

# Social Determinants of Influenza Illness and Outbreaks in the United States

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**Social determinants—such as education, race/ethnicity, socioeconomic status, access to health care services and vaccination, neighborhood-level stressors, and workplace or school policies—can impact influenza illness and outbreaks in the United States. To reduce transmission and disparities in influenza infection, policies should focus on removing existing vaccination barriers and supporting equitable social policies.**

Influenza is a serious illness that causes an average of 51,000 deaths annually in the United States [1] and contributes to an annual economic burden of \$12–\$14 billion due to work absenteeism and direct medical costs [2]. Decades of research suggest that social determinants—such as income, education, occupation, social class, sex, and race/ethnicity—may be root causes of many health outcomes. The World Health Organization defines social determinants of health as “conditions in which people are born, grow, work, live, age, and the wider set of forces and systems,” including both economic and social policies and systems, that shape our daily lives and environment [3]. Although much of the research that has been conducted on social determinants of health has primarily focused on chronic conditions [4], mounting evidence suggests that social determinants strongly influence respiratory infections in the United States, including influenza [5, 6]. The systematic and ongoing collection of data on influenza cases in the United States has provided a conduit for researchers to explore, identify, and better understand the social determinants that impact influenza infection.

In this commentary, we describe some of the key social determinants that influence influenza illness and outbreaks in the United States. Although several factors may impact influenza (see Figure 1), we focus specifically on modifiable social determinants, including poor access to health care services and influenza vaccination, individual- and neighborhood-level factors, and social policies. We contend that a social determinant framework provides a more comprehensive understanding of existing structures and policies that promote influenza illness and outbreaks. Such a framework can thus help guide researchers and policy makers in the design of preparedness plans that incorporate principles of social justice and health equity to reduce the unequal bur-

den of influenza morbidity and mortality on disadvantaged populations.

## Access to Health Care and Influenza Vaccination

Accessing health care services and vaccination are important ways individuals can prevent severe influenza illness. However, deep-seated inequalities in the United States have rendered disadvantaged populations more vulnerable to influenza infection through structural or institutionalized barriers to the receipt of vaccination and antiviral treatment [7]. These barriers also make it difficult for disadvantaged populations to be aware of and utilize nonpharmaceutical interventions—including voluntary home quarantine, isolation and treatment of cases, social distancing, face masks, hand hygiene, and keeping children home from school—that are integral for preventing influenza outbreaks, especially when vaccines or antiviral medications are unavailable or ineffective, as in the case of a new pandemic strain [8, 9]. In addition to being more vulnerable to infection, socioeconomically disadvantaged populations and marginalized racial/ethnic minorities are less likely to have access to health care, more likely to suffer the effects of discriminatory policies, less able to gain access to equitable policies, and more likely to be suspicious of health officials and government [7, 10–16]. As a consequence, disadvantaged populations experience increased risk of severe influenza illness, hospitalization, and premature death [17, 18].

Annual influenza vaccination protects individuals and their families from infection and related health complications [19]. Although the health benefits of vaccination are well established, research suggests that marginalized racial/ethnic groups have lower vaccine coverage, particularly for influenza [20, 21]. Several cross-sectional studies have demonstrated that black Americans and Latinos are less likely to be vaccinated than are white Americans [22–24]. Personal perception or knowledge of vaccines possibly accounts for some of this disparity [25–29]. A survey

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by Lindley and colleagues found that black Americans were more likely to report vaccine-related side effects and have negative opinions regarding the effectiveness and safety of vaccines than were white Americans [25]. Another study found that lack of information on the availability of vaccines among Latinos was a key reason that many forgo vaccination [30].

However, negative opinions about vaccination, mistrust of the health care system, and lack of information related to vaccination do not fully account for the large disparity in vaccination between marginalized racial/ethnic groups and whites [10, 31]. Indeed, social and structural barriers such as limited access to health care, high health care costs, lack of insurance, and language barriers have also been cited as major factors influencing vaccination uptake [10, 31-34]. A study conducted in disadvantaged neighborhoods in New York City found that individuals who reported not being connected to health or social services or government health insurance were less likely to be vaccinated but were willing to receive vaccination if it were available to them [32]. In fact, researchers found that more than 70% of disadvantaged minorities and hard-to-reach populations living in New York City—such as undocumented immigrants, substance users, sex workers, and homeless individuals—who had never been vaccinated against influenza were interested in being vaccinated [32]. Non-English-speakers, specifically Latinos, face language barriers in accessing health care [33] and report that only a few health care providers speak their native language [31]. As a result, Latinos are 23% less likely to see a physician and have 70% lower uptake of influenza vaccination compared with white non-Latino Americans [14]. Furthermore, the children of non-English-speaking

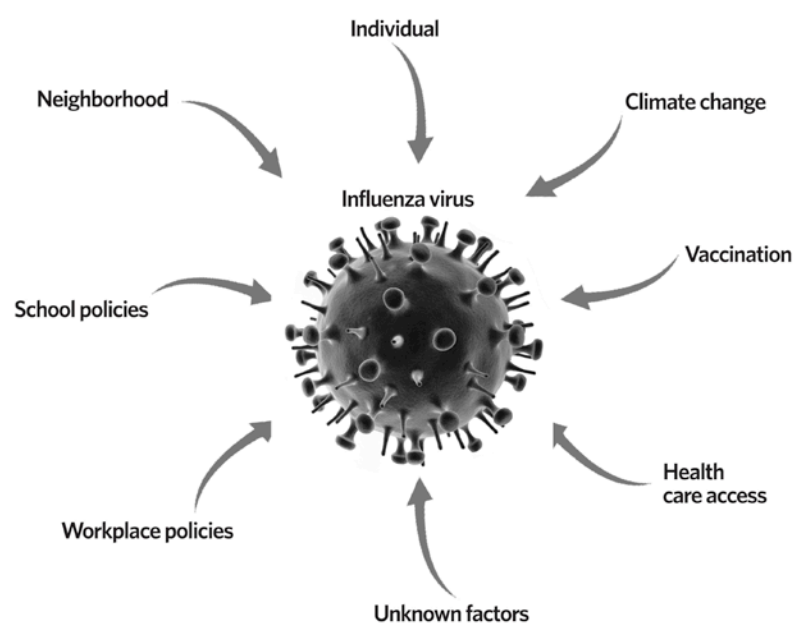
Latino caregivers are less likely to be vaccinated against influenza, creating a public health challenge that extends across generations [35].

Differences in vaccination rates that are likely to persist across generations have also been demonstrated in a study by Uddin and colleagues, which showed that influenza vaccine uptake among university students whose parents had some college education or less were 5 times lower than the vaccine uptake among students whose parents had a some graduate school-level education [36]. These socioeconomic differences in vaccination persist across generations even among those who have attained a higher level of education than their parents and in university settings where health care is equally accessible to all students [36]. Furthermore, educational attainment highly correlates with socioeconomic status in the United States, and influenza vaccination has been shown to follow a clear social gradient. For example, high-income households ( $\geq$ \$75,000) report vaccination coverage 1.24 times that of households with incomes below \$10,000 [21]. In summary, these data provide evidence that inequitable access to health care services and vaccination among disadvantaged populations exists and must be addressed in order to ameliorate the burden of severe influenza illness.

### Neighborhood and Individual-Level Factors

A growing interest in understanding how contextual factors influence health outcomes has led to a rise in studies examining neighborhood poverty and influenza. Indeed, studies of the 1918 influenza pandemic show that socioeconomically disadvantaged populations suffered greater rates of infection and deaths [37, 38]. This disparity still holds true

**FIGURE 1.**  
Social Determinants of Influenza



today. In the United States, disadvantaged neighborhoods not only report lower influenza vaccination coverage but also experience higher influenza-related hospitalizations and deaths [6, 39-42]. Research from Canada, in a population with universal access to health care services and vaccination, showed that the most materially deprived neighborhoods had twice the rate of health care utilization for influenza than the least materially deprived neighborhoods [43]. Together, these data support the growing notion that individuals living in economically deprived neighborhoods are more vulnerable to stressors and infectious diseases [44]. Researchers have hypothesized that exposure to neighborhood-level disadvantage—including higher levels of crime, unemployment, vandalism, and violence—may result in stress-related immunological changes that heighten susceptibility to infection and severe illness [45-48]. However, few studies have directly tested the stress, immune function, and influenza susceptibility hypotheses at the neighborhood level.

In addition to being exposed to neighborhood-related stressors, individuals living in disadvantaged neighborhoods are at increased risk of developing comorbidities and detrimental health behaviors that influence susceptibility to and severity of influenza. Comorbidities such as type 2 diabetes, obesity, chronic obstructive pulmonary disease (COPD), and asthma have been associated with severe influenza illness, resulting in increased rates of hospitalization and premature death [49-52]. Likewise, individual behaviors such as smoking and alcohol abuse can be detrimental to health and are associated with influenza-related hospitalization [53]. To combat the higher prevalence of comorbidities and detrimental health behaviors observed in disadvantaged neighborhoods, efforts should aim to increase vaccination coverage, improve health behaviors, and address specific underlying comorbidities (eg, type 2 diabetes, obesity, and COPD) to help decrease susceptibility to and severity of influenza illness in disadvantaged neighborhoods [54-56].

## Workplace and School Policies

Several social policies may impact influenza transmission and infection, including free vaccinations, paid sick leave in the workplace, and school closures. In a 3-year randomized controlled trial in the hospital setting, vaccinated health care workers were significantly less likely than nonvaccinated workers to become infected with influenza (1.7% versus 13.4%) [57]. Vaccination is important because it protects both individuals and their close contacts through herd immunity [58]. Even with extensive research-based evidence supporting the benefits of influenza vaccination, rates among some US workers remain as low as 40% [59-61].

As an adjunct to vaccinations or when vaccination is not available, social distancing (ie, staying home) is a critical strategy for minimizing influenza transmission in the workplace [62, 63]. In view of this, the Healthy Families Act was implemented in some US states and cities, allowing workers

to earn up to 7 days per year of paid sick time to care for themselves and their sick family members [64]. However, this policy has not been widely implemented, and universal access to paid sick days is still severely lacking in the United States [64]. In 2015, the US Bureau of Labor Statistics reported that 35% of the civilian workforce did not have paid sick leave [65], and low-income workers who are most dependent on their jobs for their day-to-day personal and family livelihood are at a significant disadvantage in adhering to outbreak preparedness guidelines that instruct individuals to stay home from work while ill with influenza. Only 13% of low-income workers (those earning less than \$25,000 per year) believe they would be able to stay at home during an influenza outbreak, compared with 44% of high-income workers (those earning more than \$75,000 per year) [66]. Moreover, marginalized racial/ethnic groups disproportionately hold jobs that do not offer employee benefits or schedule flexibility, making it difficult for these individuals to stay home from work [63, 67]. Latinos have reported being fearful of not being paid or losing their jobs if they stayed home due to illness [63]. Individuals who lack resources to miss work if they or their family members become ill with influenza need additional support to comply with outbreak preparedness guidelines that counsel staying home. An expansion of the Healthy Families Act or the development of a national standard for paid sick days is urgently needed to address this major health concern.

School closure, early dismissal, and keeping children home from school when they are ill with influenza are other effective mitigation measures, especially when there are unyielding barriers to vaccination (eg, a compromised immune system or lack of appropriate vaccine storage) or when vaccines are ineffective due to the presence of a new pandemic strain [68]. One modeling study found that opposition to school closure was associated with a 3-fold rise in influenza rates among school children [69]. Yang and colleagues estimated that an infected student can transmit influenza to 2.4 nonimmune students on average [70], but early and continuous school closure may reduce infection rates from 67% to 55% [71].

## Conclusions

Lack of access to vaccination, neighborhood disadvantage, absence of sick leave policies in the workplace, and limited support for families during school closings are all key social determinants of influenza transmission and illness in the United States. Understanding and addressing these social determinants is essential for reducing the severity of illness and curtailing future outbreaks of influenza. Policies and public health efforts should focus on removing existing barriers to vaccination such as lack of insurance, rising costs, and lack of access to vaccination in disadvantaged populations and neighborhoods [10]. Finally, greater support for social policies that promote vaccination and provide equitable workplace sick leave and support for child care

during school closings will help to mitigate transmission and ultimately reduce disparities in influenza infection in the United States.

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