The Impact of Workplace Policies and Other Social Factors on Self-Reported Influenza-Like Illness Incidence During the 2009 H1N1 Pandemic

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Objectives. We assessed the impact of social determinants of potential exposure to H1N1—which are unequally distributed by race/ethnicity in the United States—on incidence of influenza-like illness (ILI) during the 2009 H1N1 pandemic.

Methods. In January 2010 we surveyed a nationally representative sample (n=2079) of US adults from the Knowledge Networks online research panel, with Hispanic and African American oversamples. The completion rate was 56%.

Results. Path analysis examining ILI incidence, race, and social determinants of potential exposure to H1N1 demonstrated that higher ILI incidence was related to workplace policies, such as lack of access to sick leave, and structural factors, such as number of children in the household. Hispanic ethnicity was related to a greater risk of ILI attributable to these social determinants, even after we controlled for income and education.

Conclusions. The absence of certain workplace policies, such as paid sick leave, confers a population-attributable risk of 5 million additional cases of ILI in the general population and 1.2 million cases among Hispanics. Federal mandates for sick leave could have significant health impacts by reducing morbidity from ILI, especially in Hispanics. (*Am J Public Health*. Published online ahead of print November 17, 2011: e1–e7. doi:10.2105/AJPH.2011.300307)

During the 2009 H1N1 pandemic, racial/ethnic disparities in hospitalization and mortality rates were reported in the United States.[1–8] Non-Hispanic Blacks and Hispanics were overrepresented among hospitalized cases compared with non-Hispanic Whites.[3,7] It is unclear whether these disparities were attributable to unequal levels of incidence resulting from disparities in exposure by race/ethnicity, unequal levels of underlying chronic conditions, or unequal access to health care leading to differences in timely care-seeking behaviors.

We assessed the impact of social determinants of potential exposure to the virus, which are unequally distributed by race/ethnicity in the United States, on influenza-like illness (ILI) incidence.

SOCIAL DETERMINANTS OF POTENTIAL EXPOSURE TO INFLUENZA VIRUS

In 2008 Blumenshine et al.[9] proposed a model predicting that unequal levels of illness and death in a pandemic would be affected by social determinants, including household crowding, inability to take time off work, and dependence on public transportation. They hypothesized that higher levels of crowding and higher prevalences of certain types of occupation among certain population groups may give rise to disparities in exposure. Difficulty avoiding public transportation would be another source of disparity in exposure to infectious agents. Finally, staying away from work, if used as a social-distancing policy during a pandemic, would likely be more difficult for lower-wage workers because they would be less able to afford the subsequent loss of income.[9]

Researchers have speculated that disparities in hospitalization and mortality in the 2009 H1N1 pandemic may have been attributable to unequal exposure.[3] Those who live in a metropolitan area[10] or in crowded locales, such as an apartment building, may have had higher levels of exposure and higher influenza incidence rates. Furthermore, household crowding may also have affected ILI incidence.[9,11]

Workplace policies could affect differential exposure to virus and disease incidence. During the early part of the 2009 H1N1 pandemic, the Centers for Disease Control and Prevention (CDC) recommended that those with ILI stay home from work for 7 to 10 days; as epidemiological information on the illness became available, the CDC issued an updated recommendation for sick people to stay home for an additional 24 hours after symptoms subsided.[12,13] In the United States, the Bureau of Labor Statistics reports that 33% of the civilian workforce lacks paid sick leave.[14] Those who cannot take time off from work, who are unable to work from home, or who lack sick leave at work are at higher risk for exposure via colleagues not staying home when ill.[15] Therefore, these policies may predict ILI incidence. Such worksite policies also hamper workers' ability to rest and recuperate after disease has developed.[16,17] In the first study to operationalize constructs from the Blumenshine et al. model, Quinn et al. showed that multiple factors might influence racial/ethnic disparities in the pandemic in the United States and that risk of exposure to H1N1 was significantly related to race and ethnicity.[11] However, the factors that actually affect disease incidence have not been identified.

Dependence on often-crowded public transportation may be associated with increased exposure to influenza and ILI incidence. In the United States, more than 59% of public transportation users are racial/ethnic minorities.[18]

Objective data on hospitalization as a result of H1N1 infection during the 2009 pandemic are available, but incidence rates have had to be estimated by using a variety of data sources, including self-reported ILI.[19] The CDC uses the Behavioral Risk Factor Surveillance System to

collect self-reported ILI data.[20,21] In this study, we collected data on self-reported ILI incidence during the 2009 H1N1 pandemic, and we examined the data as an outcome of social determinants of potential exposure to the virus. To empirically test the Blumenshine et al. conceptual model,[9] we developed a path analysis for ILI incidence predicted by social determinants of potential exposure to the virus and social position.

METHODS

We surveyed a nationally representative random sample of adults from the Knowledge Networks online research panel[22] about their social and demographic characteristics that were relevant to the H1N1 pandemic. Knowledge Networks uses a combination of random-digit dial and address-based probability sampling to recruit panelists and provides access to computer equipment and Internet service if needed. The panel is thus designed to be representative of the entire US population, including unlisted, nontelephone, and cell phone–only households.

For this study, a national sample of 3689 adults aged 18 years or older, including oversamples of African Americans and Hispanics, was contacted by e-mail. Between January 22 and February 1, 2010, 2079 respondents completed the survey, for a completion rate of 56%. Knowledge Networks provided a data file with weighting variables, which incorporated design-based weights to account for recruitment of the panelists and both panel-based and study-specific post-stratification weights benchmarked against the most recent Current Population Survey (CPS) with respect to demographic and geographic distributions of the US population aged 18 years and older. We analyzed responses from 2042 respondents who reported their race/ethnicity as White non-Hispanic, Black non-Hispanic, or Hispanic (note that we will use "Black" to denote non-Hispanic Black and "White" to denote non-Hispanic White). We excluded the "Other" race/ethnicity category because its small size and heterogeneity made interpretation of the results by race/ethnicity difficult.

Survey Instrument and Measures

Knowledge Networks collected demographic variables, including living in an apartment building (with 2 or more units), living in a metropolitan statistical area, and number of children and adults in the household. We utilized measures of exposure to the H1N1 virus, including a summative index of work-related inability to engage in social distancing, created by Quinn et al.[23] The index of work-related inability to engage in social distancing included responses to items that assessed how easy or difficult it would be for respondents to stay home from work if needed.

> If public health officials declared that it was necessary for people to stay home from work and school, how difficult would it be for you to stay home from work for 7–10 days?

Responses were dichotomized as follows: "not at all difficult" and "slightly difficult" were collapsed into "not difficult" and a score of 0, and "moderately difficult" and "very difficult" were collapsed into "difficult" with a score of 1.

> Please indicate yes, no, or not applicable on each of the following items: (1) I am able to work at home. (2) If I do not go to work because of the flu, I will not get paid for the time I am at home. (3) I have sick leave at my job if I need to use it. (4) I could lose my job or business if I am not able to go into work. (5) My job can only be done in my workplace.

Note that respondents who did not work could pick "not applicable" and were considered not at risk. Hence, the index of work-related inability to engage in social distancing reflects employment levels as well as actual inability to engage in social distancing. The index is a summative score of responses to these survey questions, weighting each higher-risk response 1 and each lower-risk or no-risk response 0, so that a higher index value indicates greater difficulty in social distancing.[23]

One question was asked about dependence on public transportation: "How difficult would it be for you to use private transportation to avoid crowds on public transportation?" "Not at all difficult" and "slightly difficult" were collapsed into "not difficult," and "moderately difficult" and "very difficult" were collapsed into "difficult."[23] Two questions were asked about ILI incidence: "Do you think you currently have or have had influenza-like illness since April 2009?" and "Do you think that anyone in your household currently has or has had influenza-like illness since April 2009?"

We focused on self-reported ILI. As with any survey data, these self-reports are subject to recall bias. The situation of a novel virus with unprecedented media coverage of symptoms and the illness itself may have alleviated this potential bias during the 2009 H1N1 pandemic. The peak of the epidemic was in November 2009.[24] Thus, for most respondents the recall period would have been less than the 9 months between April 2009 (outbreak) and January 2010 (when the survey was fielded). The survey instrument was translated into Spanish for Spanish language–dominant respondents. This study was approved by the University of Pittsburgh institutional review board.

Data Analysis

We used complex survey analysis procedures to analyze the data in Stata version 11 (StataCorp LP, College Station, TX). We used the adjusted Wald χ^2 test (categorical measures) and the adjusted Wald F test (continuous measures) in bivariate analyses. We performed a path analysis on ILI predicted by race/ethnicity and the social determinants of potential exposure, adjusting for covariates (income, education, age, gender) using mean- and variance-adjusted weighted least squares on a polyserial correlation matrix with complex sampling. We evaluated the model fit with the model χ^2 and 2 fit indices. We used comparative fit index (CFI)[25] and root mean square error of approximation (RMSEA).[26] We determined the model fit to be good if CFI was greater than or equal to 0.95 and RMSEA was less than or equal to 0.06.[27,28] Once a good model fit was established, we examined individual parameter estimates with a z test. A P value of less than .05 indicated a significant finding.

RESULTS

Table 1 shows demographic characteristics and ILI incidence for the sample. There were significant differences by race/ethnicity in age, income, education, and household size ($P<.001$). Ten percent of the respondents reported having had ILI during the pandemic. Thirteen percent reported that someone in their household had had ILI during the pandemic, and this result differed by race/ethnicity ($P<.001$).

Disparities in Risk of Potential Exposure

Table 2 shows measures of potential exposure to influenza, broken out by race/ethnicity.

TABLE 1—Sample Demographics and Incidence of Influenza-like Illness: US Adults, 2009–2010

Characteristic	All[a] (b = 2042)	White, Non-Hispanic (n = 849)	Black, Non-Hispanic (n = 591)	Hispanic (n = 602)	P[b]
Gender, no. (%)[c]					
Men	982 (48.3)	430 (48.4)	251 (45.2)	282 (51.0)	.3
Women	1097 (51.7)	419 (51.6)	340 (54.8)	320 (49.0)	
Age, y, mean (SE)	44.9 (0.4)	48.3 (0.7)	44.3 (0.9)	40.6 (0.7)	<.001
Income, no. (%)[c]					
< $25 000	550 (30.5)	145 (21.2)	205 (39.9)	192 (35.3)	
$25 000–$49 999	582 (28.5)	199 (23.8)	178 (31.1)	199 (34.1)	<.001
$50 000–$74 999	401 (18.0)	194 (23.4)	101 (13.8)	102 (15.7)	
≥ $75 000	546 (22.9)	311 (31.6)	107 (15.2)	109 (14.9)	
Education, no. (%)[c]					
< high school	311 (18.8)	58 (9.6)	65 (15.3)	185 (36.1)	
High school	674 (31.6)	233 (31.8)	227 (35.3)	209 (30.4)	<.001
Some college	591 (27.1)	273 (30.0)	179 (30.3)	131 (20.5)	
≥ bachelor's degree	503 (22.5)	285 (28.7)	120 (19.1)	77 (13.0)	
Household size, mean (SE)	2.91 (0.05)	2.68 (0.07)	2.53 (0.09)	3.60 (0.09)	<.001
Influenza-like illness (self), no. (%)[c]	204 (10.2)	83 (10.3)	60 (10.0)	61 (10.3)	.98
Influenza-like illness (household), no. (%)[c]	233 (12.9)	112 (15.7)	41 (7.6)	80 (14.2)	<.001

[a]Thirty-seven respondents fell into an "Other" race/ethnicity category, which was not included in analyses by race/ethnicity.
[b]Adjusted Wald χ^2 test.
[c]Unweighted number, weighted percentage.

Structural measures of risk of potential exposure. Risk of potential exposure attributable to living in a metropolitan area and living in an apartment building with 2 or more units was significantly different by race/ethnicity ($P<.001$). Hispanics had a higher number of adults and children in the household, suggesting that they were at increased risk for potential exposure to the virus because of these measures of household crowding ($P<.001$).

Work-related measures of potential exposure. Racial/ethnic disparities existed for those who would find it difficult to stay home from work for 7 to 10 days ($P<.001$). Inability to work at home, not having sick leave, and job insecurity were unequally distributed by race/ethnicity ($P<.001$). Hispanics had a significantly greater score on the "work-related inability to

TABLE 2—Social Determinants of Potential Virus Exposure During the H1N1 Pandemic, by Race/Ethnicity: US Adults, 2009–2010

Characteristics	White, Non-Hispanic	Black, Non-Hispanic	Hispanic	P[a]
Structural measures of exposure				
Living in a metropolitan area, no. (%)[b]	683 (79.8)	528 (89.0)	551 (92.2)	<.001
Living in an apartment, no. (%)[b]	88 (11.9)	194 (35.8)	143 (26.2)	<.001
No of adults in household, mean (SE)	2.1 (0.04)	1.9 (0.05)	2.3 (0.05)	<.001
No of children < 18 y in household, mean (SE)	0.54 (0.04)	0.61 (0.05)	1.26 (0.07)	<.001
Work-related measures of inability to engage in social distancing, no. (%)[b]				
Difficulty staying home from work for 7–10 d	212 (30.3)	168 (30.1)	254 (46.2)	<.001
Not able to work at home	283 (31.5)	227 (41.4)	301 (52.7)	<.001
Will not get paid if stays home from work with flu	187 (26.2)	128 (23.8)	137 (23.4)	.599
Does not have sick leave at job	158 (22.4)	115 (22.0)	222 (40.5)	<.001
Could lose job or business if not able to go to work	100 (13.6)	83 (15.8)	159 (29.3)	<.001
Job can only be done at workplace	297 (40.4)	214 (36.2)	312 (56.8)	<.001
Score on index of inability to engage in social distancing, mean (SE)	1.74 (0.09)	1.73 (0.10)	2.48 (0.10)	<.001
Other measures of inability to engage in social distancing: difficulty avoiding public transportation, no. (%)[b]	78 (10.8)	102 (20.9)	135 (25.8)	<.001

[a]Adjusted Wald χ^2 test.
[b]Unweighted number, weighted percentage.

engage in social distancing" index than did Whites or Blacks ($P<.001$). Somewhat surprisingly, more than 70% of all 3 races/ethnicities reported that they would not get paid if they stayed home from work with flu ($P=.599$).

Difficulty avoiding public transportation. As another measure of the risk of potential exposure to influenza virus, we assessed the difficulty respondents would face avoiding public transportation. Minorities were significantly more dependent on public transportation than were Whites ($P<.001$).

Social Determinants of Exposure

The measures that were related to ILI incidence in the respondent differed from those that were related to ILI incidence in the household (Table 3).

Influenza-like illness incidence in respondents. In bivariate analyses, ILI in the respondent was not related to structural measures of exposure, but it was related to measures of work-related inability to engage in social distancing. Those who would find it difficult to stay home from work for 7 to 10 days and those who were unable to work at home were more likely to have had ILI ($P<.05$). Respondents who reported that they would not get paid if they were unable to go in to work, that they did not have sick leave at work, or that their job could only be done at the workplace were more likely to have had ILI ($P<.1$).

Influenza-like illness incidence in households. In contrast to ILI in the respondent, ILI in the household was related to structural measures of exposure. Presence of 2 or more adults and presence of children in the household were related to ILI incidence ($P<.001$). Surprisingly, living in an apartment building with 2 or more units was related to lower incidence of ILI ($P<.01$; Table 3). Those who reported that they would not get paid if they stayed home from work were more likely to report ILI in their household ($P<.1$). Other work-related measures were not related to ILI in the household.

TABLE 3—Relationship Between Social Determinants of Potential Exposure and Influenza-Like Illness (ILI) Incidence During the H1N1 Pandemic: US Adults, 2009–2010

Characteristics	ILI (Self), No. (%)[a]	ILI (Household), No. (%)[a]
Structural measures of exposure		
Living in a metropolitan area		
No	27 (11.6)	32 (13.0)
Yes	177 (10.0)	201 (12.9)
Living in an apartment		
No	165 (10.6)	201 (14.4)***
Yes	39 (8.8)	32 (7.9)
No. of adults in household (median = 2)		
<2	52 (10.2)	29 (7.5)†
≥2	152 (10.2)	204 (14.6)
Presence of children <18 y in household		
No	118 (9.9)	109 (9.6)†
Yes	86 (10.7)	124 (18.0)
Work-related measures of inability to engage in social distancing		
Difficulty staying home from work for 7–10 d		
Not difficult	127 (8.8)**	148 (12.2)
Difficult	71 (13.3)	79 (14.6)
Able to work at home		
Yes	111 (8.2)**	136 (12.7)
No	89 (12.8)	94 (13.3)
Will not get paid if stays home from work		
No	149 (9.2)*	163 (11.9)*
Yes	52 (13.6)	66 (16.1)
Does not have sick leave at job		
No	145 (9.0)*	168 (12.7)
Yes	55 (13.4)	62 (13.6)
Could lose job or business if not able to go to work		
No	168 (10.2)	190 (12.9)
Yes	31 (10.3)	40 (13.3)
Job can only be done at workplace		
No	110 (8.7)*	131 (12.0)
Yes	90 (12.3)	98 (14.1)
Other measures of inability to engage in social distancing: difficulty avoiding public transportation		
Not difficult	165 (9.8)	194 (13.1)
Difficult	35 (12.7)	36 (13.3)

[a]Unweighted number, weighted percentage.
*$P<.1$; **$P<.05$; ***$P<.01$; †$P<.001$.

Unequal Exposure and Determinants of Disease Incidence

There was a statistically significant difference between the observed covariance matrices and the model covariance matrices (χ^2 [25, n=2042]=66.44). However, the model fit was good (CFI=0.999; RMSEA=0.028). Results of the path analysis are shown in Figure 1. Hispanics (b=0.95; $P<.01$) and Blacks (b=0.66; $P<.05$) were more likely to live in an apartment building than were Whites. Hispanics (b=1.08; $P<.001$) and Blacks (b=0.64; $P<.001$) were also more likely than were Whites to live in a metropolitan area. Whereas Blacks had lower inability to engage in social distancing compared with Whites (b=−0.32; $P<.1$), Hispanics had significantly greater inability to engage in social distancing (b=0.37; $P<.05$). Hispanics had more children in the household (b=0.43; $P<.01$) and were more dependent on public transportation (b=0.35; $P<.05$) than were Whites. Our analyses were conservative because we controlled for education and income

as well as gender and age. Therefore, it is significant that there remained racial/ethnic differences for many social determinants of potential exposure in this model. A comparison of estimates with a model that does not adjust for these covariates makes it apparent that this is an extremely conservative model (Table 4).

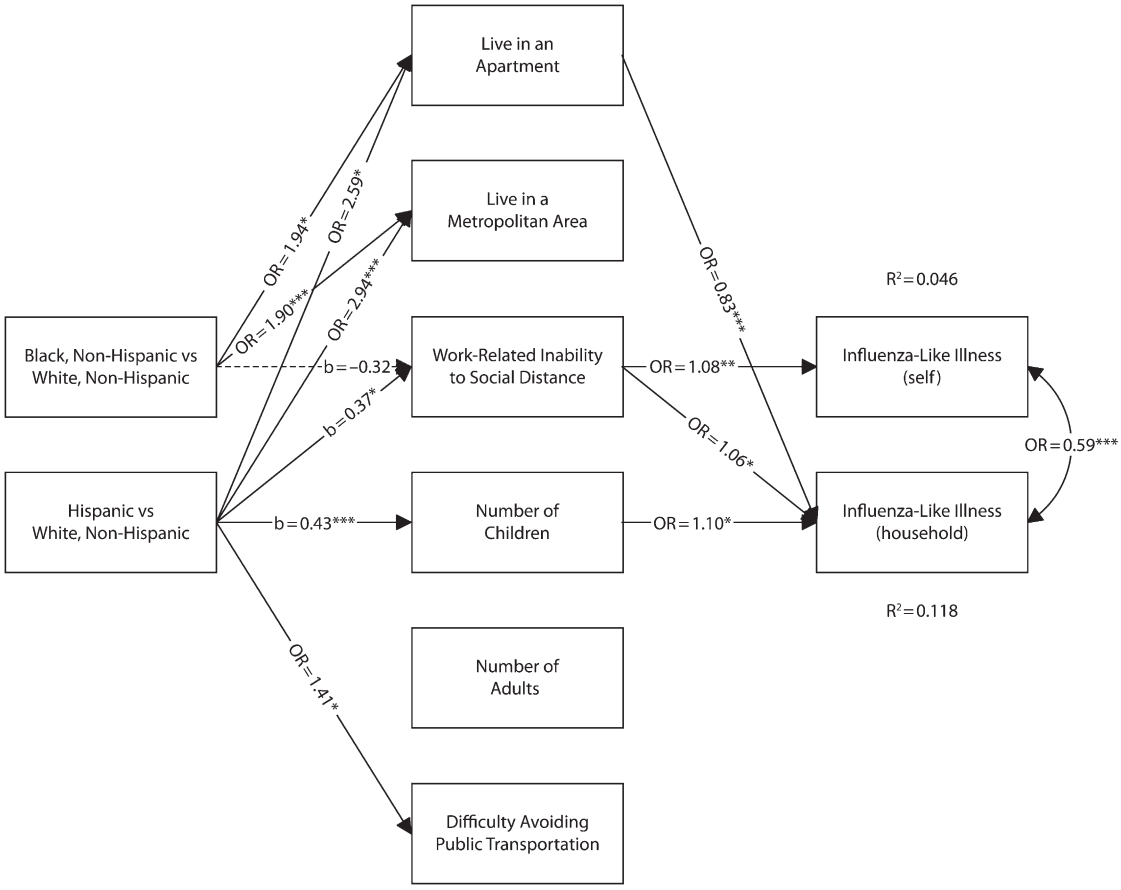
There was a significant positive correlation between ILI incidence in the respondent (self) and ILI incidence in the household (r=0.59; $P<.001$). A unit increase in the "work-related inability to engage in social distancing" index resulted in an 8% increase in odds of ILI in the respondent (b=0.08; $P<.01$; odds ratio [OR]=1.08). The odds of ILI in the household increased by 6% for each unit increase in inability to engage in social distancing (b=0.06; $P<.05$; OR=1.06). The presence of each additional child in the household resulted in an increase of about 10% in the likelihood of ILI in the household (b=0.10; $P<.05$; OR=1.10). We examined an additional model replacing the number of children with the presence of children (yes or no). The results remained similar. Unexpectedly, living in an apartment building with 2 or more units decreased the odds of ILI in the household (b=−0.19; $P<.001$; OR=0.83). The model explained 12% of the variance in ILI incidence in the household and about 5% of the variance in ILI incidence in the respondent.

DISCUSSION

We have shown that social factors, including work-related inability to engage in social distancing and household crowding, were related to a higher self-reported ILI incidence in the 2009 H1N1 pandemic. In addition, these social factors were more prevalent among Hispanics, putting them at greater risk for ILI.

Quinn et al. used data collected during the first wave of the H1N1 pandemic and showed that Hispanics who took their survey in Spanish were at greater risk than were Whites of potential exposure attributable to worksite policies and household size.[23] Blake et al. failed to detect racial/ethnic disparities in the ability to get paid if staying away from work,[29] but their results may have been biased by low response rates.

Our data suggest a 10% incidence of ILI in respondents themselves and a 13% incidence of ILI in the household since the beginning of the pandemic. In the Behavioral Risk Factor Surveillance System survey, conducted between September 2010 and December 2010, self-reported ILI in the past month among Whites, Blacks, and



Note. Odds ratios are presented for dichotomous outcomes, and unstandardized parameter estimates are presented for continuous outcomes. The model is adjusted for income, education, gender, and age.

FIGURE 1—Path analysis showing the relationship between race/ethnicity and influenza-like illness (ILI), through the intervening social determinants of potential exposure to influenza virus: US adults, 2009–2010.

TABLE 4—Prediction of Social Determinants of Potential Exposure to Influenza by Race, With and Without Adjustment for Income, Education, Age, and Gender: US Adults, 2009–2010

Structural Measures of Exposure[a]	b (Unadjusted)	R^2 (Unadjusted)	b (Adjusted)[b]	R^2 (Adjusted)
Living in an apartment				
Black, non-Hispanic	0.74†	0.090	0.66**	0.661
Hispanic	0.36†		0.95***	
Living in a metropolitan area				
Black, non-Hispanic	0.42†	0.070	0.64†	0.218
Hispanic	0.62†		1.08†	
No. of adults in household				
Black, non-Hispanic	–0.21†	0.030	0.04	0.344
Hispanic	0.24†		0.16	
No. of children <18 y in household				
Black, non-Hispanic	–0.07	0.072	0.17	0.333
Hispanic	0.66†		0.43†	
Work-related inability to engage in social distancing				
Black, non-Hispanic	–0.01	0.039	–0.32*	0.171
Hispanic	0.82†		0.37**	
Difficulty avoiding public transportation				
Black, non-Hispanic	0.35***	0.055	0.09	0.258
Hispanic	0.55†		0.35**	

[a]Reference category is White, non-Hispanic.
[b]Adjusted for income, education, age, and gender.
*P<.1; **P<.05; ***P<.01; †P<.001.

Hispanics was 8%.[21] The low rate of self-reported incidence may explain why we do not see a direct effect of Hispanic ethnicity on ILI incidence, even though we see an indirect effect via presence of children in the household and work-related inability to engage in social distancing.

Among the measures of exposure we used, we found that the number of children in the household, the inability to engage in social distancing, and living in an apartment building significantly predicted ILI incidence. Compared with structural factors such as household size and living in an apartment building, worksite policies are modifiable, and we focus on them in this discussion. Inability to engage in social distancing—based on the inability to work at home, lack of access to sick leave and paid time off from work, and perceived job insecurity—was higher in Hispanics than in Whites. The lack of work-related disparities between Blacks and Whites likely stems from the high unemployment rate in the African American population. Because we conducted our analyses to gauge potential inequalities at the population level, we did not constrain the sample to those who work outside the home. Just as workplace policies may affect the mechanism by which populations are unequally exposed, so too may the type of employment, and this question should be examined in the future.

The small ORs we saw translated to large effects at the population level. For instance, given that 27% were at increased risk for ILI because of lack of access to sick leave, a calculation of the population-attributable risk suggests that an 8% increase in odds of ILI for each unit increase on the "inability to engage in social distancing" index (95% confidence interval [CI]=1.02, 1.14) translates to 5.0 million cases of ILI because of lack of sick leave at the job (95% CI=1.3; 8.8 million cases) in an adult population of 232 million.

These cases account for about 13% of CDC's estimated 38 million H1N1 flu cases in adults between April 2009 and January 2010, which translates to 23 026 additional hospitalizations and 1376 additional adult deaths attributable to worksite policies.[19,30] For Hispanics, given that 40% were at increased risk for ILI because of lack of access to sick leave, an 8% increase in odds of ILI translates to 1.2 million additional cases of ILI attributable to lack of sick leave (95% CI=0.3; 2.0 million cases) in an adult Hispanic population of 36 million.[31] In addition, work-related inability to engage in social distancing also predicted ILI in the household. This finding suggests that the burden of morbidity attributable to ILI would be even greater with additional members in the household becoming sick because of policies at their worksites.

Thus, not only do Hispanics have less access to health care once ill,[11] but they also are at increased risk for ILI. These facts have implications for policies: there is a need to provide better access to vaccines, drugs, and culturally competent health care providers, as well as to reduce the source of disparities in ILI incidence.

The Healthy Families Act, under consideration in the US Congress, would mandate the provision of paid sick leave for employees.[32,33] Our data lend evidence-based support to the Health Impact Assessment of the bill[15] and suggest that federal mandates for sick leave would have health impacts by significantly reducing morbidity from ILI, especially in Hispanics.

This study has some limitations. First, the completion rate was 56%. However, the completion rate on our survey is normal for surveys with oversamples of minorities and respondents taking the survey in Spanish. In addition, the Knowledge Networks panel is unique in that it includes people in cell phone–only households as well as households with no phone. Our inclusion of a large proportion of minorities also allowed us to study the social determinants of ILI in racial/ethnic subpopulations. Second, we focused on self-reported ILI. Self-reports are subject to recall bias. Furthermore, we did not specify ILI symptoms in our survey, resulting in the potential for misclassification in self-reported ILI. However, we contend that the context of our survey—an outbreak of a novel virus, with unprecedented media coverage of symptoms and of the illness itself—alleviated this potential bias.

On the other hand, the strength of our data is their uniqueness, in that the survey was designed to collect information not only on self-reported ILI incidence but also on the potentially correlated social determinants of such illness. We suggest that studies be undertaken during normal flu seasons in the United States

to further explore the social determinants associated with the specific symptoms of ILI and ILI incidence in general. This would also allow an examination of the generalizability of our findings to influenza seasons in general.

The indirect effect of Hispanic ethnicity on ILI incidence, through work-related inability to engage in social distancing, provides a possible explanation for unequal levels of severe disease and hospitalization among racial/ethnic subgroups in the 2009 H1N1 pandemic. Therefore, resources such as sick leave—which would allow people to engage in social distancing—should be equitably distributed across the US population. ■

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Contributors

S. Kumar contributed to questionnaire design, study origination, analysis and interpretation of data, and drafting and revision of the article. S.C. Quinn contributed to questionnaire design, study origination, drafting and revising the article, and obtaining funding. K.H. Kim contributed to questionnaire design, study origination, analysis and interpretation of data, and drafting and revision of the article. L.H. Daniel contributed to analysis and interpretation of data. V.S. Freimuth contributed to questionnaire design, study origination, and obtaining funding. All authors approved the final version of the article.

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Human Participant Protection

This study was approved by the University of Pittsburgh institutional review board.

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