vulnerability, some recipients face worsening health and deepening health burdens that already limit participation in work. A recent report indicated that welfare recipients' health insurance coverage has also decreased over time, adding even more reason for concern.[26]

Specific WES data (not shown here) indicate that the percentage of women not covered by government or private health insurance at time of interview increased threefold, from 6.8% in 1997 to 21% in 2001 (data not shown). Although the results from the current study suggest that the health of women of low socioeconomic status under welfare reform is poor and may have worsened, these results cannot be seen as conclusive. The absence of well-designed studies of the physical health status of poor women and their families as they weather one of the most sweeping social policy changes this country has seen in decades represents an important missed opportunity. There is growing realization that social and economic policy may have important influences on both the health of populations and the health disparities within populations.[27] Therefore, we need to study how important policy changes such as welfare reform affect a population's health and make empirical data on health part of evaluationg the impact of such changes. ■

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G.A. Kaplan, N. Ranjit, and S. Danziger wrote the first draft, which was reviewed by all other authors. G.A. Kaplan, E.A. Young, D. Tran, and S. Hudson contributed to the design and conduct of the field protocol. N. Ranjit carried out the analyses. K. Siefert, S. Danziger, and R. Tolman helped in linking this study to the Women's Employment Study (WES) and in interpreting WES data. All authors contributed to the overall design of the study, formulation of hypotheses, and interpretation of results.

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Human Participant Protection

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References

1. Kaplan GA, Haan MN, Syme SL, et al. Socioeconomic status and health. In: Amler RW, Dull HB, eds. *Closing the Gap: The Burden of Unnecessary Illness.* New York, NY: Oxford University Press; 1987:125–129.

2. Kaplan GA, Lynch JW. Whither studies on the socioeconomic foundations of population health [editorial]? *Am J Public Health.* 1997;87:1409–1411.

3. US Dept of Health and Human Services. The Administration for Children and Families (ACF). 2002. Available at: www.acf.dhhs.gov/news/stats/case-fam.htm. Accessed February 20, 2003.

4. National Council of State Legislatures. Welfare Reform project. 2002. Available at: http://www.ncsl.org/statefed/welfare/caseloadwatch.htm. Accessed February 20, 2003.

5. Danziger S. Introduction: what are the early lessons? In: Danziger S, ed. *Economic Conditions and Welfare Reform.* Kalamazoo, Mich: W.E. Upjohn Institute for Employment Research; 1999:1–10.

6. Blank RM. *What Causes Public Assistance Caseloads to Grow?* Cambridge, Mass: National Bureau of Economic Research Inc; 1997. NBER Working Paper 6343.

7. Bennett NG, Lu H, Song Y. *Welfare Reform and Changes in the Economic Well-Being of Children.* Cambridge, Mass: National Bureau of Economic Research Inc; 2002. NBER Working Paper 9399.

8. Danziger S. Approaching the limit: early national lessons from welfare reform. In: Weber BA, Duncan DJ, Whitener LA, eds. *Rural Dimensions of Welfare Reform.* Kalamazoo, Mich: Upjohn Institute for Employment Research; 2002:25–49.

9. Presser HB, Cox AG. The work schedule of low-educated American women and welfare reform. *Monthly Labor Rev.* 1997;120:25–34.

10. Zedlewski SR. Work activities and obstacles to work among TANF recipients. In: *The New Federalism: National Survey of America's Families.* Washington, DC: Urban Institute; 1999. Available at: http://www.urban.org/url.cfm?ID=309091. Accessed February 20, 2003.

11. Ong PM, Blumenberg E. *Job Access, Commute, and Travel Burden Among Welfare Recipients.* Los Angeles, Calif: Ralph and Goldy Lewis Center for Regional Policy Studies, University of California–Los Angeles; 1997. Working Paper 20.

12. Danziger SK, Seefeldt KS. Barriers to employment and the "hard to serve": implications for services, sanctions and time limits. *Focus.* 2002;22(1):76–81.

13. O'Campo P, Rojas-Smith L. Welfare reform and women's health: a review of the literature and implications for state policy. *J Public Health Policy.* 1998;19(4):420–446.

14. Ensminger ME. Welfare and psychological distress: a longitudinal study of African American urban mothers. *J Health Soc Behav.* 1995;36:346–359.

15. Loprest P, Acs G. *Profile of Disability Among Families on AFDC.* Washington, DC: Kaiser Family Foundation; 1996.

16. Shern DL, Wilson NZ, Coen AS. Client outcomes, II: longitudinal client data from the Colorado treatment outcome study. *Milbank Q.* 1994;72:123–148.

17. Polit DF, London AS, Martinez JM. *The Health of*

Poor Urban Women: Findings From the Project on Devolution and Urban Change. New York, NY: Manpower Demonstration Research Corporation; 2001.

18. Danziger S, Corcoran M, Danziger S, et al. Barriers to the employment of welfare recipients. In: Cherry R, Rodgers W, eds. *Prosperity for All? The Economic Boom and African Americans.* New York, NY: Russell Sage Foundation; 2000:239–272.

19. O'Brien E, Waeber B, Parati G, Staessen J, Myers MG. Blood pressure measuring devices: recommendations of the European Society of Hypertension. *BMJ.* 2001;322:531–536.

20. *Clinical Guidelines on the Identification, Evaluation, and Treatment of Overweight and Obesity in Adults. The Evidence Report.* Washington, DC: National Heart, Lung, and Blood Institute, US Public Health Service; 1998. NIH publication 98–4083.

21. Ware JJ, Sherbourne CD. The MOS 36-item short-form health survey (SF-36): conceptual framework and item selection. *Med Care.* 1992;30:473–483.

22. Hays RD, Sherbourne CD, Mazel RM. The RAND 36-Item Health Survey 1.0. *Health Econ.* 1993;2: 217–227.

23. Knudson RJ, Lebowitz MD, Holberg CJ, et al. Changes in the normal-maximal expiratory flow-volume curve with growth and aging. *Am Rev Respir Disord.* 1983;127:725–734.

24. National Center for Health Statistics. 1999–2000 Addendum to the NHANES III Analytic Guidelines. August 30, 2002. Available at: http://www.cdc.gov/nchs/data/nhanes/guidelines1.pdf. Accessed February 20, 2003

25. Smedley BD, Stith AY, Nelson AR, eds. *Unequal Treatment: Confronting Racial and Ethic Disparities in Health Care.* Washington, DC: National Academies Press; 2003.

26. Mann C, Hudman J, Salganicoff A, et al. Five years later: poor women's health care coverage after welfare reform. *J Am Med Womens Assoc.* 2002;57(1): 16–22.

27. Kaplan GA. Economic policy is healthy policy: findings from the study of income, socioeconomic status, and health. In: Auerbach JA, Krimgold BK, eds. *Income, Socioeconomic Status and Health: Exploring the Relationships.* Washington, DC: National Policy Association; 2001:137–149.