



PERSPECTIVE

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Strategic Distribution of COVID-19 Vaccine in Health Care Systems

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Description

Since its onset, the COVID-19 pandemic has swept the globe and continues to cause damage and loss to human societies everywhere. This has revealed and amplified disparities in health status in different communities due to COVID-19 exposure and systemic inequalities in access to health care systems. Vaccines are considered the most important medical resource in fighting the pandemic, yet many countries and regions still face severe shortages. As a result, vaccine prioritization, along with well-considered strategies to balance multiple ethical values, has become a key policy issue in any public health system. As the pandemic impacts society as a whole, we argue that all members should have equal rights and opportunities to obtain the best protection from the pandemic. Against this background, our goal is to achieve the desired balance of social utility and equity.

Here, social utility is about avoiding mortality for the population as a whole, and equity is about reducing inequality in mortality among disadvantaged demographic groups. These two goals represent the most visible indicators considered by health authorities and organizations around the world, underpinned by the conflicting ethical values of utilitarianism and egalitarianism. "The welfare of some individuals" may be sacrificed in order to achieve "the greatest happiness of the greatest number." Previous research has identified trade-offs between social utility and equity in the allocation of health resources from disease investigation to treatment. In COVID-19 vaccine distribution, the latest research focuses on the trade-off between minimizing the number of years of life lost and minimizing the number of lives lost. Both reflect socially beneficial values and ignore population differences. Given this gap, we aim to demonstrate the relationship between social utility and equity in

COVID-19 vaccine distribution, and to demonstrate important implications for designing vaccine prioritization.

The studying the social benefits and equity of vaccine distribution strategies requires epidemiological models that can capture the unequal risks faced by different communities. B. Older people and those with high physical fitness are at higher risk of COVID-19. Susceptibility Infection Recovery (SIR) and Susceptibility-Exposure Infection Recovery (SEIR) have been used in several recent studies. , but they ignore the differences in inherent vulnerabilities embedded in demographic profiles. Here, we propose an epidemiological model that simultaneously captures the heterogeneity of migration patterns and demographic profiles of different communities.

Models calibrated with large-scale mobility and census data covering more than 75 million US residents automatically adjust for the dynamics of coronavirus spread within each community based on demographic profiles and experience we track inter-community diffusion that temporally alters temporal mobility flows. Our model can accurately predict daily fatalities and reconstruct uneven distributions across communities. This allows us to assess equity between communities defined by different demographics. So it's getting a lot of attention during the pandemic. Therefore, we examine four vaccine distribution strategies that prioritize communities based on vulnerability defined by these four demographics. We found that social benefits and equity are simultaneously enhanced when the most disadvantaged communities in each demographic are prioritized for vaccine access. Such findings hold true even when low-income communities and Show considerable reluctance to vaccinate, contrary to the traditional view of inevitable trade-offs.