Cardiovascular Health Risk Behaviors by Occupation in the NYC Labor Force

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Objective: We explored associations between occupation and cardiovascular disease (CVD) risk behaviors including: attempted weight loss, physical activity, smoking, and restaurant meal and sugary beverage consumption. **Methods:** We used NYC Health and Nutrition Examination Survey 2013 to 2014 data, and coded free-text, occupational question responses using 2010 US Census Bureau Classification. CVD risk behaviors were compared across occupational categories, using regression to adjust for demographics. **Results:** There were health behavior differences across occupational categories. Construction/transportation/maintenance workers smoked more and were less likely than management to attempt weight loss, service workers were less likely to eat restaurant-prepared meals, sales/office workers were less likely to be physically active (all $P < 0.05$). Adjusting for demographics, differences in health behaviors were reduced, but remained present. **Conclusions:** Knowledge of occupational disparities may aid chronic disease prevention by identifying populations for targeted interventions.

Keywords: cardiovascular disease, chronic disease, health behavior, occupation, population health, risk factors, surveillance, urban health, workforce

The United States workforce consists of over 160 million individuals including over 4 million NYC labor force participants.[1,2] On average, full-time workers spend 8.5 hours per day, or about half the hours spent awake, doing work or work-related activities.[3] Occupation influences health through mechanisms like workplace exposures and hazards, psychosocial stressors, access to healthcare, and impacts on health behaviors.[4–6] Non-traditional work shifts, inflexible schedules, and low job security contribute to the chronic disease burden among US adults by increasing the prevalence of less healthful physical activity and dietary behaviors and by increasing overall stress level.[4–6] Research suggests that individuals who work longer hours or who work nights are more likely to smoke and less likely to exercise or get adequate sleep.[7]

More than half of premature deaths from chronic disease in the United States from 1990 to 2010 were attributable to modifiable risk factors including smoking, physical inactivity, and consumption of excess alcohol, sugary beverages, and highly processed foods.[8] Restaurant-prepared meals often contain highly processed foods and are associated with higher caloric intake.[9] These factors are subsequently linked to hypertension, elevated body mass index (BMI), diabetes, and cardiovascular disease (CVD).[8,10] CVD remains the leading cause of death in the United States and CVD mortality is increased among individuals who experience chronic sleep deprivation.[11,12] Despite declines in premature mortality, more than two million CVD-related deaths occurred among working aged individuals (25 to 65) between 2005 and 2015.[13] Previous occupational analyses on CVD-associated health behaviors have focused on a single group or health behavior.[14,15] Other approaches have studied occupational disparities in CVD outcomes while treating health behaviors as confounding factors.[6,16–18] Our study uses data from the New York City Health and Nutrition Examination Survey (NYC HANES) 2013–2014 to explore the relationship between modifiable CVD risk behaviors and occupation among adults in the NYC labor force, and to identify potential areas for intervention.

METHODS

Survey Design

NYC HANES 2013–2014 was a population-based, cross-sectional survey modeled on the National Health and Nutrition Examination Survey that was designed to identify health problems and guide health policy in NYC. Detailed methods of NYC HANES have been published.[19] In brief, a three-stage cluster sampling design was used to select a representative sample of non-institutionalized NYC household residents ages 20 or older. Data collection included a face-to-face computer-assisted interview, a physical examination, and biologic specimen collection. The NYC HANES protocol was approved by the City University of New York School of Public Health and the New York City Department of Health and Mental Hygiene Institutional Review Boards. NYC HANES 2013–2014 was completed by 1527 participants, with a response rate of 36%.

Our analytic sample was confined to NYC labor force participants, that is, individuals who were employed or were seeking employment.[20] Employed participants reported ''working at a job or business'' ($n = 891$) or being ''with a job or business but not at work'' ($n = 55$) during the previous week. Participants who reported ''looking for work'' ($n = 119$) during the previous week were categorized as seeking employment. Respondents who were neither working nor seeking work and respondents who did not report their employment status ($n = 462$) were excluded from our analyses. Also excluded were 25 NYC HANES participants whose employment could not be categorized. Our final analytic sample was 1040 adults in the NYC labor force.

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Clinical Significance: This paper adds to the growing body of literature on how occupation impacts risk factors for chronic diseases in the United States labor force. The findings suggest that targeted interventions may be useful in reducing occupational disparities in CVD risk behaviors.

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Definitions

Employed survey participants were asked the following questions: ''What kind of work were you doing at your main job or business?'' and ''What were your most important activities on this job or business?'' Participants' free-text responses were coded to the 2010 US Census Bureau Occupational Classification System using the National Institute for Occupational Safety and Health (NIOSH) Industry and Occupation Computerized Coding System (NIOCCS), an automated coding system.[21] NIOCCS is a web-based tool that translates industry and occupation text from qualitative data into numbered, standardized codes based on the U.S. Census Bureau's industry and occupation coding system.[21,22] As stated above, 25 responses (3%) could not be coded.

Employed survey respondents were classified into one of five standard occupational categories: ''Management, business, science, and arts,'' ''service,'' ''sales and office,'' ''natural resources, construction, and maintenance,'' and ''production, transportation, and material moving.''[19,21,22] Because of small numbers, the latter two categories, which had similar demographic distributions, were combined to create the ''construction, transportation, and maintenance'' category. Unemployed respondents who were seeking work were analyzed as a separate category.

We analyzed prevalence of the following socio-demographic factors by occupational category: sex, race/ethnicity, nativity, education, age, neighborhood poverty, and annual household income. For nativity, we defined US-born as those born in the 50 States, Washington, DC, or US territories. Neighborhood poverty was defined as the percentage of households in the participant's census tract with annual income below the federal poverty threshold (FPT), using American Community Survey (ACS) 2008 to 2012 data. A low poverty neighborhood was defined as one where the percentage of households with annual income below the FPT was less than 10%.

We analyzed eight health behaviors: current smoking, at-risk drinking, physical activity, attempted weight loss, difficulty sleeping, soda consumption, other sugar-sweetened beverage consumption, and restaurant-prepared meal consumption. We defined current smoking as self-report of smoking cigarettes ''some days'' or ''every day.'' At-risk drinking was defined as self-report of consuming more than 14 alcoholic drinks per week for men and seven drinks per week for women.[23] A non-soda or other sugary beverage (OSB) was defined as a homemade or purchased drink containing sugar, including sweetened fruit drinks, sports or energy drinks, lemonades, and iced teas. Seltzers and diet or other artificially sweetened beverages were not included. Restaurant-prepared meals included dine-in, carry-out, and home-delivered meals prepared in food service establishments. Self-reported frequency of soda or OSB consumption was dichotomized as one or more per day or as less than one per day, and self-reported frequency of restaurant-prepared meal consumption as one or more per week or as less than one per week.[24] Participants' self-reported physical activity was dichotomized based on whether they met Healthy People 2020 guidelines.[25] Difficulty sleeping was defined as self-reported ''trouble falling or staying asleep, or sleeping too much'' during the past 2 weeks. BMI was calculated from measured height and weight and dichotomized as overweight or obese (more than or equal to 25 kg/m^2), or as normal or underweight (less than 25 kg/m^2). Attempted weight loss was defined as self-report of having tried to lose weight within the previous 12 months. Individuals who were normal weight or underweight were excluded from the attempted weight loss analyses.

Data Analysis

Data were analyzed using SAS version 9.4 (SAS Institute Cary, NC) and SUDAAN version 11.0.1 (Research Triangle Institute, Research Triangle Park, NC) in 2018. Survey weights had been developed to account for NYC HANES' complex sampling design, non-response, and post-stratification. Weights had been adjusted to approximate the NYC population by categories of age, sex, race/ethnicity, education, borough (county), and marital status, from ACS 2013. Weights were further adjusted by age, sex, and race/ethnicity to account for item non-response.

We calculated prevalence estimates for each health behavior outcome by occupational category. Chi square analyses were performed to assess differences in demographic distribution and health behaviors by occupational category. Prevalence ratios (PR) were calculated for health behaviors with significant chi square results using management workers as the reference, because this group generally had the best health behavior outcomes. The PRs were then adjusted for age group, sex, race/ethnicity, nativity, education, and neighborhood poverty—demographic variables that differed by occupational category—to identify potential associations between job categories and modifiable health behaviors independent of what was already known about demographic differences. We calculated PRs instead of odds ratios because none of the health behaviors were rare events.[26] Statistical significance for all analyses was determined by $P < 0.05$.

RESULTS

Demographics

The NYC labor force ($n = 1040$) was categorized into management, science, business, and art (36%), service (22%), sales and office (20%), construction, transport, and maintenance (10%) occupations, and those seeking work (12%). Table 1 outlines the most common job titles reported in each category. Management, science, business, and art (hereafter, management) occupations included

TABLE 1. Most Frequently Reported Occupations by Census Occupational Category, NYCHANES 2013–2014

Management, Business, Science and Arts ($n = 410$)	Service ($n = 218$)	Sales and Office ($n = 205$)	Construction, Transportation, and Maintenance ($n = 88$)
Teacher or teaching assistant (61)	Nursing aide, home health aide, healthcare support (58)	Administrative assistant (74)	Construction worker (33)
Manager, director, or executive (51)	Maid or janitor (31)	Retail salesperson (52)	Taxi, bus, or truck driver (13)
Nurse, physician, occupational therapist (51)	Food service (28)	Cashier or teller (11)	Freight, stock, or material mover (8)
Computer programmer, developer, or consultant (41)	Childcare worker (23)	Customer service representative (9)	Auto mechanic, car wash or gas station worker (7)
Accountant or financial analyst (28)	Cook or food preparer (14)	Real estate sales (9)	Equipment installation or repair (6)
Social worker or counselor (25)	Hair or nail stylist (14)	Advertising sales (6)	Production or factory, worker (5)
Lawyer or legal professional (23)	Police or firefighter (12)	Financial services (6)	Dry cleaner or tailor (3)
Artist or designer (22)	Security guard (11)	Non-retail sales (6)	Garbage collector (2)
Actor, producer, musician, or dancer (18)	Building maintenance workers (5)	Bookkeeping (4)	Packaging worker (2)
Writer or editor (13)	Fitness instructor (5)	Data entry or typing (4)	Packer or packager (2)

TABLE 2. NYC Labor Force Characteristics by Occupational Category (%), NYCHANES 2013–2014*

	All ($n = 1040$)	Management, Business, Science and Arts ($n = 410$)	Service ($n = 218$)	Sales and Office ($n = 205$)	Construction, Transportation, and Maintenance ($n = 88$)	Seeking Work ($n = 119$)
Total	100	35.7	21.8	20.3	10.4	11.8
Gender						
Male	49.9	51.0	40.6	41.1	89.5	44.0
Race						
Non-Latinx White	37.5	57.7	19.7	39.8	22.0	18.7
Non-Latinx Black	21.7	14.2	25.3	19.5	23.2	40.4
Latinx/Hispanic	23.8	11.4	39.3	23.5	33.1	25.0
Non-Latinx Asian	14.4	14.3	14.2	14.7	17.1	12.5
Non-Latinx Other	2.6	2.4	1.5	2.5	4.5	3.4
Nativity						
US-born	53.7	61.4	37.9	63.7	26.9	66.6
Education						
Less than high school	11.6	1.3	24.2	9.8	19.6	16.0
High school graduate/GED	21.9	8.4	32.1	22.2	39.0	28.4
Some college or associate's degree	23.7	12.7	27.6	34.6	26.8	28.0
College graduate or more	42.8	77.7	16.0	33.4	14.7	27.6
Age group, yrs						
20–34	38.2	35.0	31.6	45.5	24.0	60.5
35–49	32.7	37.1	31.5	25.7	43.5	24.1
50–64	24.6	20.2	33.9	26.0	29.1	13.9
≥65	4.5	7.7	3.0	2.7	3.4	1.5
Neighborhood poverty						
0 to <10% below federal poverty threshold (FPT), low poverty	27.8	39.6	20.0	25.2	25.7	12.7
10% to <20% below FPT	35.7	36.4	35.2	37.5	32.0	34.5
20% to <30% below FPT	21.9	18.8	22.0	27.0	21.8	23.1
30% to 100% below FPT, high poverty	14.6	5.2	22.9	10.3	20.5	29.8
Annual household income						
<$25,000	26.4	6.5	44.7	23.9	37.9	52.7
$25,000 to <50,000	24.8	20.4	28.5	22.0	33.1	30.3
$50,000 to <75,000	14.2	17.2	10.4	18.0	13.1	5.3
$75,000 to <100,000	11.9	15.6	8.5	15.1	7.8	3.8
≥$100,000	22.7	40.4	7.9	21.1	8.1	7.9

*All overall category comparisons of demographic variables were significant at $P < 0.001$.

teaching, managerial, and healthcare positions. Service occupations included health care support, childcare workers, food service staff, and janitorial staff. Sales and office occupations included retail workers, administrative assistants, and customer representatives. Construction, transport, and maintenance (hereafter CTM) included construction workers, freight movers, and commercial drivers.

Occupational groups differed by age, sex, race/ethnicity, nativity, education, household income, and neighborhood poverty (all P-values < 0.001) (Table 2). Participants in management occupations were predominantly non-Latinx (NL) White (58%), US-born (61%), and college-educated (78%), with annual household income more than or equal to $75,000 (56%), and were living in low-poverty neighborhoods (40%). In contrast, annual household income was lowest among those seeking work and those in service occupations. Service workers were also the most likely to have less than a high school education (24%). Participants in CTM occupations were predominantly male (90%) and were most likely to be foreign-born (73%). The sales and office group had the highest percentage of Latinx/Hispanic workers (39%). In addition to having lower income, participants who were seeking work were likely to identify as NL Black (40%), and be ages 20 to 34 years (60.5%).

Health Behaviors

Among the NYC labor force, 61% were overweight or obese, ranging from 55% among those in management occupations to 73% among CTM workers (Table 3). Prevalence of attempted weight loss within the past year among overweight and obese participants was 59% across the labor force, ranging from 35% among CTM workers to 70% among individuals seeking work. After adjustment for race/ethnicity, age, sex, nativity, education, and neighborhood poverty, differences remained across occupational categories in attempted weight loss ($P = 0.032$). Approximately 77% of the labor force reported meeting HP2020 physical activity guidelines (range: 71% to 85%). Respondents in the management category (81%) and those seeking work (85%) were most likely to meet guidelines. After adjustment, prevalence of meeting HP2020 physical activity guidelines still differed across occupations ($P = 0.031$). Compared with management, those in sales and office occupations were least likely to meet HP2020 goals (PR 0.88, 95% CI 0.79 to 0.98; APR 0.89, 95% CI 0.79 to 1.00), but other differences were attenuated (Table 4).

Labor force smoking prevalence was 19% (range: 13% to 28%), with differences between occupations ($P = 0.003$). We found the greatest prevalence among those in CTM occupations (28%) and those seeking work (27%). Those in CTM were 1.84 times more likely than those in management to report smoking (95% CI 1.21 to 2.81), and those seeking work were 1.75 times more likely (95% CI 1.15–2.67). After adjustment for socio-demographics, differences were attenuated, but the point estimates suggest that CTM workers and those seeking work remained more likely to smoke than management (CTM: APR 1.49, 95% CI 0.87 to 2.54; seeking work: APR 1.49, 95% CI 0.92 to 2.44).

TABLE 3. Prevalence of Obesity and Health Behaviors by Occupational Category (%), NYCHANES 2013–2014

	All Labor Force	Management, Business, Science, and Arts	Service	Sales and Office	Construction, Transportation, and Maintenance	Seeking Work	*P*-Value*
Overweight/obese	61.0	54.5	69.3	57.9	72.6	62.7	0.007
Obese only (BMI ≥30)	24.9	18.5	29.4	30.7	24.0	26.0	
Overweight only (≥25, <30)	36.1	36.0	39.9	29.0	48.6	36.7	
Attempted weight loss[a]	59.1	62.2	57.0	65.6	34.6	70.2	0.004
Met HP2020 physical activity goals	77.2	81.0	75.0	71.5	71.2	85.3	0.023
Sleeping problems	38.4	41.9	32.1	38.7	31.8	44.6	0.140
Smoking	18.9	15.2	22.2	12.6	28.0	26.7	0.003
Heavy drinking	9.5	10.0	7.5	10.8	7.6	10.9	0.684
Weekly restaurant meal consumption	82.6	88.8	67.2	86.6	82.4	86.0	<0.001
Daily soda consumption	14.5	7.4	19.5	11.9	17.6	28.3	<0.001
Daily sweetened beverage consumption[b]	16.0	8.7	20.0	16.3	20.2	26.2	<0.001

[a]Among overweight and obese.
[b]Refers to beverages other than soda.
*Log-linear model chi square *P*-value.

TABLE 4. Unadjusted and Adjusted Marginal Prevalence Ratios for Health Behaviors by Occupational Category, NYC HANES 2013–2014[§]

	Unadjusted Prevalence Ratio (CI 95%)	*P* Value	Adjusted* Prevalence Ratio (CI 95%)	*P* Value
Met HP2020 physical activity goal		0.023		0.031
Management (ref)	1.00		1.00	
Service	0.93 (0.84–1.02)		0.99 (0.89–1.11)	
Sales and Office	0.88 (0.79–0.98)		0.89 (0.79–1.00)	
CTM	0.88 (0.75–1.04)		0.92 (0.79–1.07)	
Seeking work	1.05 (0.95–1.16)		1.07 (0.97–1.19)	
Attempted weight loss†		0.004		0.032
Management	1.00		1.00	
Service	0.91 (0.75–1.11)		0.99 (0.78–1.24)	
Sales and Office	1.06 (0.87–1.29)		1.10 (0.89–1.36)	
CTM	0.56 (0.37–0.85)		0.65 (0.42–1.02)	
Seeking work	1.12 (0.93–1.35)		1.16 (0.96–1.42)	
Smoking		0.003		0.025
Management	1.00		1.00	
Service	1.46 (1.01–2.10)		1.29 (0.84–1.98)	
Sales and Office	0.83 (0.56–1.23)		0.71 (0.47–1.09)	
CTM	1.84 (1.21–2.81)		1.49 (0.87–2.54)	
Seeking work	1.75 (1.15–2.67)		1.49 (0.92–2.44)	
Weekly restaurant meal consumption		<0.001		0.023
Management	1.00		1.00	
Service	0.76 (0.67–0.86)		0.84 (0.76–0.94)	
Sales and Office	0.98 (0.92–1.04)		0.98 (0.91–1.06)	
CTM	0.93 (0.83–1.04)		0.97 (0.88–1.08)	
Seeking work	0.97 (0.89–1.05)		0.95 (0.84–1.07)	
Daily soda consumption		<0.001		0.340
Management	1.00		1.00	
Service	2.65 (1.61–4.35)		0.97 (0.58–1.61)	
Sales and Office	1.61 (0.91–2.85)		0.78 (0.45–1.37)	
CTM	2.39 (1.25–4.58)		0.86 (0.42–1.77)	
Seeking work	3.84 (2.40–6.13)		1.28 (0.73–2.25)	
Daily sweetened beverage consumption‡		<0.001		0.882
Management	1.00		1.00	
Service	2.30 (1.41–3.75)		1.23 (0.73–2.09)	
Sales and Office	1.87 (1.12–3.11)		1.30 (0.76–2.20)	
CTM	2.32 (1.20–4.48)		1.15 (0.57–2.36)	
Seeking work	3.01 (1.88–4.80)		1.26 (0.75–2.14)	

CTM, construction, transport, and maintenance.
*Adjusted for race/ethnicity, nativity, age group, gender, education, and neighborhood poverty.
†Among overweight or obese only.
‡Refers to beverages other than soda.
§Analyses were only done if the chi square values in Table 2 were significant.

The prevalence of weekly restaurant-prepared meal consumption was 83% (range: 67% to 89%), and differences were apparent across occupations ($P < 0.001$). Those in service occupations had the lowest prevalence compared with management (PR 0.76, 95% CI 0.67 to 0.86). After adjustment for demographics, service occupations remained the least likely category to consume restaurant-prepared meals (APR 0.84, 95% CI 0.76 to 0.94).

Daily soda consumption ranged from 7% to 28%, with 15% of the labor force consuming one or more sodas per day. Those seeking work were the most likely to drink soda (PR 3.84, 95% CI 2.40 to 6.13), followed by those in service occupations (PR 2.65, 95% CI 1.61 to 4.35), and those in management occupations (reference group) were the least likely. Labor force prevalence of daily OSB consumption was 16% (range: 9% to 26%). Consumption of OSBs was most common among those seeking work (PR 3.01, 95% CI 1.88 to 4.80) and in CTM occupations (PR 2.32, 95% CI 1.20 to 4.48), and was least common among those in management. However, these differences were largely explained by demographics (after adjustment $P = 0.88$). At-risk drinking prevalence was 10% overall (range: 8% to 11%) with no differences across occupations ($P = 0.68$). Similarly, the prevalence of self-reported sleep difficulties was 38% overall (range: 32% to 45%) with little evidence for differences across occupations ($P = 0.14$).

DISCUSSION

This study explored the relationship between occupational category and prevalence of modifiable CVD risk behaviors among NYC workers. Consistent with findings from previous large, multi-state studies, we observed differences in obesity, physical activity, and sugar-sweetened beverage consumption by occupational group before adjustment for demographics.[27,28] Our smoking findings were also similar to a national study of cigarette smoking across 22 occupational groups.[29] We found differences in the crude prevalence of attempted weight loss and restaurant meal consumption. Measurable differences in meeting HP2020 physical activity guidelines, attempting to lose weight in the past year, smoking cigarettes, and eating restaurant-prepared meals persisted after adjustment. Our sleep results contrast with a larger, multi-state study of more than 20 occupational categories, that shows differences in prevalence of short-sleep duration, and national data showing occupational differences in heavy drinking.[27,30]

Among employed NYC adults, we found that individuals in management occupations (our reference group) were the most likely to meet HP2020 physical activity guidelines, and that individuals in sales and office occupations were less physically active. Prior research shows that workers in professional, scientific, and other occupations associated with higher socioeconomic status, report more leisure-time physical activity, and that individuals with lower SES report more occupational physical activity.[31–34] Individuals in management may have more schedule flexibility and employer support to engage in leisure-time physical activity.[35] Schedule flexibility may also contribute to the high percentage of leisure-time physical activity among unemployed individuals seeking work. However, those in sales and office occupations may have rigid schedules that are less conducive to leisure-time physical activity, resulting in individuals being less active overall since non-occupational physical activity is the greatest contributor to overall activity.[36]

We found that the prevalence of overweight/obesity among NYC labor force participants was comparable to the overall NYC population estimate.[37] CTM was the occupational category associated with the lowest rate of attempted weight loss among overweight/obese individuals, despite having the highest prevalence of overweight/obesity. Prior qualitative research shows that truck drivers, a common CTM occupation, know that they are unhealthy, but view their health behaviors as inevitable consequences of their occupation, due to less access to physical activity, healthy food choices, and food storage spaces for self-prepared meals.[38,39] These perceptions are supported by data showing that commercial drivers choose healthier food options when not on the road, and that more than one in five drivers report zero days with more than 30 minutes of physical activity.[40,41] Similar patterns exist among other CTM occupations where workers' dietary choices are impacted by aspects of their workplace that are perceived to be unmodifiable.[42] These data suggest a role for workplace interventions to promote weight-loss.

Similar to our findings, two studies demonstrated that CTM workers smoked more frequently.[43,44] In our sample, the most common CTM occupations were construction and commercial driving. The 2002 NYC Smoke Free Air Act prohibited smoking in many workplaces, but did not initially include outdoor construction sites.[45] Since then, workplace restrictions have been expanded to include construction sites, though enforcement may be difficult in outdoor workspaces and drivers remain unprotected by smoke-free laws.[46]

Individuals currently seeking work were also likely to smoke. Unlike those in CTM occupations, though, they were likely to be physically active; and overweight and obese individuals among the unemployed were likely to attempt weight loss. Data on the unemployed has been inconsistent, with some researchers finding decreased smoking and physical activity among the unemployed, and others finding no difference in physical activity or smoking between employed and unemployed individuals.[47–49]

We found that service workers, despite having the second highest prevalence of overweight/obesity, were the least likely occupational group to report frequent consumption of restaurant meals. This contrasts with previous research showing that individuals who work non-standard shifts or longer hours, like service workers, are more like to consume fast food.[50,51] This difference may be explained in part by the high sugary beverage consumption in this group, a known obesity risk factor.[52] In addition, service workers' low incomes in the NYC-NJ metropolitan area, may make restaurant-prepared meals comparatively unaffordable.[53,54] Moreover, service workers in our study were predominantly foreign-born and female. Data from National HANES showed that households with foreign-born individuals cooked more dinners at home, and that women were more likely than men to cook.[55] Additional research is needed to explore the interactions between occupation and social variables on health.

Our population-based study used a weighted sample of adults that was representative of the NYC labor force, which is a major strength. However, our study is subject to several limitations. Because of small sample sizes, we used broad occupational categories, and each broad group had substantial heterogeneity. Differing lifestyles and health behaviors among each group's variety of occupations may be obscuring differences between more narrowly defined categories. Specific weight loss behaviors were also unavailable for analyses. Furthermore, self-reported variables could be subject to recall and social desirability bias. The overall response rate for NYC HANES was 36%, and this could have resulted in sampling bias. However, only modest differences were found between the unweighted and weighted characteristics of NYC HANES participants for age, sex, race/ethnicity, marital status, and education, suggesting representativeness of the sample.[19] Finally, the cross-sectional design precluded drawing conclusions about causal relationships between occupational groups and health behaviors.

We demonstrated that specific health behaviors are associated with occupational category before and after adjustment for socio-demographics. Therefore, tailoring wellness interventions to meet the needs of individuals employed in a specific occupation may be necessary. A systematic review of a workplace intervention

for construction workers demonstrated reductions in sedentary time and tobacco use, and improvements in diet among intervention participants.[56] Similarly, a study of a health program designed for employees of a large warehouse demonstrated modest improvements in employee's physical activity levels and active weight management.[57] WorkWell NYC is a workplace wellness program co-sponsored by the NYC Departments of Health and Labor for municipal employees. Preliminary data suggested that implementation is associated with reduced healthcare costs and employee stress, as well as increased however, evaluation of this 2016 initiative is ongoing.[58] Additional research should focus on interventions that target other occupational groups and workplaces in NYC.

Moreover, stronger enforcement of tobacco-free workplace policies for CTM workers, along with dedication of employer resources to support smoking cessation, may help to address disparities in smoking. Individuals who are currently unemployed and seeking work are another potential target for low-cost interventions such as smoking cessation and weight loss programs, since they may have more time to dedicate to behavior change. Studies with more narrowly defined occupational categories and a larger sample size can help target groups of workers who are at an increased risk of unhealthy behaviors and can provide additional insight into potential workplace interventions. In addition, researchers should consider incorporating more specific, occupational data into their health surveys that may help identify actionable disparities in this important social determinant of health.

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