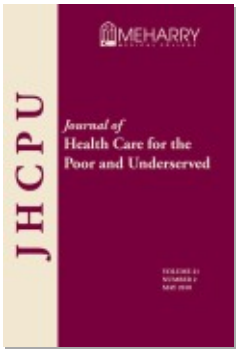
Associations between State Minimum Wage Policy and Health Care Access: A Multi-level Analysis of the 2004 Behavioral Risk Factor Survey



Kelly P. McCarrier, Diane P. Martin, James D. Ralston, Frederick J. Zimmerman

Journal of Health Care for the Poor and Underserved, Volume 21, Number 2, May 2010, pp. 729-748 (Article)

Published by Johns Hopkins University Press
DOI: *https://doi.org/10.1353/hpu.0.0284*

Associations between State Minimum Wage Policy and Health Care Access: A Multi-level Analysis of the 2004 Behavioral Risk Factor Survey

Kelly P. McCarrier, PhD
Diane P. Martin, PhD
James D. Ralston, MD
Frederick J. Zimmerman, PhD

Abstract: Minimum wage policies have been advanced as mechanisms to improve the economic conditions of the working poor. Both positive and negative effects of such policies on health care access have been hypothesized, but associations have yet to be thoroughly tested. *To examin*e whether the presence of minimum wage policies in excess of the federal standard of $5.15 per hour was associated with health care access indicators among low-skilled adults of working age, a cross-sectional analysis of 2004 Behavioral Risk Factor Surveillance System data was conducted. Self-reported health insurance status and experience with cost-related barriers to needed medical care were adjusted in multi-level logistic regression models to control for potential confounding at the state, county, and individual levels. *State-lev*el wage policy was not found to be associated with insurance status or unmet medical need in the models, providing early evidence that increased minimum wage rates may neither strengthen nor weaken access to care as previously predicted.

Key words: Minimum wage, BRFSS, uninsured, unmet medical need.

Nearly 46 million Americans, or nearly 20% of the non-Medicare-eligible population is uninsured.[1] Even among those with insurance, cost barriers often prevent access to medical care, which can have detrimental health effects.[2] The 2001 Institute of Medicine report, *Coverage Matters*, details the significant health effects of uninsurance and poor access on health outcomes in cancer, chronic illness, and overall mortality.[3]

Access to health care is often especially difficult for the working poor, a group whose members have high rates of being uninsured and little disposable income. Ongoing increases in the financial burden of health care due to rising out-of-pocket costs and stagnating wages are likely to limit health care access for the working poor further.[4]

Minimum wage policy is designed to aid low-income workers by bolstering their

***KELLY MCCARRIER** and **DIANE MARTIN** are in the Department of Health Services at the University of Washington (UW) in Seattle. **JAMES RALSTON** is affiliated with the Center for Health Studies at Group Health Cooperative in Seattle. **FREDERICK ZIMMERMAN** is in the Department of Health Services at UCLA. Please address correspondence to Kelly P. McCarrier, PhD, Senior Research Scientist, Health Research Associates, Inc., 6505 216th St. SW, Suite 105, Mountlake Terrace, WA 98043; (425) 775-6565; kpm25@u.washington.edu.*

income to keep pace with the cost of living. At this intersection of poverty and health care access, the minimum wage may be a policy tool with implications for health outcomes, but direct research in this area has been sparse. Proponents of higher minimum wage laws suggest that such interventions are likely to diminish poverty, which may then lead to improvements in access as deductibles and co-pays become more affordable.

Opponents of the policies warn that higher minimum wages will lead to unintended effects that will directly and indirectly weaken access to care for the working poor. It is argued that an adverse effect of minimum wages on health care access could operate through either of two distinct channels. First, some economists have long argued that employers may offset increases in the minimum wage by reducing benefits such as health insurance, resulting in reduced access to care.[5–7]

Second, minimum-wage opponents have also argued that increases in the minimum wage depress overall employment. This is a matter of ongoing debate in economics,[8–10] but if true it would suggest that increases in the minimum wage could result in a net worsening in access to health care and economic conditions of vulnerable populations through a reduction in low-wage employment.

Recent events related to the minimum wage allow us to explore potential associations between wage policy and health care access. After remaining at $5.15 per hour between 1997 and 2007, the federal minimum wage increased to $5.85 in July 2007 as part of a three-step phased increase that reached $7.25 in July 2009. During the ten years between increases, the real value of the minimum wage eroded, so that it was as low as it had been at any point in the preceding 50 years, whether defined in real terms or as a proportion of average wages.[11] In many areas of the United States, even the new minimum wage is not enough to keep full-time workers and their dependents out of poverty or provide affordable access to health care.[12]

In response to the diminishing real value of the federal standard, many states and municipalities have enacted policies that mandate higher minimum wages for workers in their jurisdictions. At the time of the most recent federal wage hike, thirty-one states and the District of Columbia had passed laws setting a higher wage standard, none of which were surpassed by the federal increase in 2007. [11]

To determine whether associations exist between state-level minimum wage policies and access to health care among low-skilled workers, we performed a multi-level logistic regression analysis using individual-level data from the 2004 Behavioral Risk Factor Surveillance System (BRFSS)[13] and ecological data from several other sources. The BRFSS is a nationally-representative telephone survey of the civilian non-institutionalized adult population conducted by the Centers for Disease Control and Prevention (CDC). It is uniquely suited for this analysis because it provides information on self-reported access to health care, health behaviors, and demographic information.

While the economic effects of minimum wage and living wage policies have been extensively[14,15] researched, we believe this to be one of the first studies to examine associations between state minimum wage policy and health care access.

Methods

Study design. We performed a cross-sectional study using individual level data from the 2004 BRFSS and ecological data from sources described below. We constructed multilevel logistic regression models to examine associations between wage policies and health care access, while attempting to control for the influence of factors at the state, county, and individual level. As depicted in Figure 1, our conceptual model describes a number of state-level factors likely to influence whether a given state has enacted a minimum wage law exceeding the federal standard (and the specific wage rate mandated by that law). The model also describes several county-level and individual-level factors likely to influence the relationship between minimum wage policy and our two indicators of access to health care. The specific variables used to operationalize each of the factors in this model in the regression analyses are described in greater detail below.

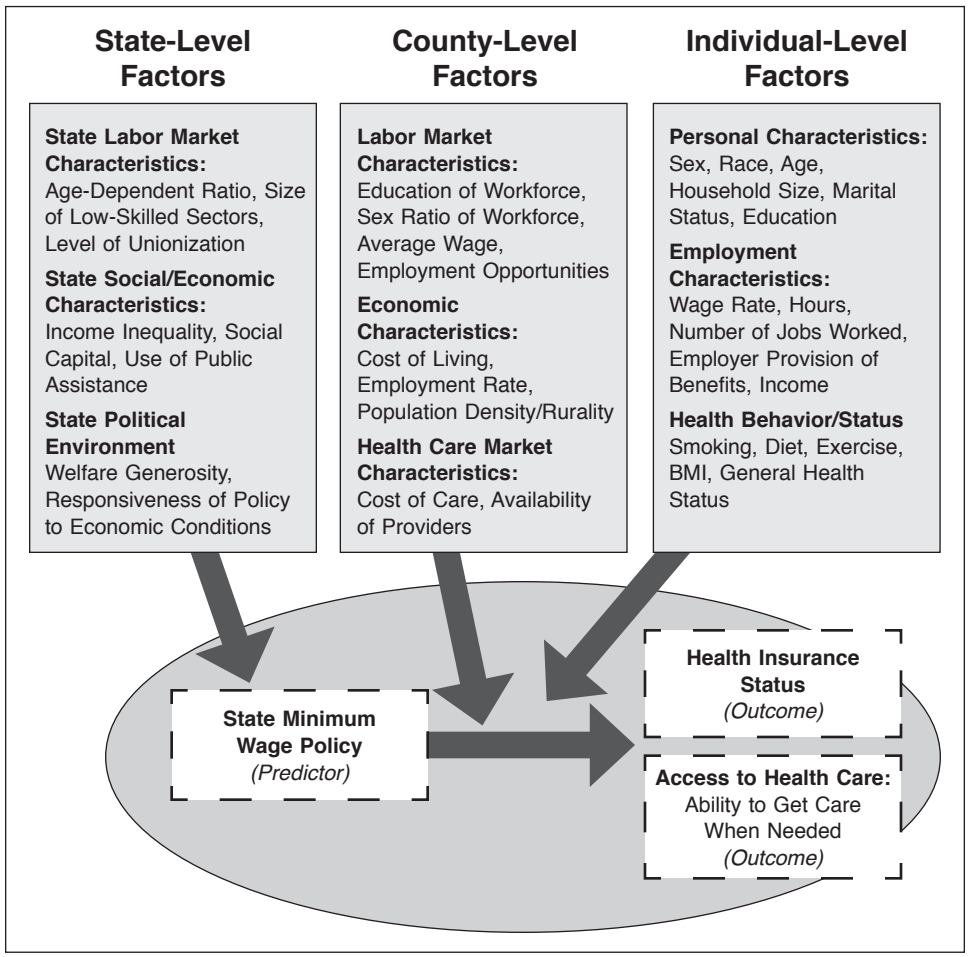


Figure 1. Conceptual model of hypothesized factors influencing the relationship between minimum wage policy and health care access.

Dataset and analytic sample. The BRFSS is the primary health behavior and risk factor surveillance system of the CDC, and is conducted collaboratively each year by the federal agency and state health departments. It employs a complex multi-stage cluster sampling design to produce a nationally representative sample with valid state-specific prevalence estimates. Random digit dialing within blocks of telephone prefixes is used to generate a probability sample of households, from which one adult is randomly selected to complete the interview. In 2004, the number of completed interviews per state ranged from 2,656 (Alaska) to 18,587 (Washington state). The cooperation rate ranged from 59.5% to 91.8%, with a median of 74.3%.[16] Forty-nine states and the District of Columbia are included in the dataset. Hawaii did not participate in 2004 and has been excluded from all analyses.

The full 2004 BRFSS dataset includes 303,875 interviews. After removing 6,851 residents of Puerto Rico and the U.S. Virgin Islands, we restricted our sample to economically-active working-age adults (age 18–64 years) and thus excluded 64,252 respondents over the age of 64 and 47,817 who reported their employment status as *homemaker*, *unable to work*, or *retired* (Figure 2). We also restricted our sample to respondents who reported their highest level of education as high school graduates (including GED) or less, which excluded an additional 120,348 individuals. The Bureau of Labor Statistics estimates that over 93% of workers earning at or below the federal minimum wage in 2004 had less than a Bachelor's degree, and 61% had a high school diploma or less.[17] Limiting the sample in this way focuses the regression analysis to the 64,607 respondents most likely to be affected by minimum wage policies.

Many young adults may be covered under their parents' health insurance policies, which could confound the relationship between minimum wage policy and health care access. To address this, we explored alternate models that excluded 18 to 24-year-old respondents. Because these models yielded results similar to the results of models based on the sample restrictions described above, we report only the latter in this paper.

Dependent variables. We assessed the outcome of health care access with two binary-coded items from the BRFSS:

1) *Health insurance status* is based on respondents' *yes*/*no* answers to the question *Do you have any kind of health care coverage, including health insurance, prepaid plans such as HMOs, or government plans such as Medicare?*
2) *Cost barriers* to accessing health care were operationalized as affirmative responses to the question *Was there a time in the past 12 months when you needed to see a doctor but could not because of cost?*

Primary independent variable. We operationalized the predictor, state-level minimum wage policy, in two ways. In the first set of regression models, the predictor is represented by a simple binary indicator of the state-level minimum wage policy in each respondent's state of residence. This variable is coded as 1 if the state had a minimum wage in excess of the federal minimum of $5.15 per hour on or before January 1, 2004. Eleven states and the District of Columbia had such policies in place at this time (Table 1). The variable is coded as zero for the 39 states with no state-level policy or a lower standard, both of which default to the federal standard being enforced.

The second approach to operationalize the predictor used the log-transformed

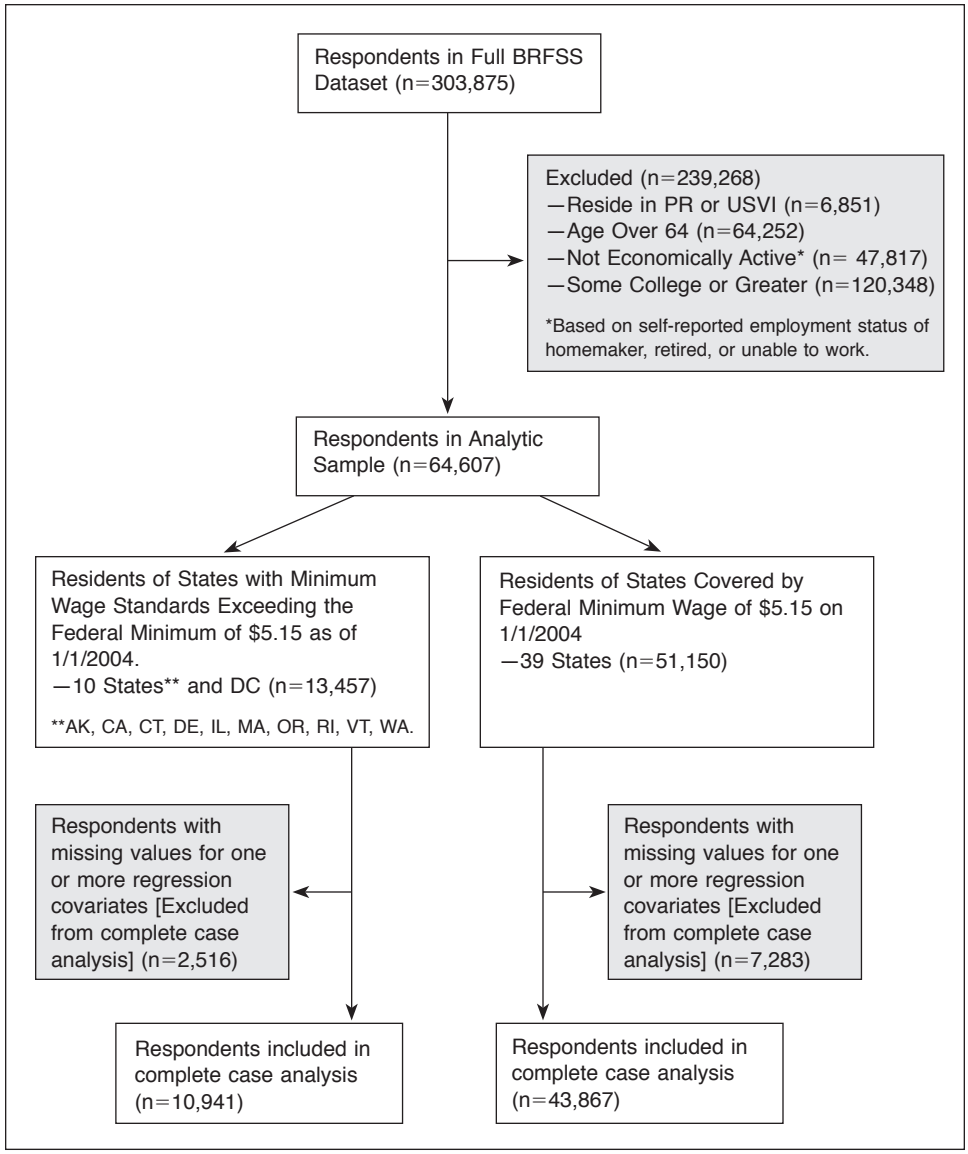


Figure 2. Steps to limit 2004 BRFSS (Behavioral Risk Factor Surveillance System) sample for analysis.

ratio of the nominal dollar value of the legally-required hourly minimum wage rate in place in each respondent's state, divided by the average hourly wage for employees in the retail service sector in the respondent's county. Although the minimum wage rate is constant across all counties in a given state, variation in wages and cost of living throughout local sub-state economic markets often result in varying relative value of the minimum wage rate across these smaller markets. By operationalizing the independent variable as a ratio that includes a direct measure of the local economic environment

Table 1.

MANDATED MINIMUM WAGE AND AVERAGE HOURLY WAGES, BY STATE, 2004

	Minimum hourly wage rate on Jan. 1, 2004	Average hourly wage (all sectors)	Average hourly wage (retail service sector)	Ratio of minimum wage rate to average hourly wage (retail service sector)
State minimum wage exceeds federal (11 states and D.C.)				
Washington	7.16	18.93	12.80	0.559
Alaska	7.15	18.78	12.40	0.576
Connecticut	7.10	24.52	13.73	0.517
Oregon	7.05	17.13	11.55	0.610
California	6.75	21.45	13.90	0.485
Massachusetts	6.75	23.53	13.00	0.519
Rhode Island	6.75	18.10	11.78	0.573
Vermont	6.75	16.00	11.28	0.598
Hawaii[a]	6.25	16.93	11.83	0.528
Delaware	6.15	20.43	11.53	0.533
District of Columbia	6.15	30.73	13.38	0.459
Illinois	5.50	20.33	11.73	0.468
Group mean (SD)	6.66 (0.16)	20.90 (1.25)	12.46 (0.29)	0.536
No state minimum wage (39 states)				
Group mean (SD)	5.15 (0)	16.81 (0.39)	10.86 (0.18)	0.474

[a]Data from Hawaii was not included in the BRFSS (Behavioral Risk Factor Surveillance System) dataset for 2004, and is thus not included in all analyses

(the prevailing retail sector wage in a given county), this approach provides a measure of the approximate bindingness of the mandated minimum wage rate that accounts for the county-level variations in each respondent's local economic environment.

Control variables. Several covariates were included in the regression models in an attempt to control for potential confounding of the association between wage policy and health care access at both the individual and ecological (state) level. Individual-level covariates come from the original BRFSS data source, and include: Sex, Race, Age, Household Size/Composition, Marital Status, Education, Employment Status, Smoking Status, Body Mass Index (BMI), and Self-Reported Fair or Poor Health. These demographic and health-related covariates were chosen because each might be associated

with economic indicators such as employment status and income, and also with health status and health care access.

Ecological variables were selected in an attempt to control for social and economic differences between states and counties that might cloud the associations between state minimum wage policies and health care access. Specifically, variables that capture characteristics of the state's workforce, generosity of welfare policies, and descriptors of social situations, as well as economic and labor market indicators at the county level, were assembled from several sources. In an attempt to mitigate the possibility of confounding by the magnitude of health and social investments, we have included two variables that serve as proxy measures of the overall level of welfare generosity.

Data on the state-level Age-Dependent Ratio (the ratio of individuals between 18–65 to those older or younger), the proportion (of the state workforce) in Service Occupations, and the proportion with Labor Union Membership were attained from the U.S. Census Bureau's *2004 American Community Survey* (ACS) website and used to control for variations in labor markets between states.[18]

We have also included several variables in an attempt to mitigate the possibility of confounding by the magnitude of state-level health and social investments. The proportion of the state population receiving Cash Public Assistance, as well as the Gini Index[19] of state-level income inequality was attained from the ACS, and a measure of the degree to which a state's Temporary Aid for Needy Families (TANF) benefit kept pace with inflation between 1995 and 2002 was also used as a proxy for the responsiveness of a state's welfare policies to changing economic conditions during the period immediately prior to the implementation of any wage laws that would be in effect during 2004. Any state whose TANF benefit kept pace with inflation during this period will have a ratio of 1.18 or greater (based on the 18% increase in the Consumer Price Index during that period).[20]

Each state's Medicaid income eligibility limit for working families, coded as a percentage of the federal poverty level (FPL), was also used as a proxy measure of the generosity of state-sponsored health coverage.[21] We also included a 14-item composite measure of state-level social capital as a covariate in the models.[22] Finally, we included the average Medicare reimbursement per enrollee for outpatient services, as compiled by the Dartmouth Health Atlas, to account for state-to-state variation in the cost of health care.

Several characteristics of each BRFSS respondent's primary county of residence were also represented in the regression models in an effort to control for variation in labor markets, availability of medical care, and cost-of-living. The county-level sex ratio, unemployment rate, high school completion rate, rural-urban commuting area (RUCA) code, median home value, and number of active licensed physicians per 10,000 population were attained from the 2005 release of the Area Resource File.[23] County-level wage data for 2004, specifically the average hourly wage in all sectors as well as in only the retail service sector, were attained from the Bureau of Labor Statistics.

Missing data approach. All respondents without a valid county code variable were excluded from analyses. For demographic variables such as race, marital status, and educational attainment, *Refused* was treated as a valid response rather than as a missing value. Missing data for all other variables was handled with a complete case analysis

in which individuals were excluded if they had missing values for any of the variables in the regression models. Thus, the study population was restricted to only those individuals with complete data for all included variables. No individual variable had more than 6% missing data and missing data were equally distributed across groups defined by state wage policy.

To assess the impact of excluding respondents with missing data in the complete case analysis, we conducted sensitivity analyses that replicated all regression models using a multiply-imputed dataset using the ICE procedure in Stata version 10 (StataCorp, College Station, TX). Because the study findings did not differ between the multiply-imputed analyses and the complete case approach, we present only the complete-case analysis below.

Statistical analysis. We described individual and state-level characteristics with standard means and frequency analysis. Unadjusted bivariate comparisons between dependent variables (and the other regression covariates) and wage policy were made using chi-squared tests for categorical variables and t-tests for continuous data. Finally, we used multi-level logistic regression models to examine associations between minimum wage policy and health care access, while controlling for potential confounding at the individual, county, and state levels.

This approach allows for statistical inference to be made at the individual level while also addressing potential confounding by factors at higher levels, such as local economic conditions, other state policies, or population characteristics that could each influence the observed associations between minimum wage policy and individual worker's access to health care.

To adjust appropriately for the complex survey design and weight for the sampling probabilities of the BRFSS data, sampling weights were used, as was the Huber-White estimator of variance.[24,25] Regression analyses were performed using the *SVY: logistic* command in STATA version 10 (StataCorp, College Station, TX).

Ethics approval. Due to the secondary nature of this analysis, the research was approved as Institutional Review Board-exempt by the Human Subjects Review Board of the University of Washington.

Results

Characteristics of study respondents. Demographic characteristics of the members of the study population appear in Table 2. Bivariate comparisons between respondents living in states without state-level minimum wage laws and those living in states with minimum wage standards higher than the federal level show that those in high-minimum-wage states on average were about one year older, were significantly more likely to be single and of Hispanic ethnicity, and had larger households. Additionally, residents of states with minimum wage policies in excess of the federal standard have slightly lower levels of health risks such as smoking and high BMI.

Bivariate comparisons of the ecological variables also show significant differences between states with and without state-level minimum wage policies on several social, demographic, and economic characteristics (summarized in Table 3). These differences

Table 2.

RESPONDENT SOCIODEMOGRAPHIC CHARACTERISTICS BY MINIMUM WAGE POLICY OF STATE OF RESIDENCE ON JAN 1, 2004; FOR ECONOMICALLY-ACTIVE BRFSS (BEHAVIORAL RISK FACTOR SURVEILLANCE SYSTEM) RESPONDENTS 18–65 WITH HIGH SCHOOL OR LESS EDUCATION

	Weighted percent of respondents (unless "mean" indicated)		
		State-level wage policy	
	Total sample	No state minimum wage (defaults to federal, $5.15/hour)	State minimum wage exceeds federal
Sample size (unweighted)	64,607	51,150	13,457
Sociodemographic characteristics			
Mean (sd) age in years***	41.29 (12.6)	41.51 (12.6)	40.45 (12.7)
Percent male	57.3	57.0	58.3
Race/ethnicity***			
White	58.8	63.3	44.2
Black	12.5	14.4	6.3
Hispanic	24.0	17.7	44.0
Other	4.7	4.5	5.5
Marital status***			
Married	51.9	52.8	49.3
Divorced, separated, widowed	14.8	15.0	14.2
Never married	33.3	32.3	36.6
Household size			
Mean (sd) adults in household***	1.99 (0.8)	1.98 (0.8)	2.03 (0.9)
Mean (sd) children in household***	0.94 (1.2)	0.93 (1.2)	0.96 (1.2)
Education***			
None or some high school	25.7	23.8	32.1
High school graduate	74.3	76.3	67.9
Employment***			
Employed for wages	71.8	71.7	71.9
Self-employed	10.9	11.6	8.8
Unemployed	11.7	11.5	12.5
Student	5.6	5.2	6.9

(Continued on p. 738)

Table 2. *(continued)*

	Weighted percent of respondents (unless "mean" indicated)		
		State-level wage policy	
	Total sample	No state minimum wage (defaults to federal, $5.15/hour)	State minimum wage exceeds federal
Health behaviors			
Current smoker***	32.5	33.9	27.8
Body mass index >30*	26.1	26.4	24.9
Poor health status	2.3	2.3	2.2
Fair health status	13.7	12.8	16.6
Good health status	36.9	37.2	36.1
Very good health status	30.1	30.5	28.9
Excellent health status	17.0	17.2	16.3
Health care access			
No health coverage	30.3	30.6	29.2
Cost barrier to hc in last year	19.6	19.9	18.9

*p<.05 for difference between wage policy groups
**p<.01
***p<.001

provide support for the necessity of multi-level models to effectively control for the likelihood of confounding by these factors.

Wage policies and insurance status. State-level minimum wage policy is not significantly associated with lack of health insurance coverage in either the binary predictor (Table 4) or the ratio predictor (Table 5) multi-level logistic regression models. Respondents living in states with a minimum wage standard above $5.15 appear to have similar odds of being uninsured as their counterparts in states without such policies, after controlling for both state and county-level features and individual demographic and health characteristics (OR=0.95, 95% CI: 0.81 to 1.12). Similarly, no significant association was observed between the ratio of minimum wage rate to average hourly wage and the odds of being uninsured (OR=1.04, 95% CI: 0.52 to 2.06).

In the insurance status models, larger percentages of a state's workforce in each of the following groups were associated with significantly higher odds of being uninsured: employed in service occupations; male gender; non-Caucasian race; unmarried; self-employed or unemployed; current smoker; or reporting fair or poor health status. Covariates associated with lower odds of being uninsured included the unionization level of the workers' state; the proportion of state population receiving cash public

Table 3.

SOCIAL AND POLITICAL CHARACTERISTICS OF STATES, STRATIFIED BY MINIMUM WAGE POLICY ON JANUARY 1, 2004

	Mean (SD)		
		State-level wage policy	
	Total sample	No state minimum wage (defaults to federal, $5.15/hour)	State minimum wage exceeds federal
Number of states[a]	50	39	11
Age-dependent ratio (ratio of 18–64 year-olds to those older or younger)*	59.1 (3.3)	59.7 (3.0)	57.0 (3.3)
Sex ratio (# males to 100 females)	96.2 (2.9)	96.3 (2.6)	95.9 (3.8)
Employment rate	70.6 (3.8)	70.6 (4.0)	70.9 (2.9)
Percent of 18-25 year olds completed high school	85.2 (3.9)	84.8 (3.9)	86.6 (3.3)
Percent of state workforce in service occupations	16.3 (1.8)	16.3 (2.0)	16.1 (0.8)
Percent of state workforce members of labor union***	11.0 (5.2)	9.9 (5.1)	15.3 (3.0)
Percent of state pop receiving cash public assistance*	2.5 (1.0)	2.3 (0.7)	3.4 (1.4)
Tanf ratio, 1995 to 2002*	1.1 (0.1)	1.1 (0.2)	1.0 (0.1)
Mean medicaid income eligibility limit (as percent of federal poverty limit), 2002***	86.8 (60.0)	71.7 (54.5)	140.2 (47.7)
State gini index, 1999	0.5 (0.03)	0.5 (0.02)	0.5 (0.04)
State average hourly wage (in dollars)**	$17.71 (3.3)	$16.81 (2.4)	$20.90 (4.15)
Ratio of minimum wage to average wage	0.317	0.312	0.333

*$p<.05$
**$p<.01$
***$p<.001$ for difference between wage policy groups
[a]The 11 states included as having a minimum wage in excess of the federal rate on 1/1/04 were: AK, CA, CT, DE, IL, MA, OR, RI, VT, WA, and the District of Columbia. Maine has been excluded because its minimum wage law took effect on 10/1/04. Hawaii is excluded from all analyses because no responses from the state were included in the 2004 Behavioral Risk Factor Surveillance System dataset.

Table 4.

MULTI-LEVEL LOGISTIC REGRESSION OF HEALTH-CARE ACCESS OUTCOMES ON STATE, COUNTY, AND INDIVIDUAL-LEVEL COVARIATES (USING BINARY MINIMUM WAGE PREDICTOR)[a]

	Uninsured status		Cost barriers	
	Odds ratio	95% CI	Odds ratio	95% CI
Minimum wage policy				
State minimum wage = federal	1.00	—	1.00	—
State minimum wage > federal	0.95	0.81 to 1.12	1.03	0.87 to 1.21
State-level covariates				
Age-dependent ratio	1.00	0.99 to 1.02	0.99	0.97 to 1.00
Percent of state workforce in service occupations	1.05**	1.03 to 1.08	1.01	0.98 to 1.03
Percent of state workforce members of labor union	0.98**	0.97 to 0.99	0.99	0.98 to 1.00
Percent of state receiving cash public assistance	0.90**	0.84 to 0.97	0.95	0.88 to 1.02
Medicaid eligibility limit	1.00**	1.00 to 1.00	1.00**	1.00 to 1.00
Temporary aid for needy families ratio, 1995 to 2002	0.94	0.70 to 1.26	1.09	0.80 to 1.48
Gini index, 1999	12.45	0.92 to 169.18	1.46	0.08 to 25.80
Social capital index	1.09	0.98 to 1.20	1.03	0.93 to 1.15
Average outpatient costs per medicare enrollee	1.00	1.00 to 1.00	1.00*	1.00 to 1.00
County-level covariates				
Sex ratio	0.73	0.33 to 1.60	1.01	0.46 to 2.19
Average hourly wage, retail service sector	0.84	0.53 to 1.33	1.31	0.80 to 2.15
Average hourly wage, all sectors	0.90	0.64 to 1.28	0.99	0.68 to 1.45
Unemployment rate	0.99	0.97 to 1.02	1.00	0.98 to 1.03
Percent of county pop (18–25) completed high school	1.00	0.99 to 1.01	1.00	0.99 to 1.01
Rural urban commuting area code	1.03	1.00 to 1.06	1.02	0.99 to 1.05
Physicians per 10,000 population	1.00	1.00 to 1.00	1.00	1.00 to 1.00
Median home value	1.00*	1.00 to 1.00	1.00**	1.00 to 1.00

(Continued on p. 741)

Table 4. *(continued)*

	Uninsured status		Cost barriers	
	Odds ratio	95% CI	Odds ratio	95% CI
Individual covariates				
Male gender	1.29**	1.19 to 1.41	0.68**	0.62 to 0.75
Race				
White (non-hispanic)	1.00	—	1.00	—
Black (non-hispanic)	1.30**	1.14 to 1.47	1.15*	1.00 to 1.31
Other (non-hispanic)	1.38**	1.14 to 1.68	1.65**	1.35 to 2.02
Hispanic	2.70**	2.38 to 3.07	1.35**	1.17 to 1.56
Refused	1.14	0.74 to 1.76	1.17	0.76 to 1.82
Age	0.98**	0.97 to 0.98	0.99**	0.98 to 0.99
Number of adults in HH	1.14**	1.09 to 1.20	1.00	0.94 to 1.05
Number of children in HH	0.97	0.93 to 1.00	1.03	0.99 to 1.07
Marital status				
Married	1.00	—	1.00	—
Divorced, widowed, separated	2.23**	1.99 to 2.50	1.57**	1.41 to 1.76
Never married	1.89**	1.68 to 2.14	1.17*	1.02 to 1.34
Refused	0.50	0.18 to 1.33	1.29	0.51 to 3.28
Education				
Less than high school	1.00	—	1.00	—
High school graduate	0.57**	0.52 to 0.64	0.76**	0.67 to 0.85
Refused	1.01	0.52 to 1.98	0.72	0.35 to 1.50
Employment status				
Employed for wages	1.00	—	1.00	—
Self employed	2.64**	2.34 to 2.98	1.51**	1.33 to 1.73
Unemployed	2.63**	2.30 to 3.01	1.97**	1.73 to 2.24
Student	0.59**	0.46 to 0.75	0.68*	0.51 to 0.91
Refused	0.70	0.34 to 1.46	0.93	0.47 to 1.83
Current smoker	1.60**	1.46 to 1.75	1.73**	1.57 to 1.90
Body mass index	0.99	0.98 to 1.00	1.01*	1.00 to 1.02
Fair/poor health status	1.60**	1.41 to 1.82	2.37**	2.10 to 2.68

*$p<.05$
**$p<.01$
[a]All regressions include 64,607 respondents. If categories are not provided, the covariate is continuous.
CI = confidence interval

assistance; the Medicaid income eligibility limit; younger age; holding a high school diploma; and being a student.

Wage policies and cost-related barriers to health care. The regression models examining cost barriers show that minimum wage policy is not significantly associated with differences in the rate of experiencing cost barriers to medical care. Residents of

Table 5.

MULTI-LEVEL LOGISTIC REGRESSION OF HEALTH-CARE ACCESS OUTCOMES ON STATE, COUNTY, AND INDIVIDUAL-LEVEL COVARIATES (USING RATIO OF MINIMUM WAGE TO COUNTY LEVEL AVERAGE WAGE IN RETAIL SERVICE SECTOR AS PREDICTOR)[a]

	Uninsured status		Cost barriers	
	Odds ratio	95% CI	Odds ratio	95% CI
Minimum wage policy				
Ratio of minimum wage to average hourly wage in retail service	1.04	0.52 to 2.06	1.07	0.51 to 2.23
State-level covariates				
Age-dependent ratio	1.00	0.99 to 1.02	0.99	0.97 to 1.00
Percent of state workforce in service occupations	1.06**	1.03 to 1.08	1.01	0.98 to 1.04
Percent of state workforce members of labor union	0.98**	0.98 to 0.99	0.99*	0.98 to 1.00
Percent of state receiving cash public assistance	0.89**	0.83 to 0.96	0.95	0.88 to 1.03
Medicaid eligibility limit	1.00**	1.00 to 1.00	1.00**	1.00 to 1.00
Temporary aid for needy family ratio, 1995 to 2002	0.94	0.70 to 1.25	1.08	0.79 to 1.46
Gini index, 1999	9.58	0.73 to 125.03	1.70	0.10 to 28.27
Social capital index	1.08	0.98 to 1.20	1.04	0.93 to 1.15
Average outpatient costs per medicare enrollee	1.00	1.00 to 1.00	1.00**	1.00 to 1.00
County-level covariates				
Sex ratio	0.68	0.30 to 1.50	1.08	0.50 to 2.35
Average hourly wage, all sectors	0.85	0.61 to 1.19	1.12	0.79 to 1.59
Unemployment rate	0.99	0.97 to 1.02	1.00	0.98 to 1.03
Percent of county pop (18–25) completed high school	1.00	0.99 to 1.01	1.00	0.99 to 1.01
Rural urban commuting area code	1.04*	1.01 to 1.06	1.01	0.99 to 1.04
Physicians per 10,000 population	1.00	1.00 to 1.00	1.00	1.00 to 1.00
Median home value	1.00*	1.00 to 1.00	1.00**	1.00 to 1.00

(Continued on p. 743)

Table 5. *(continued)*

	Uninsured status		Cost barriers	
	Odds ratio	95% CI	Odds ratio	95% CI
Individual covariates				
Male gender	1.29**	1.19 to 1.41	0.68**	0.62 to 0.75
Race				
White (non-hispanic)	1.00	—	1.00	—
Black (non-hispanic)	1.30**	1.15 to 1.47	1.14*	1.00 to 1.31
Other (non-hispanic)	1.38**	1.14 to 1.68	1.65**	1.35 to 2.02
Hispanic	2.68**	2.36 to 3.05	1.36**	1.17 to 1.57
Refused	1.14	0.74 to 1.77	1.17	0.76 to 1.82
Age	0.98**	0.97 to 0.98	0.99**	0.98 to 0.99
Number of adults in HH	1.14**	1.09 to 1.2	1.00	0.94 to 1.05
Number of children in HH	0.97	0.93 to 1.00	1.03	0.99 to 1.07
Marital status				
Married	1.00	—	1.00	—
Divorced, widowed, separated	2.23**	1.99 to 2.49	1.57**	1.41 to 1.76
Never married	1.89**	1.68 to 2.14	1.17*	1.02 to 1.34
Refused	0.50	0.19 to 1.33	1.30	0.51 to 3.29
Education				
Less than high school	1.00	—	1.00	—
High school graduate	0.57**	0.52 to 0.64	0.76**	0.67 to 0.85
Refused	1.01	0.51 to 1.98	0.72	0.35 to 1.50
Employment status				
Employed for wages	1.00	—	1.00	—
Self employed	2.64**	2.35 to 2.98	1.51**	1.33 to 1.73
Unemployed	2.63**	2.29 to 3.01	1.97**	1.73 to 2.24
Student	0.59**	0.46 to 0.75	0.68*	0.51 to 0.91
Refused	0.70	0.34 to 1.47	0.93	0.47 to 1.83
Current smoker	1.60**	1.46 to 1.75	1.73**	1.57 to 1.90
Body mass index	0.99	0.98 to 1.00	1.01*	1.00 to 1.02
Fair/poor health status	1.60**	1.41 to 1.82	2.37**	2.10 to 2.68

*$p<.05$
**$p<.01$
[a]All regressions include 64,607 respondents. If categories are not provided, the covariate is continuous.
CI = confidence interval

states with higher-than-federal minimum wage rates appear to have odds of reporting cost barriers to needed medical care that are statistically similar to those of their counterparts in states with lower wage standards (OR=1.03, 95% CI: 0.87 to 1.21). There was no significant association between the ratio of minimum wage rate to average hourly wage and the odds of experiencing cost-related barriers to health care access (OR=1.07, 95% CI: 0.51 to 2.23).

In the cost barrier models, factors associated with significantly increased odds of experiencing cost barriers to medical care included higher state-level average outpatient reimbursement per Medicare enrollee; higher county-level median home value; non-White race; unmarried; self-employed or unemployed; current smoker; and reporting fair or poor health status. Odds of experiencing cost barriers were significantly lower for workers who were living in states with higher Medicaid income eligibility limits; were male; were younger; and held a high school diploma.

Discussion

This study draws on a nationally-representative sample to examine associations between minimum wage policies and two key measures of health care access. Our study provides early evidence to suggest that minimum wage policies do not seem to affect health insurance status or cost barriers to care adversely. We found that individuals living in states where action had been taken to increase the minimum wage were no more likely to be uninsured or report cost barriers to receiving needed medical care than those respondents living in states with lower wage rates. Similarly, we found that the ratio of policy-mandated minimum wage rates to the average wages for retail service employees (a sector with a large proportion of unskilled labor) in a given county does not appear to predict the odds of being uninsured or experiencing cost-related barriers to health care. In fact, we found several of the control variables included in our models due to their potential influence on access to care to be far more strongly associated with the access outcomes than minimum wage policy. Consistent with prior research, several ecological factors (such as extent of unionization, size of the service sector within a state, Medicaid income eligibility limits, and prevailing health care costs) were found to be significantly associated with health care access in our models that also controlled for key individual characteristics. In addition to providing evidence on the relationship between minimum wage policy and access, these findings confirm earlier work describing the associations these ecological factors appear to have with health care access.[26–32]

One of the most interesting findings of our study with regard to the policy debate over minimum wage law is the lack of evidence for the detrimental effects of higher minimum wages. Although no positive association was observed between higher minimum wages and better access to care, these findings seem to refute the idea that higher minimum wages are likely to create additional difficulties in health care access for unskilled laborers and the working poor.

Much previous research has focused on the employment effects of minimum wage policy, and less attention has been paid to the potential effect on non-wage compensation such as health insurance coverage. Recent research examining the effects of minimum wage policy on employer-sponsored health insurance coverage has also found no association,[33] but the association with cost-related barriers to medical care has not been researched previously to our knowledge. The current study provides a novel outcome that can be examined alongside other emerging research to develop a fuller understanding of the impact of minimum wage policy.

Given the current turbulent economic climate, it is likely that efforts will be made

to revisit the minimum wage as policymakers focus their attention on tools to improve economic conditions for working adults. Simultaneous efforts to enact health care reform are also underway, and the evidence provided by this and similar research may prove valuable in these emerging policy debates.

Limitations. There are several limitations that must be considered when interpreting the findings of our study. First, the anonymous, self-reported survey data we have used introduces the possibility of biases. In addition to potential bias in self-report of the variables, telephone surveys are vulnerable to selection bias. In addition to missing individuals without telephones, surveys such as the BRFSS may also under-represent members of the low-wage workforce who may work unusual hours, regularly work overtime, or hold more than one job. Failure to capture accurately the individuals most likely to be directly affected by minimum wage policies may attenuate the associations found in our analysis.

Second, the BRFSS is limited to the adult population. The Bureau of Labor Statistics estimates that approximately one-fourth of minimum wage earners are between the ages of 16 and 19 and will thus be mostly missed by BRFSS methodology.[17] Additionally, the exclusion of all data from Hawaii in 2004 further limits the representativeness of our data by failing to capture respondents in a state with a consistently higher-than-federal minimum wage rate.

Third, the cross-sectional design of this study does not allow causal inference about the relationship between minimum wages and health care access, and may make the findings vulnerable to confounding due to unmeasured variables bias. Although great pains were taken to include many state, county, and individual-level factors that are likely to influence both the predictor of interest and health care access, the potential for this bias remains. Future research in this area should include the use of longitudinal datasets and time series analysis which might be able to control for some of this bias through the use of fixed effects models.

Fourth, it is important to acknowledge the potential limitations related to the outcome measures assessed in this study. While insurance status and experience with cost-related barriers to medical care are clearly appropriate indicators of health care access, these BRFSS variables are limited by being somewhat broad, self-report measures. It is possible that other indicators not currently available in the BRFSS datasets, such as utilization measures or amounts of individual health care spending might be observed to have a different association with minimum wage policy. A full understanding of this relationship should include future research with these additional indicators of health care access.

An additional limitation of this analysis is that it ignores the possible influence of local minimum wage ordinances and so-called *living wage* policies, which often set a higher wage standard than the state-level laws assessed by our models. Approximately 110 different municipalities in the United States had ordinances in place in 2004 that mandated wages ranging from $6.25 to over $12.00.[34]

Ascertaining the impact of these local minimum wage and living wage policies is complicated by the heterogeneity of the many ordinances themselves. While some mandate a minimum wage for all businesses in a certain municipality, the reach of many living wage laws is rather limited and only extends to municipal employees and

firms with contracts to provide services to the city government. In addition to the wage rates and coverage, the laws often also vary based on features such as relevant firm size (some exempt firms with fewer than 10 or 20 employees), whether exemptions are made for non-profit organizations, whether the wage rate is indexed to inflation (and which measure of inflation is used for the adjustment), and whether the policy includes provisions relating to health insurance coverage. These varying features make it difficult to reliably identify the respondents in the BRFSS dataset that are likely to be directly affected by local minimum wage ordinances. Furthermore, the workers most often covered by such policies are municipal employees who may be more likely to receive employer sponsored health benefits than their private-sector counterparts.[35,36]

Finally, it bears repeating that this study only seeks to provide early evidence of potential associations between wage policy and health-related outcomes, and should be contrasted with other models. While the findings seem to suggest that minimum wage policies are not associated with detrimental effects on health care access among unskilled workers, they cannot be used to infer causality (or the absence thereof), but should rather help guide future efforts using longitudinal models.

Conclusions. Our study provides evidence suggesting that minimum wage policies may not affect health care access. While primarily exploratory, these findings appear to refute the idea that minimum wage laws might negatively affect access to health care. Further research in this area will be needed to develop a fuller understanding of the non-employment-related effects of minimum wage policy.

Acknowledgments

Funding/Support: During the study, Dr. McCarrier was supported as a fellow in the AHRQ/NRSA Health Services Research Training Program at the University of Washington, funded by a National Institutes of Health (NIH) National Research Service Award (NRSA) Institutional Training Grant (T32) through the Agency for Healthcare Research and Quality (AHRQ). Dr. Zimmerman's participation was supported in part by 1 K01 MH06446-05 from the National Institute of Mental Health (NIH). Previous Presentation: Portions of the study were presented at the American Public Health Association Annual Meeting; November 6, 2006.

Notes

1. DeNavas-Walt C, Proctor BD, Smith JC. Income, poverty, and health insurance coverage in the United States: 2007. Washington, DC: U.S. Census Bureau, 2008.
2. Salganicoff A, Wyn R. Access to care for low-income women: the impact of Medicaid. J Health Care Poor Underserved. 1999 Nov;10(4):453–67.
3. Institute of Medicine. Coverage matters: insurance and health care. Washington, DC: The National Academy Press, 2001.
4. Banthin JS, Cunningham P, Bernard DM. Financial burden of health care, 2001–2004. Health Aff (Millwood). 2008 Jan–Feb;27(1):188–95.
5. Wessels W, Zapf H, Brubeck M, et al. Minimum wages, fringe benefits, and working conditions. Washington, DC: American Enterprise Institute, 1980.

6. Goodman JC, McKenzie RB. Saving health insurance from the minimum wage (brief analysis/health, no. 565). Dallas, TX: National Center for Policy Analysis, 2006.
7. McKenzie RB. The labor market effects of minimum wage laws: a new perspective. Journal of Labor Research. 1980 Jun;1(2):255–64.
8. Card D, Krueger AB. Myth and measurement: the new economics of the minimum wage. Princeton, NJ: Princeton University Press, 1995.
9. Neumark D, Wascher W. The effect of New Jersey's minimum wage increase on fast-food employment: a re-evaluation using payroll records. Am Econ Rev. 1995 Aug; 90(5):1362–96.
10. Brown C. Minimum wages, employment, and the distribution of income (chapter 32). In: Ashenfelter O, Card D, eds. Handbook of labor economics (1st ed., vol. 3). Amsterdam, The Netherlands: Elsevier, 1999.
11. Filion K. Minimum wage issue guide. Washington, DC: Economic Policy Institute, 2009. Available at: http://www.epi.org/content.cfm/issueguides_minwage.
12. Department of Health and Human Services. Annual update of the HHS poverty guidelines. Federal Register. 2007 Jan 24;72(15):3147–8.
13. Centers for Disease Control and Prevention. Behavioral risk factor surveillance system (survey data 2004, SAS/STATA). Atlanta, GA: U.S. Department of Health and Human Services, 2005.
14. Scott A, Neumark D. The economic effects of living wage laws: a provisional review. Urban Affairs Review. 2004 Jun;40(2):210–45.
15. Adams S, Neumark D. Living wage effects: new and improved evidence. Economic Development Quarterly. 2005 Feb;19(1):80–102.
16. Centers for Disease Control and Prevention. 2004 behavioral risk factor surveillance system summary data quality report. Atlanta, GA: U.S. Department of Health and Human Services, 2005.
17. Bureau of Labor Statistics. Characteristics of minimum wage workers: 2004. Washington, DC: U.S. Department of Labor, 2005.
18. U.S. Census Bureau. 2004 American Community Survey. Washington, DC: U.S. Census Bureau, 2006. Available at: http://www.census.gov/acs/www/index.html.
19. Gini C. Measurement of inequality and incomes. The Economic Journal. 192;31: 124–6.
20. Administration for Children and Families. Temporary Assistance for Needy Families (TANF), Sixth Annual Report to Congress. U.S. Depratment of Health and Human Services, 2004.
21. Kaiser Family Foundation. Income eligibility for parents applying for Medicaid by annual income as a percent of Federal Poverty Level (FPL), 2005. Washington, DC: Kaiser Family Foundation, 2006.
22. Putnam, RD. The 14 state-level measures of social capital used in Bowling Alone: the collapse and revival of American community. New York, NY: Simon and Schuster, 2000.
23. Health Resources and Services Administration. User documentation for the Area Resource File (ARF), 2005. Rockville, MD: U.S. Department of Health and Human Services, 2005.
24. Localio AR, Berlin JA, Ten Have TR, et al. Adjustments for center in multicenter studies: an overview. Ann Intern Med. 2001 Jul 17;135(2):112–23.
25. Maas CJM, Hox JJ. Robustness issues in multilevel regression analysis. Statistica Neerlandica. 2004;58(2):127–37.

26. Buchmueller TC, Dinardo J, Valletta RG. Union effects on health insurance provision and coverage in the United States. Industrial and Labor Relations Review. 2002 Jul;55(4):610.
27. Fichtenbaum R, Olson P. The impact of unionization on health insurance benefits. Journal of Economic Issues. 2002 Jun;36(2):323.
28. Long SH, Marquis MS. Low-wage workers and health insurance coverage: can policymakers target them through their employers? Inquiry. 2001 Fall;38(3):331–7.
29. Sommers J. Employer-sponsored health insurance for small employers in the private sector, by industry classification, 2002 (statistical brief no. 46). Rockville, MD: Agency for Healthcare Research and Quality, 2004.
30. Weissman JS, Zaslavsky AM, Wolf RE, et al. State Medicaid coverage and access to care. J Health Care Poor Underserved. 2008 Feb;19(1):307–19.
31. Coughlin TA, Long SK. Adult health care access and use under Medicaid: does it vary by state? J Health Care Poor Underserved. 2003 May;14(2):208–28.
32. Fisher ES, Wennberg DE, Stukel TA, et al. The implications of regional variations in Medicare spending. Part 1: the content, quality, and accessibility of care. Ann Intern Med. 2003 Feb 18;138(4):273–87.
33. Simon KI, Kaestner R. Do minimum wages affect non-wage job attributes? Evidence on fringe benefits and working conditions. National Bureau of Economic Research (NBER Working Paper No. W9688), 2003.
34. Living Wage Resource Center. Living wage wins. New York, NY: Living Wage Resource Center, 2006.
35. DeVaney SA, Anong ST. The likelihood of having employer-sponsored health insurance. Washington, DC: Compensation and Working Conditions, 2007.
36. Fronstin P. Sources of health insurance and characteristics of the uninsured: analysis of the March 2004 current population survey. Employee Benefit Research Institute, 2004.