

Protecting Vulnerable Populations From Pandemic Influenza in the United States: A Strategic Imperative

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Protecting vulnerable populations from pandemic influenza is a strategic imperative. The US national strategy for pandemic influenza preparedness and response assigns roles to governments, businesses, civic and community-based organizations, individuals, and families.

Because influenza is highly contagious, inadequate preparedness or untimely response in vulnerable populations increases the risk of infection for the general population. Recent public health emergencies have reinforced the importance of preparedness and the challenges of effective response among vulnerable populations.

We explore definitions and determinants of vulnerable, at-risk, and special populations and highlight approaches for ensuring that pandemic influenza preparedness includes these populations and enables them to respond appropriately. We also provide an overview of population-specific and cross-cutting articles in this theme issue on influenza preparedness for vulnerable populations. (*Am J Public Health*. 2009; 99:S243–S248. doi:10.2105/AJPH.2009.164814)

THE US NATIONAL STRATEGY for Pandemic Influenza outlines the important roles played by federal, state, tribal, and local governments; private industry; international partners; individuals; and families should a pandemic occur.¹ Governments and private institutions can do much to prepare for and respond to a pandemic, but vulnerable populations, their families, their communities, and the social safety net must also act effectively to ensure success. Therefore, implementing the national strategy fully requires that vulnerable populations, families, communities, and their social and medical safety nets act effectively.

During this decade, public health emergencies have made clear the importance of preparedness and the challenges of an effective response in vulnerable populations. For example, following Hurricane Katrina in 2005, an estimated one fifth of the 700 000 displaced residents of the Gulf Coast were poor; 30% had incomes below 1.5 times the federal poverty level, including 34% of storm victims from Orleans Parish, the area most affected by flooding.^{2,3} African Americans were disproportionately affected: 44% of storm victims and 73% of victims from Orleans Parish were African Americans.^{2,3} Older persons and persons with disabilities were also affected. As many as 88 000 seniors aged 65 years or older may have been displaced; nearly one half of seniors had at least 1 disability.^{3–5} Furthermore, 75 000 children, 56 000 pregnant women, and tens of

thousands of persons with cancer were also storm victims.^{3,6,7}

During some recent infectious disease outbreaks, racial and ethnic minority populations were disproportionately affected through an interplay of epidemiological, medical, and social factors.^{8,9} The severe acute respiratory syndrome epidemic highlighted the interplay of these factors, which created twin tasks that public health professionals must carry out: protecting the health of the public through isolation practices and preventing fear, stigmatization, and discrimination among some populations.⁹ Because influenza is a highly contagious respiratory disease that is spread from person to person, untimely or inadequate preparedness and ineffective response among all vulnerable populations can increase the risk of infection for all persons in the United States by increasing the number of individuals capable of spreading disease.

Major successes in the prevention and control of infectious diseases in the United States during the 19th and 20th centuries included public health practices that protected and cared for the most vulnerable populations.^{10–13} An example is the elimination of endemic measles from the United States after full implementation of a dual strategy with interventions to reach all persons and targeted interventions to reach the most vulnerable populations.¹⁴ To achieve similar successes during an influenza pandemic, it is a strategic imperative that the United

States be prepared to protect the health of vulnerable populations.

This theme issue provides government officials, public health and health care professionals, business leaders, research scientists, media representatives, families, and other stakeholders with information about the needs of certain vulnerable populations. Here we provide information about the definitions and determinants of vulnerable, at-risk, and special populations and approaches for ensuring that pandemic influenza preparedness includes these populations and elicits appropriate responses.

DEFINITIONS AND DETERMINANTS OF VULNERABLE, AT-RISK, AND SPECIAL POPULATIONS

In social science literature and in public health science, policy, and practice, the adjectives *vulnerable*, *at risk*, and *special* are used in different contexts to describe overlapping segments of the US population and to serve different program purposes.^{15,16} In social science literature, vulnerability has been defined as the potential for loss; county-level socioeconomic and demographic data can be used to construct an index of social vulnerability to environmental hazards to guide research and interventions.¹⁵ Other researchers have published comprehensive models of vulnerability that are based on likely inequities in health and health care¹⁶ for use in health services

research and public health practice.^{16,17}

Even before these models were proposed, public health prevention and control programs identified at-risk populations to target for specific interventions. Such targeting ensures that all populations are reached, especially those at highest risk for disease.^{14,18–22} Disease elimination and eradication programs are examples of effective targeting of high-risk populations.^{14,18,19} In this context, vulnerability is defined as increased exposure to infection; increased susceptibility to severe disease, including complications, hospitalizations, and death; and lack of access to health care.^{14,16}

One comprehensive health vulnerability model, developed by Shi and Stevens, includes a conceptual framework for defining, researching, and developing approaches to reduce or eliminate the health effects of vulnerability.¹⁶ This model outlines individual and ecological or community-level risks that converge and lead to vulnerability in health and health care quality. Individual risks include socioeconomic status and access to health care, health beliefs, and mental and physical health status. Community-level risks include neighborhood or population location, composition, socioeconomic status, and health behaviors, status, and disparities. The model groups these risks into predisposing factors, enabling factors, and health needs to emphasize that vulnerability is not a personal deficiency but rather an interaction of many individual and community-level risks over which an individual or family may have limited control. Societal and governmental efforts are essential for achieving population-wide goals such as prevention and control of pandemic influenza. When

individuals or families lack the resources to protect their own health, societal and governmental efforts assume a greater role in addressing vital needs through social and medical safety net programs.

The term *risk* has many meanings in public health. In epidemiology, risk is defined as the probability of disease developing in an individual in a specified time interval.²³ In the field of risk communications, risk is considered to be a combination of actual objective hazards and outrage (cultural perceptions).²⁴ Recognizing the necessity of protecting vulnerable populations, the December 2006 Pandemic and All-Hazards Preparedness Act defined at-risk populations as children, pregnant women, senior citizens, and others who have special needs in a public health emergency.²⁵ This definition is consistent with definitions and determinants of vulnerability in the model created by Shi and Stevens, and is particularly important during an influenza pandemic, in which high-risk populations can be targeted for specific prevention and control interventions.

Functional definitions for special needs or at-risk populations are used by emergency planners and managers who provide support functions during more common disasters, such as hurricanes, tornadoes, and floods. The support functions address needs in independence, communication, transportation, supervision, and medical care, as described in the 2008 National Response Framework²⁶ and in the Department of Health and Human Services working definition.^{27,28} The Department of Health and Human Services defines at-risk individuals before, during, and after an influenza pandemic as persons

having special needs in a public health emergency, including persons who live in institutions, come from diverse cultures, have limited English proficiency or are non-English speakers, have transportation disadvantages, or have a pharmacological dependency. The National Response Framework defines special needs populations as those who may have additional needs before, during, or after an incident in one or more functional areas²⁶:

- Independence—individuals in need of support that enables them to be independent in daily activities;
- Communication—individuals who have limitations that interfere with the receipt of and response to information;
- Supervision—individuals who require the support of caregivers, family, or friends, or have limited ability to cope in a new environment;
- Transportation—individuals who cannot drive because of the presence of a disability or the absence of a vehicle;
- Medical care—individuals who are not self-sufficient or do not have adequate support from caregivers and need assistance with managing medical conditions.

This functional approach allows emergency planners and first responders to match individuals' abilities and resources with the abilities and resources required to carry out emergency support functions. The five categories define the types of services needed by at-risk persons, but they do not specify how responders might locate vulnerable populations who have those needs.

The National Response Framework and the Department of

Health and Human Services take a factor-based, or functional, approach to identifying vulnerable or at-risk individuals in a pandemic. By contrast, the articles in this theme issue focus on populations that can be defined by geographic, demographic, biological, cultural, or socioeconomic characteristics such as age, race/ethnicity, income, and housing. Social and public health services are often directed to the populations defined by these characteristics. Moreover, the population approach enables responders to (1) locate and enumerate subgroups of target populations expected to have greater needs (e.g., higher risk for illness) by epidemiological, demographic, and socioeconomic determinants of need; (2) enumerate functional needs at the individual level for targeted interventions; and (3) deliver integrated services to meet those needs at the population level.

The functional and population-based approaches are complementary ways of understanding a complex problem, and both should be considered in preparedness for and response to pandemic influenza. Although both definitions are equally relevant in most contexts, we chose the population-based definition to set convenient boundaries between the vulnerable populations whose needs are addressed in this issue. This choice does not imply that one definition is more useful than the other for every purpose in every context.

ADDRESSING VULNERABILITY DURING PANDEMIC INFLUENZA

The Centers for Disease Control and Prevention (CDC) Office of Minority Health and Health Disparities, Influenza Coordination

Unit, and Pandemic Influenza Working Group on Vulnerable Populations collaborated to prepare the articles in this issue. The populations discussed here meet the government's definitions and determinants for vulnerability, are a programmatic focus of the CDC, and are likely to be vulnerable during an influenza pandemic. Our intent is to provide public health professionals, health care providers, business leaders, researchers, policymakers, and other stakeholders with information about the needs of vulnerable populations during an influenza pandemic, barriers to meeting those needs, and solutions for protecting these groups. These articles supplement current recommendations and guidance by addressing four questions about populations that would be considered at risk or vulnerable during an influenza pandemic:

1. Why is the population considered vulnerable?
2. What are the unique issues, concerns, and needs of each vulnerable population?
3. What strategies can protect these populations?
4. What specific approaches are needed for vulnerable populations, their families, and their health care and service providers to ensure their protection?

The articles focus on closing gaps in preparedness and response knowledge and practice for specific vulnerable populations. They provide the best available information drawn from review of the social, public health, medical, and health care literature; input from CDC scientists and extramural experts across multiple disciplines; and recommendations from experts, public health professionals, advocacy organizations,

vulnerable populations, and other stakeholders. The recommendations specifically address the needs of and barriers facing vulnerable populations in the context of national plans, guidelines, and suggestions for stopping or slowing a pandemic influenza. Several articles address cross-cutting issues such as communication, the role of primary care and community health centers, participatory planning and response, and the challenges government public health agencies face in using effective approaches for curtailing the spread of pandemic influenza. Collaboration with faith-based, community-based, voluntary, and nonprofit organizations is discussed in many of the articles.

The expert and stakeholder recommendations presented in this issue are not intended to replace current guidance, recommendations, or interventions for pandemic influenza,^{29–31} a topic addressed in detail by Santibañez et al.³² Instead, the articles review the fundamental approaches for ensuring that vulnerable populations, their service providers, and communities can carry out the recommended pandemic interventions. In addition to augmenting implementation plans for pandemic interventions for the general population, these articles build on guidance specific to vulnerable populations, including guidance prepared by the Association of State and Territorial Health Officials and the CDC. This guidance, *At-Risk Populations and Pandemic Influenza: Planning Guidance for State, Territorial, Tribal, and Local Health Departments*,³³ outlines essential parts of pandemic influenza plans needed to protect at-risk and vulnerable populations. Populations considered vulnerable during an influenza pandemic have diverse

needs and barriers and require a complex array of approaches to enable them to comply fully with pandemic interventions. These articles are targeted to frontline public health agencies, communities, and vulnerable populations and their families, who will need to collaborate to enable full implementation of pandemic influenza interventions.

Special Challenges in Distinct Vulnerable Populations

Several articles describe vulnerable populations at increased risk for severe pandemic influenza infection because of underlying health conditions. Special health care efforts, including the provision of routine care, are needed to mitigate adverse health consequences. For example, Rasmussen et al. describe the increased risk for pregnant women if they are exposed to pandemic influenza, recommendations for vaccination and prescription of antiviral medications, and the need for research to understand the effectiveness and safety of using pharmaceutical interventions during pregnancy.³⁴ Heffelfinger et al. discuss the risk for severe disease among persons with underlying health conditions and implications for programs helping persons infected with HIV, tuberculosis, and hepatitis viruses.³⁵ For pregnant women and persons with underlying health conditions, interruption in medical services—prenatal visits, routine medication refills, or laboratory tests—could make it difficult or impossible to comply with routine health maintenance and recommended pandemic influenza interventions.

Stevenson et al. focus on children,³⁶ and Campbell et al. focus on persons with disabilities.³⁷ These populations depend on support from others and may not be

vulnerable if they have sufficient support. Loss of support places them at greater risk, but there are approaches to continuing support systems, even in a limited way. Still other persons are in need of social safety net services before and during an influenza pandemic, including the provision of shelter, food, and medical care.

Loss of the social safety net during a pandemic could predispose certain individuals who are otherwise functional to be at greater risk. In a review of the challenges of public housing residents, single-parent families, and low-income populations, Bouye et al. note that even before a pandemic, these populations often have limited access to treatment and care, as indicated by low vaccination coverage for seasonal influenza.³⁸ Similarly, Truman et al. discuss the situation of immigrants and refugees living in crowded apartments with large households and extended families, who may choose to go to work while they are ill—despite recommendations to stay home—because they risk losing pay or employment.³⁹ Potter et al. review factors experienced by homeless populations, including morbidities and disabilities, lack of access to private space, and lack of financial resources for health care, medications, and basic nutritional resources.⁴⁰ They provide realistic steps and resources for mitigating the adverse health consequences to homeless populations and the larger society.

Maruschak et al. review the complex issues for correctional populations, staff, and facilities.⁴¹ They note that preadjudication juvenile detention centers and county jails present likely settings where influenza would be imported and returned to the community and provide recommendations for

mitigating pandemic transmission. In their article on migrant and agricultural workers, Steege et al. discuss work-related exposures, limited access to health care, and the use of isolated, overcrowded, or unsanitary housing.⁴² The authors also highlight promising strategies used to reach these workers routinely that might improve their health during a pandemic.

Partnerships and Collaboration

Encouraging collaboration and partnerships among public health agencies with communities and members of vulnerable populations is an essential approach for addressing their needs. Vulnerability is not a function of poverty alone. Even when they have sufficient financial means, some populations will experience challenges during an influenza pandemic that are caused by factors such as cultural barriers and stigma. Hutchins et al. describe the multiple vulnerabilities of racial and ethnic minority populations.⁴³ They highlight stakeholder suggestions to protect these populations during an influenza pandemic, including participation of vulnerable populations and their communities in pandemic influenza planning and response—a recommendation made in most of the articles in this issue. Metzler et al. also emphasize the need for participatory approaches by public health agencies and systems and emergency managers in planning with vulnerable populations.⁴⁴ Rust et al. review the role of nationwide community health centers and other primary health care practices in pandemic preparedness and response.⁴⁵

Baron et al. discuss a group seldom considered in preparedness planning: home health care workers.⁴⁶ These workers provide

assistance with activities such as bathing, toileting, eating, moving from bed to chair, and monitoring medications, yet they may be at risk themselves during a pandemic because they are disproportionately likely to be poor and uninsured, to have low educational attainment, and to lack proficiency in English. Home health care workers could be an asset to a community, but they will need protection with pharmaceutical measures to reduce their risk.

Groom et al. focus on the need for tribal health officials and community leaders to identify and provide appropriate services for specific vulnerable populations within their communities.⁴⁷

Effective Communications

To overcome cultural, educational, linguistic, and literacy barriers, targeted, tailored communications are needed to reach vulnerable populations. Vaughn and Tinker elaborate on the most effective communication messages, timing, and channels for vulnerable populations to enable them to comply with pandemic interventions.⁴⁸ Leon et al. illustrate the potential need for targeted and tailored communications to reach a population and its providers through their discussion of disparities in the use of antiviral medication during influenza season for Georgia Medicaid recipients with disabilities.⁴⁹

Within a given vulnerable population, each person may have multiple vulnerabilities or risks that will vary with time. Effective communication messages that change over time may lead to more successful pandemic interventions.

CONCLUSIONS

Although the United States has made progress in preparing for an

influenza pandemic, considerable challenges remain regarding preparations for populations whose individual and community-level risks lead to vulnerability in health and health care quality. These risks arise not from personal deficiencies but rather from the interaction of many factors such as socioeconomic status; health beliefs, behaviors, and status; and access to health care over which an individual or family may have limited control. Protection of these populations is essential to effective prevention and mitigation of an influenza pandemic.

Articles in this theme issue highlight actions to overcome the individual and community-level biological or ecological, social, and economic barriers to effective preparedness and response of vulnerable populations to a pandemic. Moral, ethical,⁵⁰ legal,³⁷ and economic reasons compel us to protect vulnerable populations during an influenza pandemic, but protection is also a strategic imperative for achieving the national goal of stopping or slowing and mitigating an influenza pandemic.

Vulnerable populations represent a substantial proportion of the US population. How we as a nation prepare for and respond to the needs of vulnerable populations ultimately may determine our overall success in limiting the impact of the next influenza pandemic. Widespread and complete undertaking of recommended pandemic interventions by vulnerable populations and their communities will require a participatory approach to planning and response. Only when the nation is prepared to protect those who are most vulnerable will we be assured that we have in place an effective and efficient preparedness and response system—and that it will endure to combat

future pandemics and other public health emergencies. ■

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Human Participant Protection

No protocol approval was necessary because no human study participants were involved.

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Pandemic Influenza and Pregnant Women: Summary of a Meeting of Experts

Pandemic Influenza: Special Considerations for Pregnant Women was a meeting convened by the Centers for Disease Control and Prevention in 2008 to obtain input from experts and key partners regarding clinical management of pregnant women and related public health actions to be taken during a pandemic.

Meeting goals were to discuss issues specific to pregnant women, identify gaps in knowledge, and develop a public health approach for pregnant women in the event of a pandemic. The meeting focused on 4 main topics: prophylaxis and treatment with influenza antiviral and other medications, vaccine use, nonpharmaceutical interventions and health care planning, and communications.

Participants reviewed the available evidence to guide action in each of these areas and identified areas of critical needs for future research. (*Am J Public Health*. 2009;99: S248–S254. doi:10.2105/AJPH.2008.152900)

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PREGNANT WOMEN constitute a significant population in the United States: more than 6 million pregnancies occurred in 2004.¹ Plans for an influenza pandemic should address several issues specific to pregnant women to ensure that they receive appropriate guidance and health care.² Experience with previous pandemics and with seasonal influenza has led health care professionals to anticipate that pregnant women will be at increased risk for influenza-associated morbidity and mortality in a future pandemic.^{3–8} The public health response should take into account the effects of maternal influenza infection and its associated fever, medications for prophylaxis and treatment, and influenza vaccine on both mother and fetus.

Pregnant women or their health care providers may be reluctant to adopt public health recommendations during a pandemic because of concerns about fetal effects of

medications or vaccines. Recommendations regarding nonpharmaceutical interventions may present special challenges to pregnant women because these may conflict with routine prenatal care and delivery recommendations. In addition, health care facilities need to develop plans to minimize exposure of well pregnant women to ill people, while continuing to ensure that women receive necessary obstetric care.² Finally, communicating recommendations in a pandemic to the diverse population of pregnant women and their health care providers will be challenging.²

The Centers for Disease Control and Prevention, in partnership with the Association of Maternal and Child Health Programs and the March of Dimes, convened Pandemic Influenza: Special Considerations for Pregnant Women, a meeting designed to integrate scientific evidence and expert opinion, on April 3 to 4, 2008, in Atlanta, Georgia. The meeting goals

were to discuss special considerations, identify important knowledge gaps, and obtain input from experts and key partners to guide the development of public health recommendations specific to pregnant women in the event of an influenza pandemic. In attendance were a wide variety of experts in obstetrics, maternal–fetal medicine, family medicine, preventive medicine, pediatrics, midwifery, teratology, pharmacology, influenza, infectious diseases and vaccines, public health, emergency response, health education, and communications and representatives from key partner groups (see the box on the next page).

Discussion focused on 4 topics: prophylaxis and treatment with antiviral and other medications, vaccine use, nonpharmaceutical interventions and health care planning, and communications. Although this meeting focused on pregnancy issues, participants noted that guidance for postpartum

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