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Paid sick leave benefits, influenza vaccination, and taking sick days due to influenza-like illness among U.S. workers

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Abstract

Introduction: Staying home when sick can reduce the spread of influenza. The objectives of this study were to quantify the percentage of workers who had paid sick leave (PSL) benefits, examine sociodemographic characteristics that may be associated with having these benefits, and examine the association between having PSL benefits and use of sick days and influenza vaccination status.

Methods: The public-use dataset from the 2009 National H1N1 Flu Survey (NHFS) were analyzed in 2017. Wald chi-square tests and t-tests were used to test for associations between having PSL benefits and sociodemographic characteristics and industry and occupation groups, the associations between having PSL benefits and seeking treatment when sick with influenza-like illness (ILI), and taking days off work when sick with ILI. Logistic regression was used to determine variables associated with having PSL benefits and the association between having PSL benefits and influenza vaccination status.

Results: Sixty-one percent of employed adults reported having PSL benefits during the 2009–10 influenza season. Being younger, female, Hispanic, less educated, or a farm/blue collar worker were associated with reduced likelihood of having PSL benefits. Not having PSL benefits was associated with a lower likelihood of receiving an influenza vaccination and visiting a health professional when sick with ILI.

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Author's contribution

YZ and TS conceived the study. YZ wrote the first draft of the manuscript and led revisions of all subsequent versions. YZ and TS had access to data and take responsibility for the data's integrity. YZ performed the statistical analyses and takes responsibility for the integrity of all statistical results. TS, KK, CB, and MD participated in data interpretation and writing of the manuscript, and advised on the data analysis. All authors have reviewed and approved the submitted version of the manuscript.

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Conflicts of interest statement

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Conclusions: The percentage of workers who have PSL benefits differs by sociodemographic characteristics and industry/occupation groups. Offering PSL benefits along with promoting influenza vaccination and encouraging employees with ILI to stay home can increase influenza vaccination coverage and help control the spread of influenza.

Keywords

Sick leave; Influenza, influenza A virus; H1N1 subtype; Vaccination; Workplace

1. Introduction

The 2009 pandemic influenza A(H1N1)pdm09 virus caused approximately 60.8 million cases of influenza, 274,304 hospitalizations, and 12,469 deaths in the United States [1]. Approximately 80% of these deaths were among adults of working age (18–64 years) [1]. Workplace transmission of influenza is associated with workdays lost [2,3]. One study estimated that eight million workers attended work while infected with the A(H1N1) pdm09 virus, and these workers were estimated to pass their influenza infection to as many as seven million co-workers [4].

During a pandemic, before effective vaccines are widely available, staying home from work and school may be the most effective measure for controlling the spread of infection [5,6]. Paid sick leave (PSL) benefits allow workers to stay home or visit a doctor or other medical professional when they are ill [7]. PSL has become more important as the percentage of dual-career couples among married-couple families has increased to 48.3% in 2017[8]. In the United States by 2018, nineteen cities, D.C., and ten states have passed laws mandating PSL [9]. According to the National Compensation Survey, the percentage of civilian workers having access to PSL benefits remained stable at 65–68% from 2009 to 2016 then increased to 72% in 2017 [10].

Influenza vaccination is the most important strategy to prevent people from getting influenza and influenza-related complications [11]. The Advisory Committee on Immunization Practices (ACIP) recommends routine annual influenza vaccination for all people 6 months and older who do not have contraindications [12]. However, influenza vaccination coverage for working age adults remains below 40% and well below the Healthy People 2020 (HP2020) target of 70% [13,14]. Some evidence indicates that a lack of PSL deters workers from receiving preventive care, including vaccinations, and from seeking medical treatment when needed [15–18]. Few studies have examined the association between PSL and influenza vaccination uptake among U.S. workers. One study found that one-hour paid time off (PTO) did not improve the influenza vaccination rate among healthcare workers, while another study concluded that universal PSL resulted in a 42% higher odds of receiving seasonal influenza vaccination [19].

The objectives of this study were: to describe the prevalence of having PSL benefits among U.S. workers by sociodemographic characteristics and industry and occupation (I&O) of employment; to identify variables associated with having PSL benefits; and to examine the association between having PSL benefits and (1) taking sick days from work, (2) seeking treatment due to influenza-like illness (ILI), and (3) influenza vaccination status (seasonal

and pandemic H1N1 influenza vaccine [pH1N1]) during the 2009 pandemic. The findings from this study can inform policy makers and employers regarding the impact of PSL benefits on influenza vaccination coverage among workers and behaviors related to the spread of influenza illness in the workplace, especially during an influenza pandemic.

2. Methods

2.1. Study sample

The public-use, de-identified version of data from the 2009 National H1N1 Flu Survey (NHFS) were analyzed in 2017. The NHFS was a list-assisted random-digit-dialed telephone survey of sampled households with a landline and/or cellular telephone from all 50 states and the District of Columbia and was conducted from October 2009 through June 2010 [20–22]. The NHFS was designed to provide timely population-based within-season national and state-level estimates for pH1N1 and seasonal influenza vaccination coverage. In addition to questions related to pH1N1 and seasonal influenza vaccination status and recent respiratory illness and health risks, the adult questionnaire included questions about employment status and I&O of employment. PSL information was collected from adults who completed the survey in January through June 2010 and reported that they were employed full time. The Council of American Survey Research Organizations (CASRO) response rate for the NHFS was 34.0% for landline and 25.5% for cellular telephones, with 19.9% of the interviews completed from the cellular telephone sampling frame [20,23]. The NHFS included completed interviews for 70,944 children and adults. For this study, analysis was restricted to 15,933 adults aged 18 years and older who were employed full time, completed the survey during January–June 2010, and answered the PSL questions.

2.2. Measures

The status of having PSL benefits was assessed for adults who reported being currently employed full time by asking the following, “Workers sometimes receive benefits in addition to their wages. Whether you receive them or not, please tell me whether you are ELIGIBLE to receive sick leave with full pay.” Respondents who refused to answer or responded “don‘t know” to the question were excluded from the analysis (2.0%). ILI was defined based upon affirmative response to the questions “During the past month, were you ill with a fever?” and “Did you also have a cough or sore throat?” Receiving treatment for ILI was based on response to the question “Did you visit a doctor, nurse, or other health professional for this illness?”

Both pH1N1 and seasonal influenza vaccination status were assessed based upon self-report. Respondents were asked, “Since September 2009, have you had an H1N1 flu vaccination?” and if so, “During what month did you receive [your/your first] H1N1 flu vaccine?” Respondents were also asked, “Since August 2009, have you had a seasonal flu vaccination?” and if so, “During what month did you receive your most recent seasonal flu vaccine?” Those who reported receiving a seasonal or pH1N1 influenza vaccination during August 2009 or September 2009, respectively, through May 2010 were defined as vaccinated. Vaccinated respondents were identified as having received the seasonal and/or pH1N1 influenza vaccine, and were also identified as having received “any influenza”

vaccine (i.e. seasonal, pH1N1, or both). Influenza vaccination coverage estimates for seasonal, pH1N1, and any influenza vaccine were calculated using Kaplan-Meier analysis with the event being time (in months) of receipt of the first dose of seasonal, pH1N1, or any influenza vaccine. Respondents who reported not to have been vaccinated at the time of the interview were censored on the month of interview.

Respondent-reported sociodemographic characteristics included in this study were: age, sex, race/ethnicity, education level, household poverty level, health insurance status, number of children in the household, Metropolitan Statistical Area (MSA), and I&O of employment. The household poverty level variable was based on reported total household income in the past calendar year and the total number of people and children living in the household, according to the U.S. Census poverty thresholds [24]. I&O were initially grouped following the Standard Occupational Classification (SOC) and North American Industry Classification System (NAICS) [25–27]. For this study, occupations were regrouped into four categories, and industries were regrouped into eight National Occupational Research Agenda (NORA) sectors using a similar categorization as previously outlined in the literature (Appendix A) [28,29]. Specific SOC and NAICS codes included in each broad industry and occupation category are listed in Appendix Table A1.

2.3. Statistical analysis

Wald chi-square tests followed by post-hoc comparison t-tests were used to test the associations between sociodemographic characteristics and I&O groups and having PSL benefits. These tests were also used to examine the associations between having PSL benefits and reporting ILI in the past month, and—among those who reported ILI—being treated for the illness and taking days off from work due to the illness. Multivariable logistic regression models were used to determine (1) variables independently associated with having PSL benefits and (2) the association between having PSL benefits and influenza vaccination status. The restriction in this study to interviews conducted January through June lends validity to this second multivariable model because it reduces the possibility of vaccinations occurring after the interview. An additional analysis was conducted on the subset of adults not vaccinated in the workplace because about 85% of vaccinated workers who had PSL benefits reported being vaccinated at their workplace, making vaccination at the workplace an important confounder of the association between PSL and influenza vaccination coverage. Adjusted prevalence ratios (APR) based on predicted marginals from the logistic regression models are reported [30,31]. Collinearity of model variables was examined [32]. All analyses were weighted to population totals and to adjust for households having multiple telephone lines, unit non-response, and non-coverage of non-telephone households. All statistical tests were two-sided with a significance level of 0.05. Estimates, along with 95% confidence intervals (CIs), were calculated using SAS (version 9.3) and SUDAAN (version 11.01) to account for the complex survey design.

3. Results

The percentage of employed adults who had PSL benefits are presented by sociodemographic and I&O characteristics in Table 1. Overall, 61.0% of U.S. employed

adults had PSL during the 2009–10 A(H1N1)pdm09 pandemic season. In bivariate analysis, a higher proportion of employed adults aged 35–44 years and 45–54 years had PSL compared with employed adults aged 55 years and older. A lower proportion of Hispanic workers had PSL than workers in other race/ethnicity groups. The proportion who had PSL among workers with less than a high school diploma was lower (34.7%) compared with workers who were more educated, and only about half that of workers with a college degree (71.7%) (Table 1). Workers living in households with 3 or more children were less likely to have PSL than workers living in households with fewer children. Workers living in a non-MSA, living at or below poverty, or who were uninsured were less likely to have PSL. Farm/blue collar workers had a lower percentage with PSL than workers of other occupations, with the percentage who had PSL among farm/blue collar workers being less than half that of white collar workers (35.7% vs. 72.0%). Workers in both the agriculture, forestry & fishing industry (32.9%) and construction industry (35.0%) were less likely to have PSL than workers in all other industries, with the proportion who had PSL being approximately half that of workers in other industries (Table 1).

Results from the multivariable logistic regression model were similar to those from the bivariate analysis. The exceptions were that, after controlling for other sociodemographic characteristics, sex was associated with having PSL, with male workers being more likely to have PSL benefits. Also, only black workers were more likely to have PSL than Hispanic workers in the model. Finally, the number of children in the household and MSA were no longer significant factors in predicting the status of having PSL benefits (Table 1).

In bivariate analysis, workers who had and those who did not have PSL were equally as likely to report being sick with ILI in the past month. Among workers who reported being sick with ILI in the past month, those who had PSL benefits were more likely to seek treatment for their illness than those who did not have PSL (48.9% vs. 30.7%). Multivariable analysis confirmed that having PSL benefits was independently associated with seeking treatment for their illness (Table 2).

Influenza vaccination coverage estimates for seasonal, pH1N1, and any influenza vaccine among workers with and without PSL are shown in Fig. 1. For all three vaccination categories, workers with PSL were more likely to be vaccinated, with influenza vaccination coverage estimates for workers with PSL approximately 15, 10, and 15 percentage points higher than those without PSL, respectively. After excluding workers who reported being vaccinated at their workplace and may not have needed to use PSL for influenza vaccination, vaccination coverage among workers with PSL continued to be higher (Fig. 1).

In multivariable analysis, having PSL was found to be independently associated with influenza vaccination status. Workers with PSL were greater than 30% more likely to be vaccinated against influenza, after adjusting for other factors (APR 1.38, 1.31, and 1.34, for seasonal, pH1N1, and any influenza vaccinations, respectively). After excluding workers who reported being vaccinated at their workplace, the positive association between having PSL and vaccination status persisted for seasonal (APR 1.18), pH1N1 (APR 1.14), and any (APR 1.17) influenza vaccination (Table 3).

4. Discussion

The results of this study indicate that approximately 40% of workers did not have PSL benefits during the A(H1N1)pdm09 pandemic. A majority of workers reported going to work when they were sick with a cold or flu [33]. Offering PSL and encouraging sick workers to stay home are important for reducing the spread of influenza. A simulation study found that having employees infected with influenza stay home and out of the workplace could reduce influenza transmission in the workplace by 25–40%, and providing PSL would reduce workplace infections by 6% [34]. Another study reported that the spread of ILI decreased by about 5% after some U.S. cities mandated worker access to PSL benefits [35]. A recent study also found that children of parent with PSL benefits were more likely to receive flu vaccination [36]. Encouraging sick workers to stay home may be an effective strategy in controlling the spread of ILI and decreasing the number of workdays lost [37,38]. It was estimated that 5 million cases of A(H1N1) pdm09 infection could have been avoided if universal access to PSL was in place [37]. A cost analysis suggested that PSL could reduce an estimated 1.3 million emergency room visits and save $1.1 billion in medical costs for the United States annually [39]. Implementing PSL benefits generally do not increase labor costs or reduce profits for businesses; instead, employers might benefit from the increase in productivity, reduced incidence of workplace injury, higher-quality new hires, and less turnover [40–43]. Because PSL is viewed as important for public health, business, the health care system, and economic growth, the momentum for it has grown nationally [44].

A few sociodemographic characteristics were found to be associated with not having PSL benefits. Workers who were 55 years and older, female, who had less than a high school education, and who worked in farm and blue collar jobs were less likely to have PSL benefits. Income level was left out of the multivariable model due to collinearity issues, but the percentage of low-wage workers with PSL benefits was less than half that of those earning higher incomes. This could present financial challenges to these low income workers, if they become ill and have to take time off without pay or be at risk of losing their jobs. Surveys found that 14% of low-wage workers reported having lost a job because they were sick or had to care for a sick family member; this percentage increased to 19% for low-wage working mothers [45].

During the A(H1N1)pdm09 pandemic, the risk of hospitalization and death due to influenza among working-age adults was estimated to be 4–7 times and 8–12 times greater, respectively, than what is typically seen due to seasonal influenza [1]. Annual influenza vaccination is considered to be the most important measure to reduce risk of getting influenza and spreading it to others [11]. The effectiveness of different kinds of PSL on increasing influenza vaccination coverage may be varied. One study found that modest incentives such as one-hour PTO did not improve the influenza vaccination rate among healthcare workers [19]. Another study concluded that universal PSL, which is more comparable to the PSL in the NHFS survey, resulted in greater than 40% higher odds of receiving seasonal influenza vaccination [18]. Our study indicates that workers having PSL were greater than 30% more likely to receive a seasonal, pH1N1, or any influenza vaccination. After removing workers who reported being vaccinated at their workplace from

the sub-analysis, a higher probability of receiving influenza vaccination among workers who had PSL was still found. However, the “opportunity” for workplace vaccination could not be controlled for in this analysis, because such questions were not on the survey.

Among workers who reported a recent ILI, those having PSL benefits were more likely to seek treatment for their illness, but their likelihood of taking ≥1 day off from work was similar to those not having PSL benefits. This finding suggests that many workers may choose to go to work despite being sick or before being fully recovered from sickness regardless of whether or not they have PSL benefits. Another study found an opposite result, that workers with PSL did take more days off from work due to illness, and workers without PSL benefits tend to come to work when they are sick because they cannot afford to take unpaid leave or are fearful of penalties and losing their job [46]. For workers who have access to PSL benefits but do not use them to take time off when sick, more than one-third (37%) reported wanting to save PTO for another time [33]. One conjecture is that many of these workers may have a PTO benefit that combines sick days, vacation days, and other types of leave into one pool, where taking a sick day would decrease the number of leave days they have available [47]. Some studies have found that the most common reasons health care workers go to work when they are sick are: complicated systems and processes for obtaining leave, social and cultural norms, and ambiguity about symptoms and risk to others [48,49].

5. Limitations

The findings in this study are subject to the following limitations: First, all data were self-reported and findings might be subject to recall bias. Second, bias in the estimates may remain even after weighting. Third, income and insurance status were removed from the logistic regression models due to collinearity, therefore the independent effects of PSL on vaccination status and taking time off of work, controlling for income and insurance status, could not be determined although all three are likely contributors. Fourth, public safety and oil and gas extraction did not became a separate NORA sector until 2008. These two sectors were combined into other sectors in the NHFS survey design. Finally, collapsing I&O categories improved the regression performance but may aggregate workers who likely have substantially different percentages of PSL.

6. Conclusions

This study indicates that only three in five workers reported having PSL in 2009–10, and this proportion varied by sociodemographic characteristics and I&O groups. Lack of PSL was associated with a lower likelihood of workers getting influenza vaccinations and seeking treatment for ILI. Offering access to PSL could improve workplace safety, increase workers’ access to preventive care such as influenza vaccinations, protect workers from influenza infection and complications, and reduce the healthcare burden and cost during an influenza pandemic.

Appendix A

See Table A1.

Table A1

Cross-walk between industry and occupation (I/O) categories in this study and NHFS I/O recodes.

	Study category	NHFS simple recodes included: Label (code)*
Occupation[a]	White collar	Management Occupations (01)
		Business and Financial Operations Occupations (02)
		Computer and Mathematical Occupations (03)
		Architecture and Engineering Occupations (04)
		Life, Physical, and Social Science Occupations (05)
		Community and Social Services Occupations (06)
		Legal Occupations (07)
		Education, Training, and Library Occupations (08)
		Arts, Design, Entertainment, Sports and Media Occupations (09)
		Healthcare Practitioners and Technical Occupations (10)
	Service	Healthcare Support Occupations (11)
		Protective Service Occupations (12)
		Food Preparation and Serving Related Occupations (13)
		Building and Grounds Cleaning and Maintenance Occupations (14) Personal Care and Service Occupations (15)
	Farm/blue collar	Farming, Fishing, and Forestry Occupations (18)
		Construction and Extraction Occupations (19)
		Installation, Maintenance, and Repair Occupations (20)
	Sales & office and administrative	Sales and Related Occupations (16)
	support	Office and Administrative Support Occupations (17)
		Production Occupations (21)
		Transportation and Material Moving Occupations (22)
Industry[b]	Agriculture, forestry, & fishing	Agriculture, Forestry, Fishing, and Hunting Industries (01)
	Mining	Mining Industries (02)
	Construction	Construction Industries (04)
	Manufacturing	Manufacturing Industries (05)
	Transportation, warehousing, & utilities	Utilities Industries (03)
		Transportation and Warehousing Industries (08)
	Wholesale and retail trade	Wholesale Trade Industries (06)
		Retail Trade Industries (07)
	Services	Information Industries (09)
		Finance and Insurance Industries (10)
		Real Estate and Rental and Leasing Industries (11)

Study category	NHFS simple recodes included: Label (code)*
	Professional, Scientific, and Technical Services Industries (12)
	Management of Companies and Enterprises Industries (13)
	Administrative and Support and Waste Management and Remediation Services Industries (14)
	Education Services Industries (15)
	Arts, Entertainment, and Recreation Industries (17)
	Accommodation and Food Services Industries (18)
	Other Services (except Public Administration) Industries (19)
	Public Administration Industries (20)
Healthcare & social assistance	Health Care and Social Assistance Industries (16)

*These distinctions are based on two-digit industry (NAICS) and occupation (SOC) codes, but are not actually equal to these existing codes; they are simply numeric values (1,2,3…) assigned for purposes of the NHFS.

[a]Respondents coded to NHFS Simple Recode Military Specific Occupations were excluded from analyses.

[b]Respondents coded to NHFS Simple Industry Recode Armed Forces were excluded from analyses.

Abbreviations:

PSL	paid sick leave
NHFS	national H1N1 flu survey
ILI	influenza-like illness
ACIP	Advisory Committee on Immunization Practices
HP2020	Healthy People 2020
PTO	paid time off
I&O	industry and occupation
CASRO	Council of American Survey Research Organizations
MSA	Metropolitan Statistical Area
SOC	Standard Occupational Classification
NAISC	North American Industry Classification System
NORA	National Occupational Research Agenda
APR	adjusted prevalence ratio
CIs	confidence intervals
HFA	Healthy Families Act

References

[1]. Shrestha SS, Swerdlow DL, Borse RH, Prabhu VS, Finelli L, Atkins CY, et al. Estimating the burden of 2009 pandemic influenza A (H1N1) in the United States (April 2009–April 2010). Clin Infect Dis 2011;52(Suppl 1):S75–82. [PubMed: 21342903]

[2]. Palmer LA, Rousculp MD, Johnston SS, Mahadevia PJ, Nichol KL. Effect of influenza-like illness and other wintertime respiratory illnesses on worker productivity: the child and household influenza-illness and employee function (CHIEF) study. Vaccine 2010;28:5049–56. [PubMed: 20493819]

[3]. Nichol KL, Lind A, Margolis KL, Murdoch M, McFadden R, Hauge M, et al. The effectiveness of vaccination against influenza in healthy, working adults. N Engl J Med 1995;333:889–93. [PubMed: 7666874]

[4]. Drago R, Miller K. Sick at work: infected employees in the workplace during the H1N1 pandemic. IWPR; 2010 No. B264.

[5]. Public Health and Law Enforcement Emergency Preparedness Workgroup. Coordinated implementation of community response measures (including social distancing) to control the spread of pandemic respiratory disease; 2008 Available at: <https://www.bja.gov/Publications/CRM_MOU.pdf> [Accessed January 3, 2018].

[6]. Ferguson NM, Cummings DA, Fraser C, Cajka JC, Cooley PC, Burke DS. Strategies for mitigating an influenza pandemic. Nature 2006;442:448–52. [PubMed: 16642006]

[7]. Council of Economic Advisers. The economics of paid and unpaid leave. June 2014 Available at <https://www.whitehouse.gov/sites/default/files/docs/leave_report_final.pdf> [Accessed January 3, 2018].

[8]. U.S. Bureau of Labor Statistics. Employment Characteristics of Families Summary: Employment Characteristics of Families – 2017, Available at <https://www.bls.gov/news.release/famee.nr0.htm> [Accessed August 31, 2018].

[9]. National Partnership for Women & Families. Paid Sick Days – State and District Statutes. Available at <http://www.nationalpartnership.org/research-library/work-family/psd/paid-sick-days-statutes.pdf> [Accessed August 31, 2018].

[10]. U.S. Bureau of Labor Statistics. National Compensation Survey: Employee Benefits in the United States. Available at <https://www.bls.gov/ncs/ncspubs.htm> [Accessed August 30, 2018].

[11]. CDC. Key Facts About Seasonal Flu Vaccine, Available at <https://www.cdc.gov/flu/protect/keyfacts.htm> [Accessed January 3, 2018].

[12]. Grohskopf LA, Sokolow LZ, Broder KR, Walter EB, Bresee JS, Fry AM, et al. Prevention and control of seasonal influenza with vaccines: recommendations of the advisory committee on immunization practices – United States, 2017–18 influenza Season. MMWR Recomm Rep 2017;66:1–20.

[13]. CDC. Prevention. Healthy people 2020. Topics & objectives—immunization and infectious diseases. Last updated December 17, 2014. Available at <http://www.healthypeople.gov/sites/default/files/HP2020IIDandGHProgressReviewData.xlsx> [Accessed January 3, 2018].

[14]. CDC. Flu vaccination coverage, United States, 2016–17 influenza season. Last updated September 28, 2017. Available at <https://www.cdc.gov/flu/fluvaxview/coverage-1617estimates.htm> [Accessed February 12, 2018].

[15]. Bernstein AB, Thompson GB, Harlan LC. Differences in rates of cancer screening by usual source of medical care. Data from the National Health Interview Survey. Med Care. 1987;1991(29):196–209.

[16]. Corbie-Smith G, Flagg EW, Doyle JP, O'Brien MA. Influence of usual source of care on differences by race/ethnicity in receipt of preventive services. J Gen Intern Med 2002;17:458–64. [PubMed: 12133161]

[17]. Kirkman-Liff B, Kronenfeld JJ. Access to cancer screening services for women. Am J Public Health 1992;82:733–5. [PubMed: 1566955]

[18]. Wilson FA, Wang Y, Stimpson JP. Universal paid leave increases influenza vaccinations among employees in the U.S. Vaccine 2014;32:2441–5. [PubMed: 24631069]

[19]. Cheema S, Vinnard C, Foster-Chang S, Linkin DR. A time off incentive was not associated with influenza vaccination acceptance among healthcare workers. Influenza Res Treat 2013;2013:209491. [PubMed: 23878733]

[20]. CDC. A User's Guide for the Public-Use Data File for the National 2009 H1N1 Flu Survey (NHFS). Available at <http://ftp.cdc.gov/pub/Health_Statistics/NCHS/Dataset_Documentation/NIS/nhfs/nhfspuf_DUG.PDF> [Accessed January 3, 2018].

[21]. CDC. Interim results: state-specific influenza A (H1N1) 2009 monovalent vaccination coverage – United States, October 2009–January 2010. MMWR Morb Mortal Wkly Rep. 2010;59:363–8. [PubMed: 20360670]

[22]. Santibanez TA, Singleton JA, Santibanez SS, Wortley P, Bell BP. Sociodemographic differences in opinions about 2009 pandemic influenza A (H1N1) and seasonal influenza vaccination and disease among adults during the 2009–2010 influenza season. Influenza Other Respir Viruses 2013;7:383–92. [PubMed: 22568588]

[23]. Frankel L The Report of the CASRO Task Force on Response Rates In: Wiseman F, editor. Improving Data Quality in Sample Surveys. Cambridge, MA: Marketing Science Institute; 1983.

[24]. United States Census Bureau. Poverty thresholds. Available at <http://www.census.gov/hhes/www/poverty/data/threshld/index.html> [Accessed January 3, 2018].

[25]. Luckhaupt SE, Calvert GM, Li J, Sweeney M, Santibanez TA, Centers for Disease C, et al. Prevalence of influenza-like illness and seasonal and pandemic H1N1 influenza vaccination coverage among workers–United States, 2009–10 influenza season. MMWR Morb Mortal Wkly Rep. 2014;63:217–21. [PubMed: 24622286]

[26]. U.S. Bureau of Labor Statistics. The 2018 Standard Occupational Classification System, US Department of Labor. Available at <https://www.bls.gov/soc/2018/major_groups.htm> [Accessed January 2, 2018].

[27]. United States Census Bureau. North American Industry Classification System. Available at <https://www.census.gov/eos/www/naics/> [Accessed January 2, 2018].

[28]. Luckhaupt SE, Sestito JP. Examining national trends in worker health with the National Health Interview Survey. J Occup Environ Med. 2013;55:S58–62. [PubMed: 24284753]

[29]. Luckhaupt SE, Calvert GM, Centers for Disease C, Prevention. Prevalence of coronary heart disease or stroke among workers aged <55 years–United States, 2008–2012. MMWR Morb Mortal Wkly Rep 2014;63:645–9. [PubMed: 25078653]

[30]. Korn E, Graubard B. Predictive marginals Analysis of health surveys. New York: John Wiley & Sons Inc.; 1999 p. 126–40.

[31]. Nadel MR, Shapiro JA, Klabunde CN, Seeff LC, Uhler R, Smith RA, et al. A national survey of primary care physicians' methods for screening for fecal occult blood. Ann Intern Med 2005;142:86–94. [PubMed: 15657156]

[32]. Hair JF, Black WC, Babin BJ, Anderson RE. Multivariate data analysis, Supplement, Advanced diagnostics for multiple regression. 7th ed. Upper Saddle River, NJ: Prentice Hall; 2010.

[33]. NPR. The Workplace and Health. Available at <http://www.npr.org/documents/2016/jul/HarvardWorkplaceandHealthPollReport.pdf> [Accessed January 3, 2018].

[34]. Kumar S, Grefenstette JJ, Galloway D, Albert SM, Burke DS. Policies to reduce influenza in the workplace: impact assessments using an agent-based model. Am J Public Health 2013;103:1406–11. [PubMed: 23763426]

[35]. Pichler S, Ziebarth NR. The Pros and Cons of sick pay schemes: testing for contagious presenteeism and shirking behavior. Discussion paper 1501. Available at <http://ftp.iza.org/dp8850.pdf> [Accessed January 3, 2018].

[36]. Asfaw A, Colopy M. Association between parental access to paid sick leave and children's access to and use of healthcare services. Am J Ind Med 2017;60:276–84. [PubMed: 28169438]

[37]. Kumar S, Quinn SC, Kim KH, Daniel LH, Freimuth VS. The impact of workplace policies and other social factors on self-reported influenza-like illness incidence during the 2009 H1N1 pandemic. Am J Public Health. 2012;102:134–40. [PubMed: 22095353]

[38]. Asfaw A, Rosa R, Pana-Cryan R. Potential economic benefits of paid sick leave in reducing absenteeism related to the spread of influenza-like illness. J Occup Environ Med 2017;59:822–9. [PubMed: 28692009]

[39]. Miller K, Williams C, Yi Y. Paid sick days and health: cost savings from reduced emergency department visits, Institute for Women's Policy Research, November 2011 Available at <http://www.iwpr.org/publications/pubs/paid-sick-days-and-health-cost-savings-from-reduced-emergency-department-visits> [Accessed January 3, 2018].

[40]. Appelbaum E, Milkman R, Elliott L, Kroeger T. Good for business? Connecticut's paid sick leave law, Center for Economic and Policy Research; 2014 Available at <http://cepr.net/documents/good-for-buisness-2014-02-21.pdf> [Accessed January 3, 2018].

[41]. Drago R, Lovell V. San Francisco's paid sick leave ordinance: outcomes for employers and employees, Institute for Women's Policy Research; 2011 Available at <http://www.iwpr.org/publications/pubs/San-Fran-PSD> [Accessed January 3, 2018].

[42]. Lindemann D, Britton D. Earned sick days in Jersey City: a study of employers and employees at year one, Rutgers Center for Women and Work; 2015 Available at <http://cww.rutgers.edu/sites/cww.rutgers.edu/files/documents/working_families/Jersey_City_ESD_Issue_Brief.pdf> [Accessed January 3, 2018].

[43]. Asfaw A, Pana-Cryan R, Rosa R. Paid sick leave and nonfatal occupational injuries. Am J Public Health 2012;102:e59–64.

[44]. Lake Research Partners. Recent survey findings (memo), January 15, 2015. Available at <http://makeitworkcampaign.org/wp-content/uploads/2015/02/MIW-SOTU-Poll-Memo.pdf> [Accessed January 3, 2018].

[45]. Oxfam America. Hard work, hard lives, 2013 Available at <http://www.oxfamamerica.org/static/media/files/low-wage-worker-report-oxfam-america.pdf> [Accessed January 3, 2018].

[46]. Klerman JA, Daley K, Pozniak A. Commonly cited reasons for not taking leave exhibit 6.4.1, family and medical leave in 2012: Technical Report, USDOL, 2014 Available at <http://www.dol.gov/asp/evaluation/fmla/fmla-2012-technical-report.pdf> [Accessed January 3, 2018].

[47]. Smith TW, Kim J. Paid sick days: attitudes and experiences. Public Welfare Foundation. Available at <http://www.nationalpartnership.org/research-library/work-family/psd/paid-sick-days-attitudes-and-experiences.pdf> [Accessed January 3, 2018].

[48]. Szymczak JE, Smathers S, Hoegg C, Klieger S, Coffin SE, Sammons JS. Reasons why physicians and advanced practice clinicians work while sick: a mixed-methods analysis. JAMA Pediatr 2015;169:815–21. [PubMed: 26146908]

[49]. Starke JR, Jackson MA. When the health care worker is sick: primum non nocere. JAMA Pediatr 2015;169:809–10. [PubMed: 26148244]

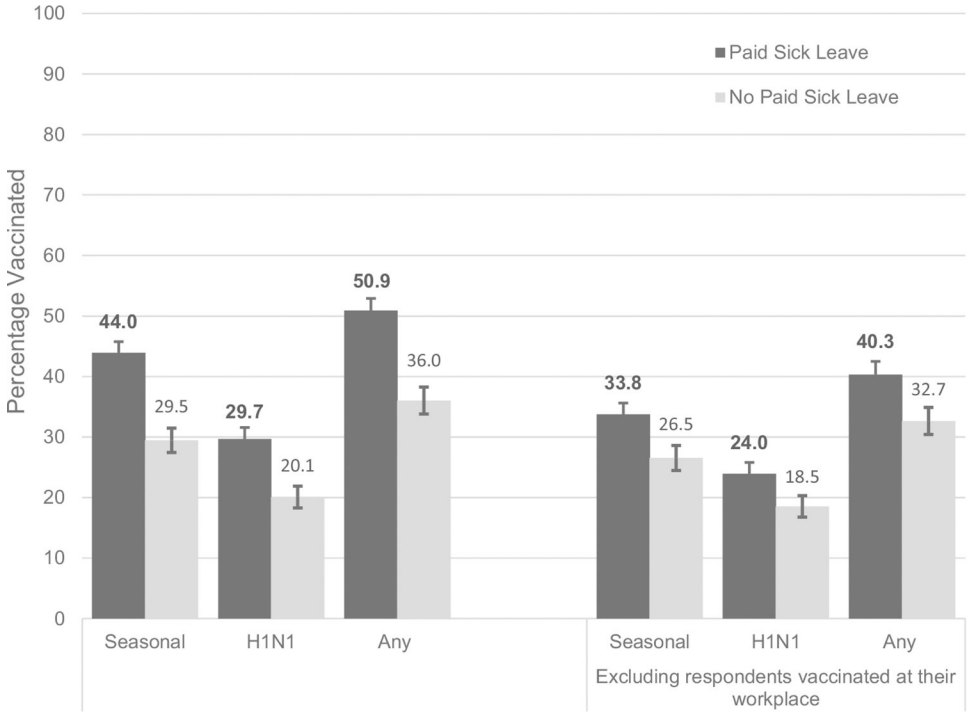

Fig. 1.

Influenza vaccination coverage among all workers and only those who were not vaccinated at their workplace, by having paid sick leave benefits, National 2009 H1N1 Flu Survey (NHFS), 2009–10 influenza season. Note: Boldface indicates significant differences ($p < 0.05$) compared with corresponding no paid sick leave group.

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Table 1

Association between having paid sick leave and sociodemographic characteristics among employed adults.

Characteristics	Had paid sick leave benefits		
	n*	% (± 95% CI)	APR (± 95% CI)
Overall	9,818	61.0 (± 1.4)	-
Age group			
18–34 years	2,148	57.1 (± 2.9)	1.07 (1.00, 1.15)
35–44 years	2,048	**63.2 (± 3.0)**	**1.11 (l.04, 1.20)**
45–54 years	2,810	**66.3 (± 2.5)**	**1.17 (1.10, 1.24)**
55+ years	2,812	57.7 (± 2.5)^{R}	Referent
Sex			
Male	4,416	61.9 (± 2.0)	**1.09 (1.04, 1.14)**
Female	5,402	59.8 (± 1.9)^{R}	Referent
Race/ethnicity†			
Hispanic	568	48.6 (± 5.1)^{R}	Referent
Black only, non-Hispanic	782	**64.4 (± 4.5)**	**1.16 (1.04, 1.29)**
White only, non-Hispanic	7,884	**62.9 (±1.4)**	1.05 (0.96, 1.16)
Other or multiple races, non-Hispanic	584	**63.9 (± 6.5)**	1.07 (0.95, 1.22)
Education			
< High school	311	34.7 (± 6.6)^{R}	Referent
High school or equivalent	1,528	**49.4 (± 3.4)**	**1.23 (1.03, 1.46)**
Some college	2,500	**58.4 (± 2.7)**	**1.34 (1.13, 1.58)**
College graduate	5,454	**71.7 (± 1.8)**	**1.50 (1.27, 1.78)**
Number of children in household			
0 children	6,278	**61.0 (± 1.8)**	1.07 (0.98, 1.18)
1–2 children	2,877	**63.3 (± 2.5)**	1.09 (0.99, 1.21)
≥3 children	660	52.4 (± 5.4)^{R}	Referent
Metropolitan Statistical Area (MSA)			
MSA, central city	3,048	**61.6 (± 2.8)**	1.06 (1.00, 1.13)

Characteristics	Had paid sick leave benefits		
	n*	% (± 95% CI)	APR (± 95% CI)
MSA, non-central city	4,535	**62.4 (± 1.9)**	1.05 (1.00, 1.11)
Non-MSA	2,235	54.9 (± 2.7)[R]	Referent
Occupation			
White collar	5,774	**72.0 (± 1.8)**	**1.69 (1.45, 1.97)**
Service	872	**43.9 (± 4.2)**	**1.23 (1.04, 1.45)**
Farm/blue collar	398	35.7 (± 5.5)[R]	Referent
Sales & office	2,349	**56.8 (± 2.7)**	**1.46 (1.25, 1.70)**
Unknown/missing	425	**70.4 (± 6.4)**	**1.72 (1.44, 2.04)**
Income/Poverty Level‡			
Above poverty, >$75 K/year	4,366	**75.1 (± 1.9)**	-
Above poverty, ≤$75 K/year	4,604	**58.7 (± 2.1)**	-
At or below poverty	259	26.3 (± 5.3)[R]	-
Not reported	589	**46.9 (± 4.7)**	-
Insured‡			
Yes	9,341	**68.2 (± 1.3)**	-
No	465	24.4 (± 3.8)[R]	-
Industry‡			
Agriculture, forestry & fishing	89	32.9 (± 14.2)[R]	-
Construction	349	35.0 (± 5.4)	-
Healthcare & social assistance	1,916	**68.2 (± 3.2)**	-
Manufacturing	630	**63.3 (± 4.8)**	-
Mining	66	**69.0 (± 16.1)**	-
Services	5,309	**62.5 (± 2.0)**	-
Transportation, warehousing & utilities	481	**62.7 (± 6.3)**	-
Wholesale and retail trade	842	**61.3 (± 4.2)**	-
Unknown/missing	136	**68.5 (± 9.1)**	-

Note: Boldface indicates significance ($p < 0.05$) compared to referent group.

APR = adjusted prevalence ratio.

[*] Sample sizes are unweighted.

[R] Reference group.

[†] Persons identified as black, white, or other race are non-Hispanic. Persons identified as Hispanic or Latino might be of any race. 'Other' includes American Indian/Alaska Native, Asian, and persons who identified multiple races. The four racial/ethnic categories are mutually exclusive.

[≠] Excluded from the logistic regression model due to collinearity issues.

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Table 2

Association between having paid sick leave and being treated/taking days off due to influenza-like illness (ILI).

	Had paid sick leave benefits				
	Yes		No		
	n*	% (±95% CI)	n	% (±95% CI)	APR (± 95% CI†)
Sick with ILI in the past month	421	4.4 (±0.7)	266	4.9 (± 1.0)	0.99 (0.90, 1.09)
Subset of those reporting being sick with ILI in the past month:					
Visited a doctor, nurse, or other health professional for their ILI	213	**48.9** (± 8.3)	102	**30.7** (± 9.6)	**1.21 (1.01, 1.44)**
Took ≥1 day off from work because of ILI	257	63.9 (± 8.2)	140	60.1 (± 9.8)	1.12 (0.91, 1.38)

*Sample sizes are unweighted.

†Logistic regression model adjusted for sex, age, race/ethnicity, education, occupation, number of children < 18 years old in the household, and Metropolitan Statistical Area (MSA). Income, insurance status, and industry were excluded from the logistic regression due to collinearity issues.

Table 3

The association between having paid sick leave benefits and influenza vaccination status.[*]

Reported having paid sick leave benefits?	Vaccination type					
	Seasonal influenza		pH1N1 influenza		Any influenza	
	n[†]	APR (± 95% CI[‡])	n	APR (± 95% CI)	n	APR (± 95% CI)
Overall sample:						
Yes	4,730	**1.38 (1.27, 1.49)**	3,036	**1.31 (1.17, 1.47)**	5,220	**1.34 (1.24, 1.44)**
No	2,131	Referent	1,336	Referent	2,467	Referent
Only adults not vaccinated in the workplace						
Yes	3,101	**1.18 (1.07, 1.30)**	2,293	**1.14 (1.01, 1.30)**	3,371	**1.17 (1.07, 1.27)**
No	1,832	Referent	1,204	Referent	2,114	Referent

Note: Boldface indicates significance ($p < 0.05$) compared to referent group.

APR = adjusted prevalence ratio.

[*] Logistic regression model adjusted for sex, age, race/ethnicity, education, occupation, number of children < 18 years old in the household, and Metropolitan Statistical Area (MSA). Income, insurance status, and industry were excluded from the logistic regression due to collinearity issues.

[†] Only the number of vaccinated, sample sizes are unweighted.

[‡] CI = confidence interval.