

Cancer Screening in US Workers

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Regular cancer screening can prevent the development of some cancers and increase patient survival for other cancers. We evaluated the reported cancer screening prevalence among a nationally representative sample of all US workers with data from the 2000 and 2005 Cancer Screening Supplements of the National Health Interview Survey. Overall, workers with the lowest rates of health insurance coverage (in particular, Hispanic workers, agricultural workers, and construction workers) reported the lowest cancer screening. There was no significant improvement from 2000 to 2005. (*Am J Public Health*. 2009;99:59–65. doi:10.2105/AJPH.2008.135699)

The American Cancer Society^{1–3} and other groups⁴ recommend regular professional screening examinations for the prevention of cervical and colorectal cancer through removal of precancerous lesions and for the early detection of these and other cancers (e.g., breast, prostate) to reduce mortality (Table 1). A key Healthy People 2010 objective is “to eliminate health disparities among segments of the population including differences that occur by gender, race, or ethnicity, geographic location, or sexual orientation.”⁵ However, as noted by Barbeau et al.,⁶ occupation is not identified as a significant predictor of health disparities. We used a nationally representative database to examine health disparities and reported cancer screening behaviors of US workers in 2000 and 2005.

METHODS

The National Health Interview Survey (NHIS) is an annual, cross-sectional household survey of the US civilian noninstitutionalized population conducted by the National Center for Health Statistics (NCHS). The NHIS Cancer Control Module was administered to all NHIS participants in 2000 and 2005 and included questions on reported regular cancer screening examinations. The conditional response rates to the 2000 and 2005 sample adult component of the NHIS (and their Cancer Control Modules) were 82.6% and 80.1%, respectively.

Variables

Detailed employment information coded by occupation and industry was collected on all participants older than 18 years who reported working (paid and unpaid) during the week before the NHIS survey.⁷ Standard industry codes were grouped into the new National Institute of Occupational Safety and Health National Occupational Research Agenda (NORA) industry groups representing 8 sectors of industry.⁸ Occupation type was derived from detailed US Census occupation codes and collapsed into the 4 occupational status groups used by NCHS.⁹

Participants were asked if they had ever had a particular cancer screening examination by a doctor or other health professional. Screening was evaluated in different gender-specific age groups per contemporary national recommendations (Table 1): home or office stool blood (combined for study purposes) and colorectal screening (sigmoidoscopy, colonoscopy, or proctoscopy) for men and women, mammogram for women 40 years or older, manual breast examination for women 20 years or older, Papanicolaou test for women 18 years or older, and prostate-specific antigen (PSA) testing for men 50 years or older. The question on PSA testing was asked somewhat differently in 2000 and 2005, but results of both surveys were included.

Statistical Analysis

All worker and gender-specific prevalences were created depending on the specific screening test reported. We tested statistical differences, comparing 95% confidence intervals for all prevalences within a year as well as between years; we calculated these confidence

intervals with SUDAAN version 9.0 (Research Triangle Institute, Research Triangle Park, NC) by multiplying the standard error of each prevalence by 1.96. To create total estimates of US workers (including the subpopulations), we applied the annual sample–person weights and summed them over each annual group and the associated subgroups. Because of the complex sample survey design, we used SAS version 9.1.3 (SAS Institute Inc, Cary, NC) and SUDAAN for all analyses, with adjustment for case weights and design effects.¹⁰

RESULTS

The NHIS Cancer Control Module was administered to 19 702 (2000) and 18 422 (2005) employed participants of an estimated 128 480 200 and 133 103 520 US workers, respectively. The results are displayed by race/ethnicity, NORA industry sector (Table 2), and occupational status (Table 3) for each age- and gender-specific appropriate subgroup. Of note, between-year comparisons (i.e., 2000 vs 2005) did not show uniform improvement and were significantly different for all workers only for colorectal screening (32.4% vs 43.2%), manual breast examination (89.0% vs 83.3%), and PSA (50.8% vs 58.4%).

Race/Ethnicity

Both male and female Hispanic workers reported the lowest prevalence of cancer screening for all screening examinations. These differences were statistically significant and included home or office blood stool screening (2005: 24.5% Hispanics vs 41.0% all US workers), colorectal screening (2000: 23.7% vs 32.4%), manual breast examination (2005: 62.2% vs 83.3%), mammogram (2005: 75.2% vs 86.5%), Papanicolaou test (2000: 85.2% vs 93.9%), and PSA (2005: 37.4% vs 50.8%). In general, Black workers reported cancer screening rates between those of Hispanics and all US workers (including Blacks and Hispanics).

Industry and Occupation

Among the National Institute of Occupational Safety and Health NORA industry sectors (Table 2) for all workers; those in agriculture, forestry, or fishing; and those in construction had the lowest reported rates of

TABLE 1—American Cancer Society Cancer Screening Recommendations for Years 2000 and 2005 and Healthy People 2010 Cancer Screening Recommendations

Cancer Site	Breast Cancer (Women)	Colorectal Cancer	Cervical Cancer (Women)	Prostate Cancer (Men)
American Cancer Society cancer screening recommendations for 2000 and 2005				
ACS (2000)	Clinical breast examination every 3 years, aged 20–39; annually, aged ≥40. Mammography annually, aged ≥40.	Start at age 50. Annual fecal occult blood test and flexible sigmoidoscopy every 5 years, or double contrast barium enema, every 5–10 years, or colonoscopy every 10 years.	Sexually active women or those ≥18 years, annual Pap test and pelvic examination. After more than 3 consecutive satisfactory normal annual examinations, the Pap test may be performed less frequently at the discretion of the physician.	Annual digital rectal examination and PSA test should be offered to men starting at age 50.
ACS (2005)	Clinical breast examination as part of a periodic health examination, preferably at least every 3 years, aged 20–39; annually, ≥40 years. Mammography annually, age ≥40.	Start at age 50. Fecal occult blood test, fecal immunochemical test annually, or flexible sigmoidoscopy or fecal occult blood test annually and flexible sigmoidoscopy, or double contrast barium enema every 5 years, or colonoscopy every 10 years.	Begin approximately 3 years after a woman begins having vaginal intercourse, but no later than age 21. Every year with conventional Pap tests or every 2 years using liquid-based Pap tests. At or after age 30, women who have had 3 normal test results in a row may be screened every 2 to 3 years with cervical cytology alone, or every 3 years with a human papillomavirus DNA test plus cervical cytology. Women ≥70 years who have had 3 or more normal Pap tests and no abnormal Pap tests in the last 10 years and women who have had a total hysterectomy may choose to stop cervical cancer screening.	Digital rectal examination and PSA test should be offered annually, starting at age 50, for men who have a life expectancy of at least 10 years.
Healthy People 2010 objectives and target screening rates				
Objectives	Reduce the breast cancer death rate. Increase the proportion of women ≥40 years who have received a mammogram within the preceding 2 years.	Reduce the colon cancer death rate. Increase the proportion of adults who receive a colorectal cancer screening examination.	Increase the proportion of women who receive a Pap test.	Reduce the prostate cancer death rate.
Baseline (1998) and target screening rates	67% of women ≥40 years received a mammogram within the preceding 2 years. Target: 70%.	35% of adults ≥50 years received a fecal occult blood test within the preceding 2 years. Target: 50%. 37% of adults ≥50 years have ever received a sigmoidoscopy. Target: 50%.	92% of women ≥18 years have ever received a Pap test. Target: 97%. 79% of women ≥18 years received a Pap test within the preceding 3 years. Target: 90%.	Efforts aimed at reducing deaths through screening and early detection remain controversial because of the uncertain benefits and potential risks of screening, diagnosis, and treatment. Digital rectal examination and the PSA test are two commonly used methods for detecting prostate cancer.

Note. ACS = American Cancer Society; PSA = prostate-specific antigen; Pap = Papanicolaou.

TABLE 2—Reported Cancer Screening and Health Insurance Rates Among Workers, by Race/Ethnicity and Industry Sector: National Health Interview Survey (NHIS) Cancer Screening Supplements, 2000–2005

NORA industry sector	US Worker Population Estimate ^a		NHIS Sample, No.				Screening Prevalence										
	2000		2005		2000, % (95% CI)		2005, % (95% CI)		All Workers			Hispanic Workers			Black Workers		
	2000	2005	2000	2005	2000, % (95% CI)	2005, % (95% CI)	2000, % (95% CI)	2005, % (95% CI)	2000, % (95% CI)	2005, % (95% CI)	2000, % (95% CI)	2005, % (95% CI)	2000, % (95% CI)	2005, % (95% CI)	2000, % (95% CI)	2005, % (95% CI)	
Home or office blood stool screen (age ≥ 50 y)																	
All sectors	28 395 332	32 338 326	4 480	4 755	43.3 (41.7, 44.9)	41.0 (39.2, 42.8)	25.0 ^b (20.3, 29.8)	24.5 ^b (19.8, 29.2)	42.4 (37.7, 47.0)	42.4 (37.7, 47.0)	42.4 (37.7, 47.0)	42.4 (37.7, 47.0)	42.4 (37.7, 47.0)	42.4 (37.7, 47.0)	42.4 (37.7, 47.0)	42.4 (37.7, 47.0)	
Agriculture, forestry, fishing	782 140	561 163	129	80	37.4 (27.1, 47.8)	27.6 (16.3, 38.9)	6.5 ^{b,c} (0.0, 16.2)	0.0 ^{b,c} (0.0, 0.0)	18.8 ^c (0.0, 51.7)	18.8 ^c (0.0, 51.7)	18.8 ^c (0.0, 51.7)	18.8 ^c (0.0, 51.7)	18.8 ^c (0.0, 51.7)	18.8 ^c (0.0, 51.7)	18.8 ^c (0.0, 51.7)	18.8 ^c (0.0, 51.7)	
Construction	1 506 923	1 863 858	235	253	27.0 (20.8, 33.3)	35.5 (28.5, 42.4)	7.3 ^{b,c} (0.0, 16.0)	15.1 ^c (0.6, 29.6)	17.8 ^c (0.8, 34.8)	17.8 ^c (0.8, 34.8)	17.8 ^c (0.8, 34.8)	17.8 ^c (0.8, 34.8)	17.8 ^c (0.8, 34.8)	17.8 ^c (0.8, 34.8)	17.8 ^c (0.8, 34.8)	17.8 ^c (0.8, 34.8)	
Health care and social assistance	3 925 453	4 029 784	657	646	52.1 (47.1, 56.5)	50.0 (45.7, 54.2)	40.2 ^b (23.7, 56.7)	42.6 (26.0, 59.2)	46.7 (36.3, 57.1)	46.7 (36.3, 57.1)	46.7 (36.3, 57.1)	46.7 (36.3, 57.1)	46.7 (36.3, 57.1)	46.7 (36.3, 57.1)	46.7 (36.3, 57.1)	46.7 (36.3, 57.1)	
Manufacturing	3 984 625	3 951 865	601	563	44.4 (40.0, 48.8)	35.1 (30.0, 40.2)	23.8 ^b (12.6, 35.0)	18.7 ^b (7.5, 29.9)	49.4 ^d (33.7, 65.2)	49.4 ^d (33.7, 65.2)	49.4 ^d (33.7, 65.2)	49.4 ^d (33.7, 65.2)	49.4 ^d (33.7, 65.2)	49.4 ^d (33.7, 65.2)	49.4 ^d (33.7, 65.2)	49.4 ^d (33.7, 65.2)	
Mining	130 696	125 662	22 ^c	13 ^c	49.8 ^c (25.4, 74.1)	27.8 ^c (1.0, 54.5)	28.5 ^c (0.0, 62.7)	100.0 ^c (100.0, 100.0)	61.5 ^c (0.0, 100.0)	61.5 ^c (0.0, 100.0)	61.5 ^c (0.0, 100.0)	61.5 ^c (0.0, 100.0)	61.5 ^c (0.0, 100.0)	61.5 ^c (0.0, 100.0)	61.5 ^c (0.0, 100.0)	61.5 ^c (0.0, 100.0)	
Services	11 287 847	15 661 653	1 781	2 310	43.9 (41.4, 46.5)	42.4 (39.8, 45.0)	28.0 ^b (19.2, 36.9)	24.1 ^b (17.8, 30.3)	41.2 (34.0, 48.5)	41.2 (34.0, 48.5)	41.2 (34.0, 48.5)	41.2 (34.0, 48.5)	41.2 (34.0, 48.5)	41.2 (34.0, 48.5)	41.2 (34.0, 48.5)	41.2 (34.0, 48.5)	
Transportation, warehousing, utilities	2 116 953	1 916 296	318	262	39.1 (33.3, 44.9)	35.8 (29.2, 42.5)	20.2 ^c (1.9, 38.4)	33.0 ^c (12.3, 53.8)	56.3 (39.8, 72.7)	56.3 (39.8, 72.7)	56.3 (39.8, 72.7)	56.3 (39.8, 72.7)	56.3 (39.8, 72.7)	56.3 (39.8, 72.7)	56.3 (39.8, 72.7)	56.3 (39.8, 72.7)	
Wholesale and retail trade	4 660 695	4 228 045	737	628	41.4 (37.5, 45.4)	39.9 (35.9, 43.9)	26.3 ^b (15.3, 37.3)	19.4 ^b (5.6, 33.2)	29.4 ^{b,d} (6.3, 17.0)	29.4 ^{b,d} (6.3, 17.0)	29.4 ^{b,d} (6.3, 17.0)	29.4 ^{b,d} (6.3, 17.0)	29.4 ^{b,d} (6.3, 17.0)	29.4 ^{b,d} (6.3, 17.0)	29.4 ^{b,d} (6.3, 17.0)	29.4 ^{b,d} (6.3, 17.0)	
Colorectal screening (age ≥ 50 y)																	
All sectors	28 474 998	32 459 969	4 489	4 773	32.4 ^d (30.8, 34.1)	43.2 ^d (41.4, 44.9)	23.7 ^b (18.5, 29.0)	27.0 ^b (22.4, 31.7)	29.7 (25.5, 33.9)	29.7 (25.5, 33.9)	29.7 (25.5, 33.9)	29.7 (25.5, 33.9)	29.7 (25.5, 33.9)	29.7 (25.5, 33.9)	29.7 (25.5, 33.9)	29.7 (25.5, 33.9)	
Agriculture, forestry, fishing	780 304	567 951	128	81	23.2 (15.0, 31.3)	40.5 (28.6, 52.4)	4.3 ^{b,c} (0.0, 12.8)	8.3 ^{b,c} (0.0, 23.6)	0.0 ^{b,c} (0.0, 0.0)	0.0 ^{b,c} (0.0, 0.0)	0.0 ^{b,c} (0.0, 0.0)	0.0 ^{b,c} (0.0, 0.0)	0.0 ^{b,c} (0.0, 0.0)	0.0 ^{b,c} (0.0, 0.0)	0.0 ^{b,c} (0.0, 0.0)	0.0 ^{b,c} (0.0, 0.0)	
Construction	1 510 182	1 863 858	236	253	27.0 (20.4, 33.6)	38.1 (30.5, 45.6)	3.2 ^{b,c} (0.0, 9.3)	10.6 ^{b,c} (0.0, 23.0)	47.6 ^c (26.7, 68.4)	47.6 ^c (26.7, 68.4)	47.6 ^c (26.7, 68.4)	47.6 ^c (26.7, 68.4)	47.6 ^c (26.7, 68.4)	47.6 ^c (26.7, 68.4)	47.6 ^c (26.7, 68.4)	47.6 ^c (26.7, 68.4)	
Health care and social assistance	3 953 598	4 054 575	660	650	37.2 (33.2, 41.2)	43.5 (38.7, 48.3)	34.2 (19.4, 49.1)	31.3 (18.6, 44.1)	25.5 (17.7, 33.2)	25.5 (17.7, 33.2)	25.5 (17.7, 33.2)	25.5 (17.7, 33.2)	25.5 (17.7, 33.2)	25.5 (17.7, 33.2)	25.5 (17.7, 33.2)	25.5 (17.7, 33.2)	
Manufacturing	3 984 625	3 960 412	601	564	30.5 (26.5, 34.4)	38.7 (34.0, 43.3)	21.2 (8.6, 33.8)	30.8 (17.5, 44.0)	39.5 (25.8, 53.1)	39.5 (25.8, 53.1)	39.5 (25.8, 53.1)	39.5 (25.8, 53.1)	39.5 (25.8, 53.1)	39.5 (25.8, 53.1)	39.5 (25.8, 53.1)	39.5 (25.8, 53.1)	
Mining	130 696	125 662	22 ^c	13 ^c	44.0 ^c (18.5, 69.4)	60.3 ^c (24.9, 95.8)	28.5 ^{c,d} (0.0, 62.7)	100.0 ^{b,c,d} (100.0, 100.0)	100.0 ^{b,c,d} (100.0, 100.0)	100.0 ^{b,c,d} (100.0, 100.0)	100.0 ^{b,c,d} (100.0, 100.0)	100.0 ^{b,c,d} (100.0, 100.0)	100.0 ^{b,c,d} (100.0, 100.0)	100.0 ^{b,c,d} (100.0, 100.0)	100.0 ^{b,c,d} (100.0, 100.0)	100.0 ^{b,c,d} (100.0, 100.0)	
Services	11 299 854	15 702 632	1 782	2 318	34.6 ^d (32.1, 37.1)	45.5 ^d (43.0, 47.9)	34.6 (25.1, 44.2)	29.8 ^b (22.7, 37.0)	29.3 (23.0, 35.6)	29.3 (23.0, 35.6)	29.3 (23.0, 35.6)	29.3 (23.0, 35.6)	29.3 (23.0, 35.6)	29.3 (23.0, 35.6)	29.3 (23.0, 35.6)	29.3 (23.0, 35.6)	
Transportation, warehousing, utilities	2 136 908	1 936 266	320	264	27.6 (21.7, 33.5)	38.5 (31.6, 45.3)	19.1 (2.9, 35.3)	27.6 ^c (5.0, 50.3)	38.1 (20.4, 55.7)	38.1 (20.4, 55.7)	38.1 (20.4, 55.7)	38.1 (20.4, 55.7)	38.1 (20.4, 55.7)	38.1 (20.4, 55.7)	38.1 (20.4, 55.7)	38.1 (20.4, 55.7)	
Wholesale and retail trade	4 678 831	4 248 613	740	630	30.1 ^c (26.3, 33.9)	42.8 ^d (38.8, 46.8)	15.4 ^b (6.9, 24.0)	17.0 ^b (6.1, 27.8)	13.2 ^{b,d} (3.8, 22.7)	13.2 ^{b,d} (3.8, 22.7)	13.2 ^{b,d} (3.8, 22.7)	13.2 ^{b,d} (3.8, 22.7)	13.2 ^{b,d} (3.8, 22.7)	13.2 ^{b,d} (3.8, 22.7)	13.2 ^{b,d} (3.8, 22.7)	13.2 ^{b,d} (3.8, 22.7)	
Manual breast examination (age ≥ 20 y)																	
All sectors	42 770 837	41 921 192	7 312	6 549	89.0 ^d (88.2, 89.9)	83.3 ^d (82.1, 84.4)	74.5 ^{b,d} (71.1, 77.8)	62.2 ^{b,d} (57.9, 66.4)	88.7 ^d (86.4, 90.9)	88.7 ^d (86.4, 90.9)	88.7 ^d (86.4, 90.9)	88.7 ^d (86.4, 90.9)	88.7 ^d (86.4, 90.9)	88.7 ^d (86.4, 90.9)	88.7 ^d (86.4, 90.9)	88.7 ^d (86.4, 90.9)	
Agriculture, forestry, fishing	533 309	267 285	83	41 ^c	88.3 (81.8, 94.7)	72.7 ^c (52.3, 93.0)	57.5 ^c (31.7, 83.3)	55.4 ^c (20.6, 90.2)	80.4 ^c (42.4, 118.3)	80.4 ^c (42.4, 118.3)	80.4 ^c (42.4, 118.3)	80.4 ^c (42.4, 118.3)	80.4 ^c (42.4, 118.3)	80.4 ^c (42.4, 118.3)	80.4 ^c (42.4, 118.3)	80.4 ^c (42.4, 118.3)	
Construction	553 811	519 873	85	82	90.2 (84.4, 95.9)	81.5 (82.1, 84.4)	44.2 (0.0, 88.5)	75.1 ^c (50.6, 99.6)	69.0 ^c (20.4, 100.0)	69.0 ^c (20.4, 100.0)	69.0 ^c (20.4, 100.0)	69.0 ^c (20.4, 100.0)	69.0 ^c (20.4, 100.0)	69.0 ^c (20.4, 100.0)	69.0 ^c (20.4, 100.0)	69.0 ^c (20.4, 100.0)	
Health care and social assistance	9 969 626	9 324 157	1 679	1 468	91.1 ^d (89.5, 92.7)	86.3 ^d (84.4, 88.2)	79.4 ^b (72.8, 86.1)	70.0 ^b (61.4, 78.6)	87.8 (83.8, 91.9)	87.8 (83.8, 91.9)	87.8 (83.8, 91.9)	87.8 (83.8, 91.9)	87.8 (83.8, 91.9)	87.8 (83.8, 91.9)	87.8 (83.8, 91.9)	87.8 (83.8, 91.9)	
Manufacturing	4 441 044	3 652 163	747	570	86.9 ^d (84.0, 89.7)	78.7 ^d (74.4, 83.0)	65.2 (56.4, 74.0)	53.2 ^b (41.4, 65.3)	92.1 (86.6, 97.7)	92.1 (86.6, 97.7)	92.1 (86.6, 97.7)	92.1 (86.6, 97.7)	92.1 (86.6, 97.7)	92.1 (86.6, 97.7)	92.1 (86.6, 97.7)	92.1 (86.6, 97.7)	
Mining	43 391	23 633	7 ^c	5 ^c	100.0 ^c (100.0, 100.0)	100.0 ^c (100.0, 100.0)	100.0 ^c (100.0, 100.0)	100.0 ^c (100.0, 100.0)	100.0 ^c (100.0, 100.0)	100.0 ^c (100.0, 100.0)	100.0 ^c (100.0, 100.0)	100.0 ^c (100.0, 100.0)	100.0 ^c (100.0, 100.0)	100.0 ^c (100.0, 100.0)	100.0 ^c (100.0, 100.0)	100.0 ^c (100.0, 100.0)	
Services	18 656 428	21 805 997	3 182	3 385	90.1 ^d (88.9, 91.3)	83.1 ^d (81.5, 84.6)	77.5 ^{b,d} (72.7, 82.4)	61.1 ^{b,d} (56.3, 66.0)	88.2 ^d (84.4, 92.0)	88.2 ^d (84.4, 92.0)	88.2 ^d (84.4, 92.0)	88.2 ^d (84.4, 92.0)	88.2 ^d (84.4, 92.0)	88.2 ^d (84.4, 92.0)	88.2 ^d (84.4, 92.0)	88.2 ^d (84.4, 92.0)	
Transportation, warehousing, utilities	1 930 167	1 216 315	361	184	89.0 (84.9, 93.1)	86.1 (80.5, 91.7)	80.0 (65.4, 94.7)	80.7 (65.3, 96.1)	94.3 (89.3, 99.4)	94.3 (89.3, 99.4)	94.3 (89.3, 99.4)	94.3 (89.3, 99.4)	94.3 (89.3, 99.4)	94.3 (89.3, 99.4)	94.3 (89.3, 99.4)	94.3 (89.3, 99.4)	
Wholesale and retail trade	6 643 061	5 111 769	1 168	814	84.4 (82.0, 86.8)	82.0 (85.4, 87.7)	69.3 ^b (61.6, 76.9)	60.6 ^b (50.7, 70.5)	87.4 (80.1, 94.6)	87.4 (80.1, 94.6)	87.4 (80.1, 94.6)	87.4 (80.1, 94.6)	87.4 (80.1, 94.6)	87.4 (80.1, 94.6)	87.4 (80.1, 94.6)	87.4 (80.1, 94.6)	
Mammogram (age ≥ 40 y)																	
All sectors	28 308 100	30 055 295	4 732	4 604	86.2 (85.0, 87.4)	86.5 (85.4, 87.7)	77.5 ^b (72.9, 82.0)	75.2 ^b (70.3, 80.0)	82.4 (79.3, 85.6)	82.4 (79.3, 85.6)	82.4 (79.3, 85.6)	82.4 (79.3, 85.6)	82.4 (79.3, 85.6)	82.4 (79.3, 85.6)	82.4 (79.3, 85.6)	82.4 (79.3, 85.6)	
Agriculture, forestry, fishing	371 981	201 226	57	32 ^c	88.2 (80.3, 96.0)	81.7 ^c (66.7, 96.8)	87.5 ^c (68.6, 106.4)	53.2 ^c (9.4, 97.0)	100.0 ^{b,c} (100.0, 100.0)	100.0 ^{b,c} (100.0, 100.0)	100.0 ^{b,c} (100.0, 100.0)	100.0 ^{b,c} (100.0, 100.0)	100.0 ^{b,c} (100.0, 100.0)	100.0 ^{b,c} (100.0, 100.0)	100.0 ^{b,c} (100.0, 100.0)	100.0 ^{b,c} (100.0, 100.0)	
Construction	330 203	346 400	54	52	77.1 (65.3, 88.9)	89.9 (81.7, 98.1)	51.1 ^c (0.0, 120.4)	35.5 ^c (0.0, 84.6)	100.0 ^{b,c} (100.0, 100.0)	100.0 ^{b,c} (100.0, 100.0)	100.0 ^{b,c} (100.0, 100.0)	100.0 ^{b,c} (100.0, 100.0)	100.0 ^{b,c} (100.0, 100.0)	100.0 ^{b,c} (100.0, 100.0)	100.0 ^{b,c} (100.0, 100.0)	100.0 ^{b,c} (100.0, 100.0)	
Health care and social assistance	6 463 462	6 715 778	1 081	1 035	87.7 (85.5, 90.0)	87.5 (85.0, 90.0)	86.2 (78.8, 93.6)	86.0 (75.5, 96.4)	81.4 (75.3, 87.6)	81.4 (75.3, 87.6)	81.4 (75.3, 87.6)	81.4 (75.3, 87.6)	81.4 (75.3, 87.6)	81.4 (75.3, 87.6)	81.4 (75.3, 87.6)	81.4 (75.3, 87.6)	

Continued

TABLE 2—Continued

Manufacturing	2 915 633	2 628 304	483	403	86.7 (83.0, 90.4)	84.0 (80.2, 87.9)	78.1 (88.3, 87.9)	72.7 (60.2, 85.1)	87.6 (79.0, 96.3)	88.0 (78.0, 98.1)
Mining	43 391	15 151	7 ^c	2 ^c	100.0 ^c (100.0, 100.0)	100.0 ^c (100.0, 100.0)	100.0 ^c (100.0, 100.0)
Services	12 630 107	15 657 159	2 090	2 382	87.2 (85.5, 88.9)	87.4 (85.9, 89.0)	74.4 ^b (67.0, 81.8)	72.4 ^b (65.6, 79.1)	86.3 (82.2, 90.4)	82.8 (77.9, 87.6)
Transportation, warehousing, utilities	1 289 004	880 918	235	131	83.5 (78.1, 89.0)	85.3 (78.9, 91.7)	89.9 (78.9, 100.0)	69.9 (42.0, 97.8)	84.0 (71.8, 96.2)	80.2 (60.2, 100.0)
Wholesale and retail trade	4 264 319	3 610 359	725	567	81.7 (78.4, 85.0)	82.7 (79.2, 86.1)	69.4 (57.6, 81.3)	79.5 (69.4, 89.6)	74.4 (63.2, 85.6)	84.3 (74.1, 94.4)
Papanicolaou test (age ≥ 18 y)										
All sectors	57 334 753	55 574 383	9 585	8 413	93.9 (93.2, 94.6)	94.0 (93.3, 94.7)	85.2 ^b (82.3, 88.0)	87.6 ^b (85.1, 90.1)	96.7 ^b (95.5, 97.9)	94.2 (92.5, 95.8)
Agriculture, forestry, fishing	702 746	329 877	108	54	92.8 (86.6, 98.9)	89.2 (77.2, 100.0)	75.8 ^c (54.1, 97.5)	55.9 ^c (24.4, 87.4)	100.0 ^{b,c} (100.0, 100.0)	100.0 ^c (100.0, 100.0)
Construction	722 085	590 327	107	94	87.1 (74.8, 99.3)	97.4 (93.8, 100.0)	44.5 ^c (0.6, 88.4)	74.4 ^c (40.6, 100.0)	100.0 ^{b,c} (100.0, 100.0)	100.0 ^c (100.0, 100.0)
Health care and social assistance	12 820 735	11 986 787	2 118	1 838	96.0 (94.8, 97.1)	96.4 (95.3, 97.4)	86.5 ^{b,d} (80.9, 92.0)	96.0 ^d (93.2, 98.8)	97.6 (95.6, 99.6)	93.8 (90.5, 97.0)
Manufacturing	5 589 303	4 336 918	929	665	93.7 (91.6, 95.7)	92.4 (89.1, 95.7)	80.9 ^b (73.6, 88.3)	77.9 ^b (67.0, 88.7)	98.9 (97.6, 100.0)	92.7 (85.8, 99.6)
Mining	44 976	32 794	8 ^c	6 ^c	100.0 ^c (100.0, 100.0)	100.0 ^c (100.0, 100.0)	100.0 ^c (100.0, 100.0)	100.0 ^c (100.0, 100.0)
Services	24 273 222	29 190 844	4 101	4 400	94.6 (93.7, 95.5)	93.3 (92.3, 94.4)	88.8 ^b (85.7, 91.9)	86.6 ^b (83.2, 90.0)	97.0 (95.2, 98.7)	94.2 (91.6, 96.8)
Transportation, warehousing, utilities	2 358 298	1 501 921	441	223	97.1 (95.1, 99.1)	96.7 (93.5, 99.8)	96.5 (92.3, 100.8)	97.1 ^c (91.5, 100.0)	100.0 ^b (100.0, 100.0)	94.7 ^c (84.6, 100.0)
Wholesale and retail trade	10 823 388	7 604 915	1 773	1 133	89.8 (87.6, 92.1)	93.2 (91.4, 95.0)	81.3 ^{b,d} (75.2, 87.4)	91.9 ^d (87.9, 95.9)	91.1 (85.4, 96.7)	95.3 (93.1, 97.5)
Prostate-specific antigen test (age ≥ 50 y)										
All Sectors	15 197 015	17 126 936	2 215	2 315	50.8 ^d (48.4, 53.3)	58.4 ^d (55.9, 60.8)	37.4 ^b (30.0, 44.7)	44.7 ^b (37.1, 51.6)	53.4 (45.5, 61.4)	54.6 (47.3, 61.9)
Agriculture, forestry, fishing	571 801	430 922	98	59	46.8 (35.5, 58.0)	50.5 (36.9, 64.1)	27.1 ^d (7.0, 47.1)	0.0 ^{b,d} (0.0, 0.0)	30.8 ^c (0.0, 70.0)	0.0 ^{b,c} (0.0, 0.0)
Construction	1 324 176	1 768 617	204	236	43.8 (35.8, 51.8)	55.2 (48.0, 62.4)	29.2 (10.8, 47.6)	24.5 ^c (7.5, 41.5)	44.3 ^c (22.3, 66.2)	68.3 ^c (50.3, 86.4)
Health care and social assistance	942 961	778 879	141	110	69.5 (60.4, 78.7)	69.1 (59.4, 78.8)	42.8 (3.9, 81.6)	86.2 (68.9, 100.0)	24.7 ^{b,c} (7.6, 41.8)	46.1 ^c (16.7, 75.5)
Manufacturing	2 705 524	2 760 395	386	366	40.1 ^d (35.0, 45.2)	53.1 ^d (47.5, 58.7)	28.2 (12.5, 43.8)	42.6 (26.5, 58.7)	34.9 ^c (16.0, 53.8)	35.4 ^c (19.4, 51.3)
Mining	111 290	122 931	19 ^c	12 ^c	71.0 ^c (46.2, 95.8)	47.6 ^c (7.9, 87.4)	62.9 ^{c,d} (29.9, 95.9)	100.0 ^{b,c,d} (100.0, 100.0)
Services	5 237 270	7 329 845	756	1 001	55.5 (51.5, 59.8)	60.0 (56.3, 63.7)	49.0 (33.7, 64.4)	44.9 ^b (34.0, 55.8)	61.2 (48.2, 74.2)	57.2 (45.6, 68.7)
Transportation, warehousing, utilities	1 700 407	1 564 300	234	207	51.2 (43.8, 58.5)	55.9 (48.1, 63.7)	41.3 (15.4, 67.1)	58.6 (37.1, 80.2)	72.4 ^c (58.3, 86.6)	79.4 ^c (66.4, 92.4)
Wholesale and retail trade	2 603 586	2 371 047	377	324	49.3 ^d (43.6, 55.0)	61.8 ^c (55.8, 67.7)	38.3 (21.6, 55.1)	51.7 (30.6, 72.9)	56.8 ^c (38.0, 75.6)	36.4 ^{b,c} (16.8, 56.1)
Current health insurance (age ≥ 18 y)										
All sectors	127 320 464	127 810 983	19 527	17 642	84.5 ^d (83.9, 85.2)	82.4 ^d (81.6, 83.1)	61.8 ^b (59.0, 64.6)	59.0 ^b (56.7, 61.3)	80.4 ^b (78.5, 82.2)	78.0 ^b (75.5, 80.5)
Agriculture, forestry, fishing	3 188 852	1 721 820	497	243	67.7 (62.4, 72.9)	69.6 (62.5, 76.7)	29.9 ^b (20.2, 39.6)	33.7 ^b (19.6, 47.7)	69.0 ^c (47.1, 90.8)	75.5 ^c (40.2, 110.7)
Construction	8 622 806	10 516 444	1 234	1 350	68.5 ^d (65.6, 71.5)	60.9 ^d (57.5, 64.2)	37.6 ^b (30.7, 44.6)	30.6 ^b (24.6, 36.6)	71.4 (61.8, 81.0)	55.0 (43.0, 66.9)
Health care and social assistance	16 885 458	15 794 791	2 717	2 349	89.1 (87.9, 90.3)	86.6 (85.0, 88.2)	77.9 ^b (72.2, 83.6)	71.8 ^b (65.6, 78.1)	81.9 ^b (78.3, 85.5)	74.4 ^b (69.3, 79.5)
Manufacturing	18 472 477	15 079 398	2 711	2 008	90.2 (88.8, 91.6)	89.8 (88.2, 91.4)	72.4 ^b (68.0, 76.7)	72.0 ^b (66.6, 77.4)	85.2 (80.4, 90.0)	91.0 (86.9, 95.1)
Mining	444 848	413 475	66	52	88.7 (81.8, 96.2)	88.6 (80.2, 97.0)	84.5 ^c (65.4, 103.7)	75.6 ^c (53.6, 97.6)	100.0 ^{b,c} (100.0, 100.0)	100.0 ^{b,c} (100.0, 100.0)
Services	46 156 829	59 549 626	7 287	8 305	87.8 (86.9, 88.6)	83.4 (82.4, 84.5)	67.4 ^b (63.7, 71.2)	61.6 ^b (58.2, 65.0)	82.0 ^b (79.5, 84.5)	78.2 ^b (74.5, 81.8)
Transportation, warehousing, utilities	9 271 769	6 620 522	1 377	889	88.3 (86.4, 90.3)	86.5 (84.1, 88.8)	80.1 (73.2, 87.1)	69.9 ^b (62.0, 77.7)	87.3 (83.0, 91.6)	86.7 (81.2, 92.3)
Wholesale and retail trade	24 277 425	18 114 907	3 638	2 446	77.2 ^d (75.6, 78.9)	81.0 ^d (79.1, 82.9)	52.1 ^b (45.9, 58.3)	62.6 ^b (57.1, 68.1)	69.7 ^b (64.4, 75.0)	73.7 (67.5, 79.8)

Note. CI = confidence interval; NORA = National Occupational Research Agenda. Industry sectors were based on the National Institute of Occupational Safety and Health NORA classification.

^aWorker estimates based on NHIS sampling weights and estimates vary by screening age cutoff and nonresponse to screening questions.

^bStatistically different compared with all workers within the same year.

^cSample size was under 45, which is considered unstable by the NHIS.

^dStatistically different between years.

TABLE 3—Reported Cancer Screening and Health Insurance Rates Among Workers, by Race, Ethnicity, and Occupational Status: National Health Interview Survey Cancer (NHIS) Screening Supplements, 2000–2005

Occupational status	US Worker Population Estimate ^a		NHIS Sample, No.		Screening Prevalence					
	All Workers		All Workers		Hispanic Workers		Black Workers			
	2000	2005	2000	2005	2000, % (95% CI)	2005, % (95% CI)	2000, % (95% CI)	2005, % (95% CI)	2000, % (95% CI)	2005, % (95% CI)
All workers	28 562 316	32 309 880	4510	4753	Home or office blood stool screen (age ≥ 50 y)					
White collar	18 082 862	19 981 996	2793	2885	43.3 ^b (41.7, 44.9)	41.0 (39.3, 42.8)	24.9 ^b (20.2, 29.7)	24.9 ^b (20.2, 29.6)	42.3 (37.6, 46.9)	34.4 (29.5, 39.3)
Service	3 272 511	5 099 729	595	834	48.2 (46.1, 50.3)	45.4 (43.2, 47.6)	34.4 ^b (25.4, 43.4)	30.6 ^b (22.4, 38.8)	44.7 (38.7, 51.2)	39.2 (32.1, 46.2)
Farm worker	751 355	2 490 662	129	37 ^c	36.6 (32.4, 40.7)	38.5 (34.7, 42.3)	21.4 ^b (12.6, 30.3)	31.6 (22.1, 41.0)	39.1 (30.4, 47.9)	33.9 (25.2, 42.7)
Blue collar	6 455 588	6 979 093	993	997	35.4 (25.3, 45.5)	21.5 ^c (7.2, 35.8)	2.4 ^{b,c} (0.0, 7.4)	0.0 ^{b,c} (0.0, 0.0)	24.4 ^c (0.0, 57.2)	68.8 ^c (9.3, 128.3)
					33.8 (30.3, 37.2)	31.1 (27.7, 34.4)	19.2 ^b (12.1, 26.3)	14.0 ^b (8.1, 20.0)	42.2 (33.5, 50.9)	26.9 (19.1, 34.8)
All workers	28 641 982	32 431 523	4519	4771	Colorectal screening (age ≥ 50 y)					
White collar	18 139 063	20 063 939	2799	2897	32.3 ^d (30.6, 34.0)	43.3 ^d (41.6, 45.0)	23.7 ^b (18.4, 28.9)	27.6 ^b (22.9, 32.3)	29.6 (25.5, 33.8)	36.7 ^b (32.3, 41.1)
Service	3 279 957	5 119 459	596	838	36.6 ^d (34.5, 38.7)	48.4 ^d (46.2, 50.6)	37.8 (28.5, 47.1)	36.4 ^b (27.7, 45.2)	31.4 (25.5, 37.2)	42.6 (35.6, 49.5)
Farm worker	749 519	2 490 662	128	37 ^c	24.7 ^d (20.7, 28.7)	38.2 ^d (34.2, 42.2)	21.6 (10.8, 32.4)	23.4 ^b (16.2, 30.7)	18.3 (11.7, 25.0)	32.5 (23.7, 41.2)
Blue collar	6 473 443	6 999 063	996	999	20.8 (12.9, 28.8)	30.8 ^c (14.5, 47.1)	4.5 ^c (0.0, 13.3)	9.2 ^c (0.0, 26.1)	0.0 ^{b,c} (0.0, 0.0)	0.0 ^c (0.0, 0.0)
					25.6 ^d (22.6, 28.6)	32.9 ^d (29.6, 36.3)	11.3 ^b (5.7, 16.8)	22.1 (14.7, 29.6)	39.4 ^b (31.0, 47.9)	31.5 (23.7, 39.4)
All workers	42 929 966	41 933 057	7344	6556	Manual breast examination (age ≥ 20 y)					
White collar	31 438 346	30 387 403	5225	4859	89.1 ^d (88.2, 89.9)	83.3 ^d (82.2, 84.5)	74.5 ^{b,d} (71.1, 77.9)	62.2 ^{b,d} (58.0, 66.4)	88.7 ^d (86.4, 90.9)	78.5 ^{b,d} (75.7, 81.4)
Service	6 952 627	8 079 865	1304	1414	91.8 ^d (90.9, 92.6)	86.6 ^d (85.3, 87.8)	84.5 ^{b,d} (80.4, 88.6)	74.1 ^{1,b,d} (69.0, 79.3)	92.0 ^d (89.8, 94.3)	81.4 ^{b,d} (77.8, 85.0)
Farm worker	346 588	1 175 000	59	23 ^c	82.1 ^d (79.7, 84.5)	75.8 ^d (73.1, 78.5)	63.3 ^b (56.5, 70.1)	49.8 ^b (42.7, 56.9)	80.7 (75.1, 86.2)	76.0 (71.0, 81.0)
Blue collar	4 192 405	3 408 289	756	560	84.1 (74.5, 93.7)	67.0 ^c (44.0, 90.0)	50.9 ^c (24.2, 77.5)	53.2 ^c (23.4, 83.0)	82.3 ^c (47.0, 100.0)	45.5 ^c (0.0, 100.0)
					80.8 (77.3, 84.3)	73.1 (68.5, 87.8)	62.3 ^b (54.2, 70.5)	47.9 ^b (38.0, 57.7)	89.5 ^{b,d} (84.7, 94.3)	70.0 ^b (59.7, 80.3)
All workers	28 398 360	30 088 247	4753	4604	Mammogram (age ≥ 40 y)					
White collar	20 928 158	21 843 139	3402	3223	86.2 (85.0, 87.5)	86.4 (85.3, 87.6)	77.5 ^b (73.0, 82.1)	75.6 ^b (70.7, 80.5)	82.5 (79.3, 85.6)	83.0 ^b (79.6, 86.3)
Service	4 513 855	5 688 639	829	974	88.8 (87.4, 90.1)	88.4 (87.1, 89.7)	84.1 (79.0, 89.1)	80.9 ^b (75.1, 86.7)	87.2 (84.0, 90.4)	84.3 (80.0, 88.6)
Farm worker	222 687	890 054	40	17 ^c	76.1 (72.5, 79.7)	81.9 (78.8, 85.0)	67.1 (58.4, 75.9)	72.4 (63.3, 81.5)	70.5 (62.7, 78.3)	80.1 (73.8, 86.3)
Blue collar	2 733 660	2 467 415	482	390	82.5 (69.2, 95.8)	61.2 ^c (33.5, 88.8)	88.4 ^c (71.0, 100.0)	44.7 ^c (5.8, 83.6)	100.0 ^{b,c} (100.0, 100.0)	100.0 ^{b,c} (100.0, 100.0)
					83.9 (80.4, 87.3)	80.7 (76.0, 85.5)	74.8 (66.0, 83.6)	67.9 (56.3, 79.6)	88.2 (81.2, 95.1)	84.0 (74.4, 93.6)
All workers	57 527 535	55 612 395	9624	8416	Papanicolaou test (age ≥ 18 y)					
White collar	41 762 462	39 164 261	6836	5742	93.9 (93.2, 94.6)	94.0 (93.3, 94.7)	85.2 ^b (82.3, 88.0)	87.6 ^b (85.1, 90.1)	96.7 (95.5, 97.9)	94.2 (92.5, 95.8)
Service	9 915 550	12 032 430	1773	1965	95.4 (94.7, 96.0)	95.9 (95.3, 96.6)	89.8 (87.3, 92.3)	93.8 (91.7, 95.8)	97.2 (95.9, 98.5)	94.9 (93.3, 96.4)
Farm worker	451 797	1 703 362	81	33 ^c	89.8 (87.9, 91.6)	90.2 (88.3, 92.1)	80.1 (75.1, 85.1)	84.0 (79.3, 88.7)	95.5 (92.5, 98.5)	93.2 (89.7, 96.7)
Blue collar	5 397 726	4 245 342	934	676	90.5 (83.4, 97.7)	79.1 ^c (58.5, 99.7)	82.7 ^c (75.1, 85.1)	66.8 ^c (38.2, 95.4)	100.0 ^c (100.0, 100.0)	100.0 ^c (100.0, 100.0)
					90.7 (87.0, 94.3)	87.7 (83.9, 91.5)	77.7 (68.5, 86.9)	76.5 (67.5, 85.6)	96.3 (92.5, 100.0)	92.8 (86.7, 98.8)
All workers	15 314 204	17 098 683	2233	2313	Prostate-specific antigen test (age ≥ 50 y)					
White collar	8 328 019	9 090 371	1162	1187	50.8 ^d (48.3, 53.2)	58.4 ^d (55.9, 60.8)	37.4 ^b (30.4, 44.7)	44.6 (37.8, 51.5)	53.2 (45.3, 61.6)	54.5 (47.1, 61.8)
Service	1 138 305	1 911 844	190	292	56.3 ^d (53.0, 59.6)	64.6 ^d (61.3, 67.9)	48.1 (33.4, 62.8)	55.1 (40.9, 69.3)	60.5 (47.6, 73.4)	54.0 (42.6, 65.5)
Farm worker	631 672	206 027	108	27 ^c	46.8 (38.1, 55.4)	53.1 (46.3, 59.8)	41.2 ^c (15.8, 66.5)	40.6 (25.4, 55.8)	44.0 (29.2, 58.8)	55.6 (36.1, 75.2)
					52.8 (42.0, 63.7)	60.2 ^c (38.5, 82.0)	16.2 ^{b,c,d} (5.9, 26.5)	0.0 ^{b,c,d} (0.0, 0.0)	47.4 ^{b,d} (1.1, 93.6)	0.0 ^{c,d} (0.0, 0.0)

Continued

TABLE 3—Continued

	5216208	5890441	773	807	42.5 ^d (38.8, 46.2)	50.4 ^d (46.5, 54.3)	32.1 (22.3, 41.9)	42.0 (32.2, 51.7)	52.3 (41.7, 62.8)	54.9 (44.4, 65.4)
Blue collar										
All workers	127943300	127771802	19633	17640	84.5 ^d (83.8, 85.2)	82.3 ^d (81.6, 83.1)	61.7 ^b (59.0, 64.5)	59.1 ^b (56.8, 61.4)	80.3 ^b (78.5, 82.1)	78.0 ^b (75.5, 80.5)
White collar	76445923	74241954	11701	10152	91.0 (90.4, 91.6)	89.4 (88.7, 90.2)	78.4 ^b (75.4, 81.4)	79.1 ^b (75.8, 82.3)	86.1 ^b (84.2, 88.0)	83.7 ^b (81.0, 86.3)
Service	16960933	22269921	2813	3338	71.1 (69.1, 73.0)	71.0 (69.1, 72.9)	48.9 ^b (42.9, 54.8)	49.3 ^b (45.0, 53.6)	68.7 (64.4, 73.0)	67.9 (63.0, 72.7)
Farm worker	2958645	969731	486	146	64.8 (59.2, 70.3)	61.8 (52.0, 71.6)	30.4 ^b (21.1, 39.6)	37.6 (22.8, 52.4)	66.5 ^c (47.8, 85.3)	66.9 ^c (21.6, 100.0)
Blue collar	31577799	30290196	4633	4004	77.8 (76.4, 79.2)	73.9 (72.2, 75.6)	55.1 ^b (51.5, 58.8)	48.8 ^b (45.1, 52.6)	78.7 (75.1, 82.4)	77.2 (72.9, 81.5)

Note. CI = confidence interval.

^aWorker estimates based on NHIS sampling weights and estimates vary by screening age cutoff and nonresponse to screening questions.

^bStatistically different compared with all workers within the same year.

^cSample size was under 45, which is considered unstable by the NHIS.

^dStatistically different between years.

cancer screening. These included home or office blood stool screening (2000: construction workers, 27.0%; 2005: agricultural workers, 27.6%), colorectal screening (2000: agricultural workers, 23.2%), manual breast examination (2005: agricultural workers, 72.7%), mammogram (2000: construction workers, 77.1%), and Papanicolaou test (2000: construction workers, 87.1%). However, manufacturing workers reported the lowest rates of PSA testing in 2000 (40.1%).

Among the NCHS occupational status (Table 3) for all workers, farm workers in general had the lowest reported rates of cancer screening, although blue collar and service-industry worker rates were also low. These included home or office blood stool screening (2005: farm workers, 21.5%), colorectal screening (2000: farm workers, 20.8%), manual breast examination (2005: farm workers, 67.0%), mammogram (2005: farm workers, 61.2%), and Papanicolaou test (2005: farm workers, 79.1%). However, blue collar workers reported the lowest rates of PSA testing in 2000 (42.5%).

Health Insurance

With respect to respondents' reports of having current health insurance, Hispanic workers had the lowest statistically significant reported rates compared with all workers within the same year (2005: 59.1% vs 82.3%). For the NORA sectors, Hispanic workers in agriculture, forestry, or farming had the lowest rates (29.9%) of health insurance coverage in 2000, and Hispanic construction workers had the lowest rates (30.6%) of health insurance coverage in 2005. For occupational status, Hispanic farm workers had the lowest rates (30.4%) of health insurance coverage in 2000.

DISCUSSION

These results from a nationally representative sample demonstrate substantial health disparities in reported cancer screening behavior among US workers by race/ethnicity and by industry or occupational group. In general, taking into account small sample sizes, Hispanic workers and workers in the farming and construction industry or occupations reported the lowest rates of cancer screening. These same workers also reported the lowest rates of health insurance coverage. The

reported lack of health insurance is particularly worrisome given that the US health care system relies heavily on health insurance from employers to cover not only the worker but also the worker's family.

A major limitation of the NHIS survey is that the data are self-reported and may misrepresent true rates of screening or health insurance coverage. For example, based on a review of studies that compared self-reported chronic conditions in the NHIS with physicians' records, there is considerable underreporting and some overreporting by the participants.^{11,12} However, results for US workers in terms of both self-reported health insurance and cancer screening behavior are consistent with other national survey sources.¹³ A second limitation is with sample size in some occupational and race/ethnicity categories. The NCHS considers sample sizes of fewer than 45 to be unstable; however, we included small samples in the tables to provide important national data on the National Institute of Occupational Safety and Health NORA industrial sectors and on occupational status for the occupational health and primary care communities. Finally, these are cross-sectional data; therefore, we cannot conclude, for example, that the low reported prevalence of health insurance coverage among Hispanic workers is responsible for the low use of cancer screening among these same workers.

Although cancer screening behavior has been shown to depend on many factors,^{14–16} our results suggest that access to care is a major obstacle. Health insurance and cancer screening are increasingly made available through the workplace.^{17,18} Therefore, results from this study can be used to target workplace cancer screening programs, particularly those that serve the subpopulations of workers who lack health insurance. ■

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Contributors

L. Vidal originated the study and led the writing of this article with support from L. E. Fleming. W. LeBlanc managed the data and performed statistical analyses. All authors helped conceptualize ideas, interpret findings, and provide critical review of the article.

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This study was approved by the University of Miami's Miller School of Medicine institutional review board.

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Estimating the World Trade Center Tower Population on September 11, 2001: A Capture–Recapture Approach

Joe Murphy, MA

I applied the capture–recapture method to estimate the World Trade Center tower population at the time of the September 11, 2001, terrorist attacks. Available lists helped identify 8965 survivors and 2152 confirmed casualties. The capture–recapture model suggested that an additional 4435 survivors were present, putting the total count of all present at 15552 (95% confidence interval=15216, 15897). An accurate estimate represents the potential number at risk for trauma as a result of direct exposure to the events of the day. (*Am J Public Health*. 2009;99:65–67. doi: 10.2105/AJPH.2007.124768)

On September 11, 2001, 2 airplanes crashed into the World Trade Center towers in New York City as part of a terrorist attack. In addition to the loss of life, survivors were exposed to hazardous dust and debris from the collapse of the buildings, and many people endured psychological trauma.^{1–4} No one has definitively determined the number of persons present in the 2 towers at 8:46 AM on that day when the first airplane crashed into the North Tower, and no one may ever be able to do so. Several estimates have been made previously,^{5–7} but none made use of capture–recapture methods, which are useful in estimating population size when enumeration by more-direct methods is not feasible.^{8–10}

My objective was to apply the capture–recapture method to 3 list sources of individuals determined to be present inside the World Trade Center towers on September 11 to estimate the number present when the first airplane struck. This number represents a population at risk for long-term health effects as a result of direct exposure to the events of the day.

METHODS

The World Trade Center Health Registry (WTCHR) is a database used for following up with individuals exposed to the disaster of September 11 to evaluate the short- and long-term physical and mental health effects. Exposed groups, including rescue and recovery workers, residents, students and school staff, building occupants, and passersby, were located and interviewed. Potentially eligible individuals were identified through a multitude of list sources and could also register through the project Web site or toll-free telephone number. In all, 71437 interviews were completed, including 8965 with individuals present in the World Trade Center towers at 8:46 AM on September 11.

Those present in the towers—a group with high potential for physical and psychological trauma as a result of exposure to the events of the day—were identified from 3 different list sources for the WTCHR. The first list included 3622 individuals who volunteered by Web site or telephone to complete the WTCHR survey (the self-identified list), and were confirmed to be present in the buildings on September 11. The second list included data