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# Rural responses to H1N1: A flexible model for community collaboration

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## ABSTRACT

*This paper examines a regional 2009 H1N1 rural response model, which utilises community partnerships with local government, county emergency management, public health, private healthcare, Medical Reserve Corps volunteers, and other organisations in rural Southeast Idaho. Unique aspects of the collaborative use of federal, state, county, and community systems in addressing specific needs of rural communities are described. The organisation and process of the model in identifying effective vaccine distribution methods and public education appropriate to each rural community are reviewed. Implementation of the model during the fall of 2009 to address the H1N1 pandemic resulted in immunisation rates that were higher in rural populations than with urban counties, contrary to national trends in immunisation rates.*

**Key words:** H1N1, rural response, pandemic, collaboration, vaccination, immunization

## Introduction

Rural communities throughout the world face particularly daunting challenges when attempting to address public health concerns regarding pandemic influenza. Like Australia, in the United States it has been noted repeatedly that rural communities are more likely to experience extreme shortages in medical providers, lower educational attainment of residents, and less willingness to seek medical care than urban counterparts (NAC, 2008). Additionally, rural residents are often geographically isolated from preventative care due to the geographic distance to care, extreme weather conditions, and the lack of public transportation options (Mulder et al., 2000). Other barriers to immunisation more common to rural residents than their urban counterparts include high rates of rural poverty, lower levels of parental education, and lack of insurance coverage (Gamm & Hutchinson, 2004). These barriers are all factors associated with the lower immunisation rates noted across various types of infectious diseases in rural areas of the United States (Gamm & Hutchinson, 2004).

Idaho is a state in the northwestern Rocky Mountain region of the United States that faces many of these challenges. The Southeastern District Health Department (SDHD) is one of seven designated public health districts in the state and is responsible for the public health services for the southeastern region of Idaho. SDHD coordinates public health promotion, environmental health, and family and child health services for this area. The SDHD geographic region (see Figure 1),

which includes eight counties in the most southeastern corner of Idaho, covers a combined area of 11,441 square miles and has a population of 164,348 people (population census, 2008). The sovereign nation of the Native American Shoshone-Bannock Tribe is also located within the district. Throughout the district, SDHD has offices in each of its eight counties, with approximately 100 staff members.

Geographically, SDHD covers extremes in terrain: mountainous regions of the Rocky Mountain range and high desert flatlands of the Snake River plains. Winters are often harsh with snowfall that makes roads treacherous or impassable, and summer wildfires create similar travel difficulties. Aside from one 'metropolitan' area that touts a population of 50,000–60,000, the remainder of the district consists of small towns or clustered settlements which often lack immediate access to medical care without a significant commute. A recent geographic information systems study found that more than 50% of the non-metropolitan Idahoans live at least 66 miles (straight-line distance) from the nearest tertiary healthcare facilities, while 25% live at least 95 miles, and 10% live 106 miles away from these facilities (Beedasy et al., 2007). Additionally, all eight counties in the district are designated as Health Professional Shortage Areas (HPSA) by the national criteria due to the low ratio of health professionals to residents (HRSA, 2008). Thus, southeast Idaho is prototypical of all things rural when addressing public health barriers with the H1N1 pandemic.

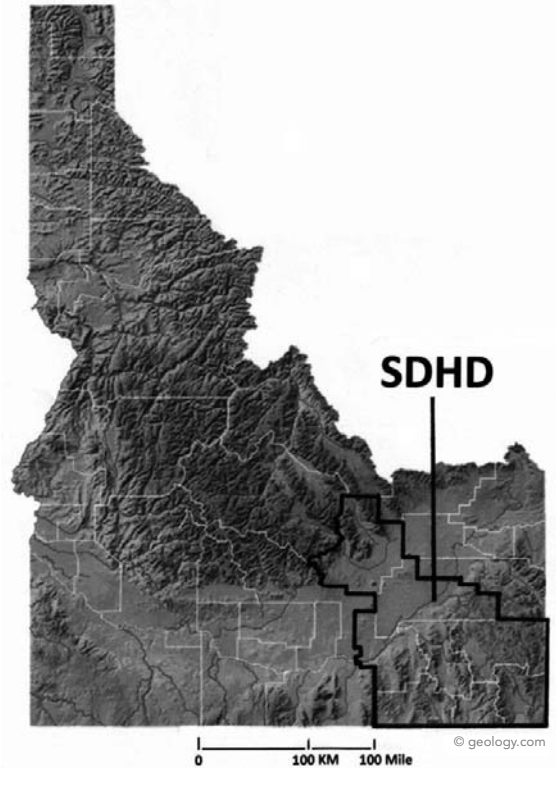


**Figure 1: Map of Idaho Department of the Southeastern District Health Department (SDHD) area of service with county boundaries (in white).**

## The national system for addressing pandemic threats

To address the various issues related to public health emergencies, the United States has developed the National Incident Management System (NIMS) and adopted the Incident Command System (ICS) as a resource in all planning, training, and exercise efforts regarding health emergencies. However, the local jurisdiction, in coordination with the County Emergency Manager and SDHD, essentially is responsible for determining whether its medical resources are adequate to meet their needs. When local resources are inadequate, the State can be contacted in order to request the Centers for Disease Control and Prevention's Strategic National Stockpile (SNS). The SNS contains medical material, ranging from life support medications to antitoxins and medical/surgical supplies and can be delivered to any state in the United States within 12 hours. All states have developed plans to receive and deploy these materials to the affected area as quickly as possible.

At the local/regional level, Idaho's method to distribute SNS vaccine, antibiotics, or anti-virals to large numbers of people take place at a Point of Dispensing (POD) site. Often, the words 'point of dispensing', and 'mass vaccination', and 'vaccination clinic' are used interchangeably. In a worst case

scenario, the entire population of southeastern Idaho would need post-event prophylaxis or vaccination as quickly as possible in order to prevent people from becoming symptomatic or ill. Using the POD site strategy, it is estimated that 100% of the affected population in the SDHD region could receive prophylaxis within 48 hours of the event.

## Typical Idaho models of prophylaxis/immunisation distribution

Despite the uniform national and state systems available to emergency health officials across the regions of Idaho, organisation and administration strategies of regional POD sites are the responsibility of local public health districts and vary substantially in methods of administration. The majority of regional public health district offices engage in outreach efforts across the multiple counties in each region. Outreach includes establishing temporary POD locations in a few selected communities, often the county seat, at one centralised location in each county. This model relies on public health district staff as the 'experts' who provide the clinical services, with minimal collaboration in providing a location for the POD and occasional extra staffing needs required locally. Public health officials typically arrange personnel needs and supplies for these outreach efforts, with public health district staff frequently traveling for an intermittent 1-day POD within the region and Medical Reserve Corps or POD volunteers aiding the mass vaccination clinic POD operations (Strategic Plan, 2010).

## A rural collaborative model

In examining best practices for immunisation coverage, it is clear that collaborative networks for distribution are an essential part of many of the model immunisation programs throughout the United States (Gamm & Hutchinson, 2004). In an effort to embrace a more collaborative model and simultaneously address rural barriers in the region, SDHD took a three-pronged approach to addressing pandemic preparedness for the region:

1. Obtain community-based feedback about the implications of a pandemic at a local/regional level;
2. Develop collaborative plans for community-based influenza response models for mass vaccination clinics; and
3. Evaluate response plans through tabletop and full-scale exercises.

This approach is the foundation of the model (Figure 2) and laid the groundwork for increased knowledge, trust, and support from local/county government, city officials, community organisations, and key response agencies.

### Obtaining community feedback

In the spring of 2006, 'Flu Summit' workshops were hosted to raise awareness among community partners and discuss planning options. At that time, the most likely pandemic threat was avian influenza, also known as H5N1. SDHD explained transmission and clinical aspects of influenza; projections for illness, absenteeism, hospitalisation, and mortality rates based on population; as well as community mitigation strategies to prevent the spread of Pandemic Influenza (PI) and continuity of operations to lessen interruption of services for businesses.

### Developing community-based plans

Planning and response documents were distributed to participants, which detailed a community-based approach to educating the public, prevention strategies, and mass vaccination clinics. Using these materials, each county identified potential POD locations and critical partners not present. Following the workshops, POD operations training began to take place in every county. County Emergency Managers identified someone from their community to be the POD Manager. They assigned community members duties such as greeter, registrar, traffic flow manager, security supervisor, and public information distributor. For medical-related tasks, a SDHD staff member acted as a Clinical Manager and oversaw epidemi-

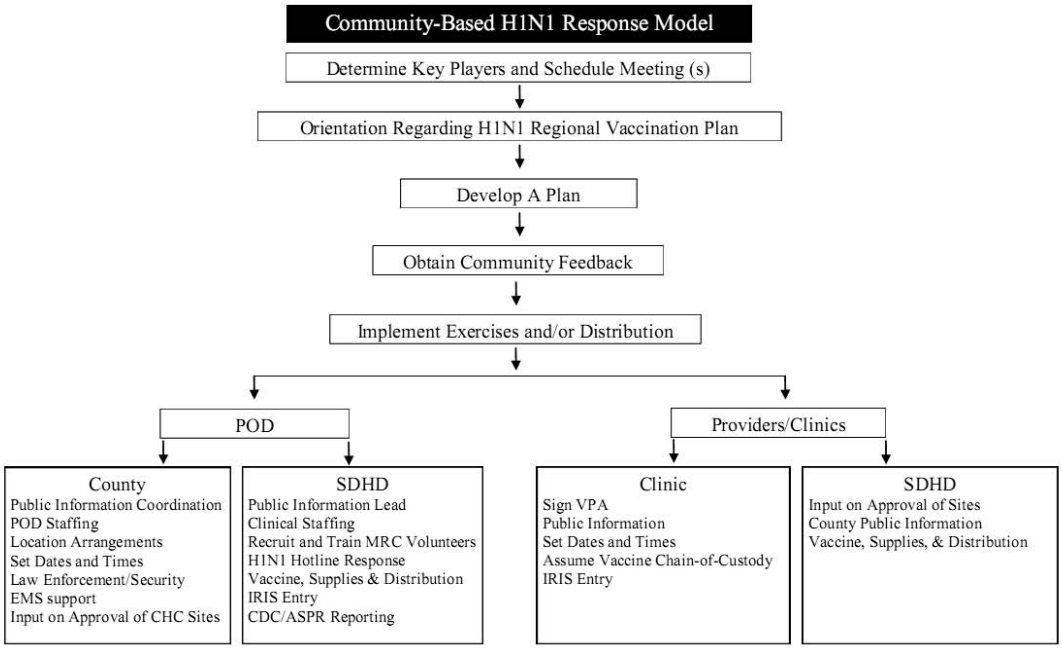


**Figure 2: Rural community-based response model.**

ology and nursing staff, who were assigned roles of medical screening and vaccination administration. The previously established SDHD Southeast Idaho Medical Reserve Corps (MRC) also provided a cadre of volunteer resources to assist with public health emergencies and exercises.

## Implementation (Table-top and full-scale exercises)

The first large-scale evaluation of the POD concept consisted of an exercise scenario simulating a bioterrorist attack that required mass antibiotic prophylaxis of community members. PODs were established at 13 locations throughout southeastern Idaho. Gymnasiums in schools and churches are typically the sites chosen for a POD, and Memorandums of Agreements had been established with these entities. Subsequent preparation efforts included 'Preventing Pandemonium', a month-long multiple influenza preparation and response activity including numerous presentations for the public, a Blog Exercise (http://sdhdtraining.wordpress.com/), a tabletop exercise with funerary industry representatives, and a two day full-scale exercise in which area hospitals established Alternate Care Sites for PI patients. The month-long series of activities focused on pandemic influenza, solidifying roles and responsibilities, and collaboratively evaluating the effectiveness of existing plans with key players.

## Emergence of 2009 H1N1 influenza

On April 26, 2009, the United States Department of Health and Human Services (DHHS) issued a national public health emergency in its response to what was then termed as 'swine influenza A (swine flu) virus'. It was seemingly renamed many times throughout the course of the outbreak, and is more commonly referred to now as 2009 H1N1 Influenza A (H1N1). On the same day as the public health emergency declaration, the CDC's Division of the Strategic National Stockpile released one-quarter of its antiviral drugs and personal protective equipment to help states respond to this outbreak (CDC, 2009).

SDHD mobilised its Initial Response Team (IRT) and activated its Emergency Operations Center on April 27, 2009. The Epidemiology Strike

Team heightened their surveillance and increased contact with local hospitals and healthcare providers. Also, at that time, the SDHD, as a part of the National Incident Management System (NIMS) and adopting the Incident Command System (ICS), began daily briefings with the IRT, communication with healthcare and emergency response partners, community education, local disease surveillance, and shipping test samples to the Idaho Bureau of Laboratories in Boise, Idaho. The broader community-based response was implemented with the foundation of the previous planning and exercises described above.

## Model implementation during the H1N1 pandemic

### Obtaining H1N1 community feedback

To obtain community feedback specific to the H1N1 mass vaccination campaign, in September 2009, SDHD hosted a workshop, in the form of a tabletop exercise, with emergency response partners. Participants included county commissioners, county emergency managers, healthcare, school district representatives, and the Director and/or representatives from the Idaho Bureau of Homeland Security. The workshop addressed the current situation, projected arrival of vaccine in early October, and the variety of methods in which the counties could vaccinate the public.

### Develop a regional H1N1 plan

Based on previous work, the community collaborators agreed to utilise the community-based response model with distribution of vaccination to community-based PODs and private providers, as noted in Figure 3. Pod staffing responsibilities were designated across collaborators for each jurisdiction.

To facilitate the planning process, a worksheet was completed by collaborators in each county during the H1N1 workshop. The worksheet contained the following questions related to POD location, staffing, and timing:

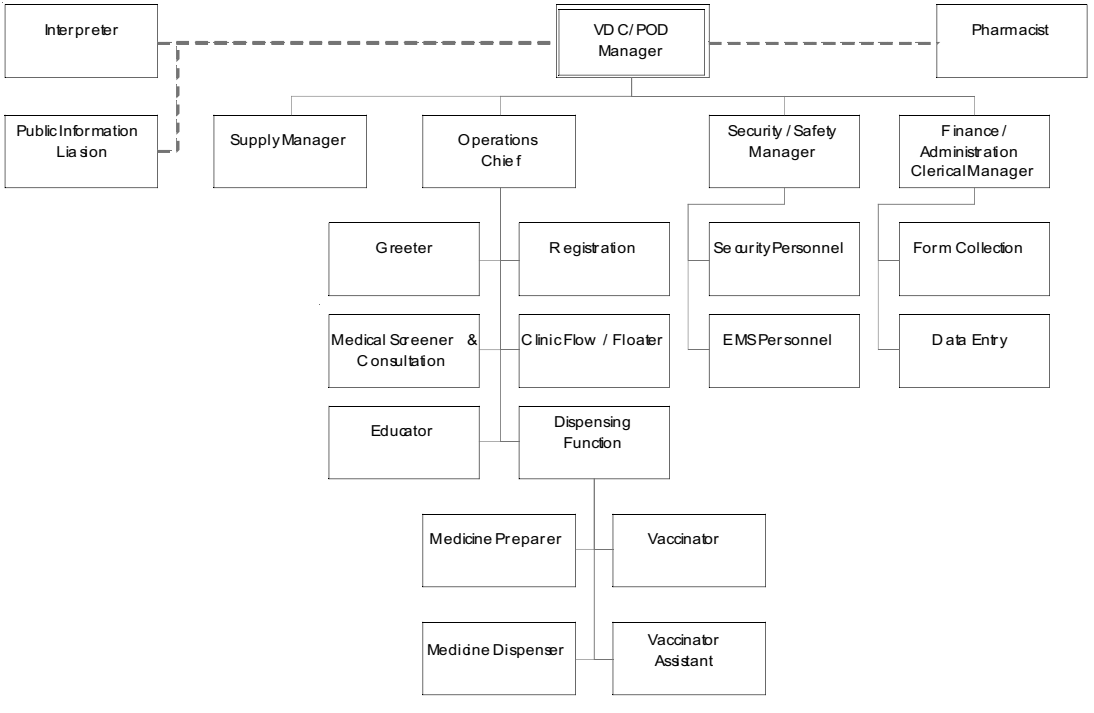


Figure 3: Point of distribution (POD) staffing organizational chart.

1. Is the planned POD location still a feasible facility for the proposed vaccinations?
2. Is a secondary facility available? If so, where is it?
3. Who is the 'go-to' person for all things POD-related in your county?
4. Is the POD team in your county still intact to use? Is the POD management team in your county still intact?
5. Do you want/need a refresher training period? When is a good day/night/time for that?
6. What additional staff do you need (list by skill and number)?
7. What is the best day(s) to operate the POD vaccinations?
8. What is the best time(s) to operate POD vaccinations?
9. What other considerations need to be considered for your county?

Following the workshop, the SDHD All-Hazards Planner used responses from each worksheet to formalise an overall regional district plan, with responsibilities specific for each county. As a result of this information, the most common issues identified included changes in the POD team members, unmet staffing needs, and training needs. Consequently, each county addressed their particular needs with the collaborative help of SDHD.

## Implementation (full scale H1N1 response)

Six out of the eight counties opted to hold their POD vaccination clinics at local churches or schools, and a mall. Counties with a much smaller population base held H1N1 vaccination clinics at the local SDHD office. Upon receiving confirmation that vaccine was being shipped, County Emergency Management and POD Managers chose dates and times for the mass vaccination clinics and informed SDHD to start the public information campaign. Information was disseminated on the SDHD website, county websites, press releases, and interviews with print, radio, and television media.

For each clinic, SDHD and POD staff arrived early to set up vaccination stations and establish mobile internet hotspots with network connectivity to enter vaccination information into Idaho's Immunisation Reminder Information System (IRIS) in near real-time. Just-in-time training was provided to volunteers related to their specific job function at the POD site. Figure 4 illustrates the POD clinic flow as a patient process.

## H1N1 implementation results

At the various SDHD POD sites, vaccinators averaged 35–40 vaccinations per hour. As noted in Table 1, 28 POD vaccination clinics completed more than 18,000 vaccinations across the eight-county region. Vaccination coverage rates for Idaho are estimated to average 13.85% of the population across the seven public health regions as computed from the most recent state strategic plan data (IDHW, 2010). This rate does not include the estimated 1.24% of the population receiving vaccinations from private providers. Similarly, the rates noted on Table 1 do not include vaccinations performed by private providers in the area. The overall penetration rate for the SDHD region was 11.49%, which is slightly lower than the state average. This difference, when examined statistically with a *t*-test was not significant, $T(7)=1.735$, $p=.21$. However, if SDHD coverage rates are examined by county and categorised as urban or rural based on a metropolitan service area (MSA) population of 25,000 or more, rural communities have a higher immunisation rate than urban counterparts as evidence by marginally significant 1-way ANOVA comparison even with the small number of counties, $F(1,6)=5.164$, $p=.06$. This is also evident in the cumulative immunisation rates for SDHD rural counties (17.08%) being higher than either the state average or the two urban county rate (9.71%).

## Discussion

The model discussed embraces the collaborative aspect of best practices in addressing community immunisation needs. Previous research that indicates rural communities have significant

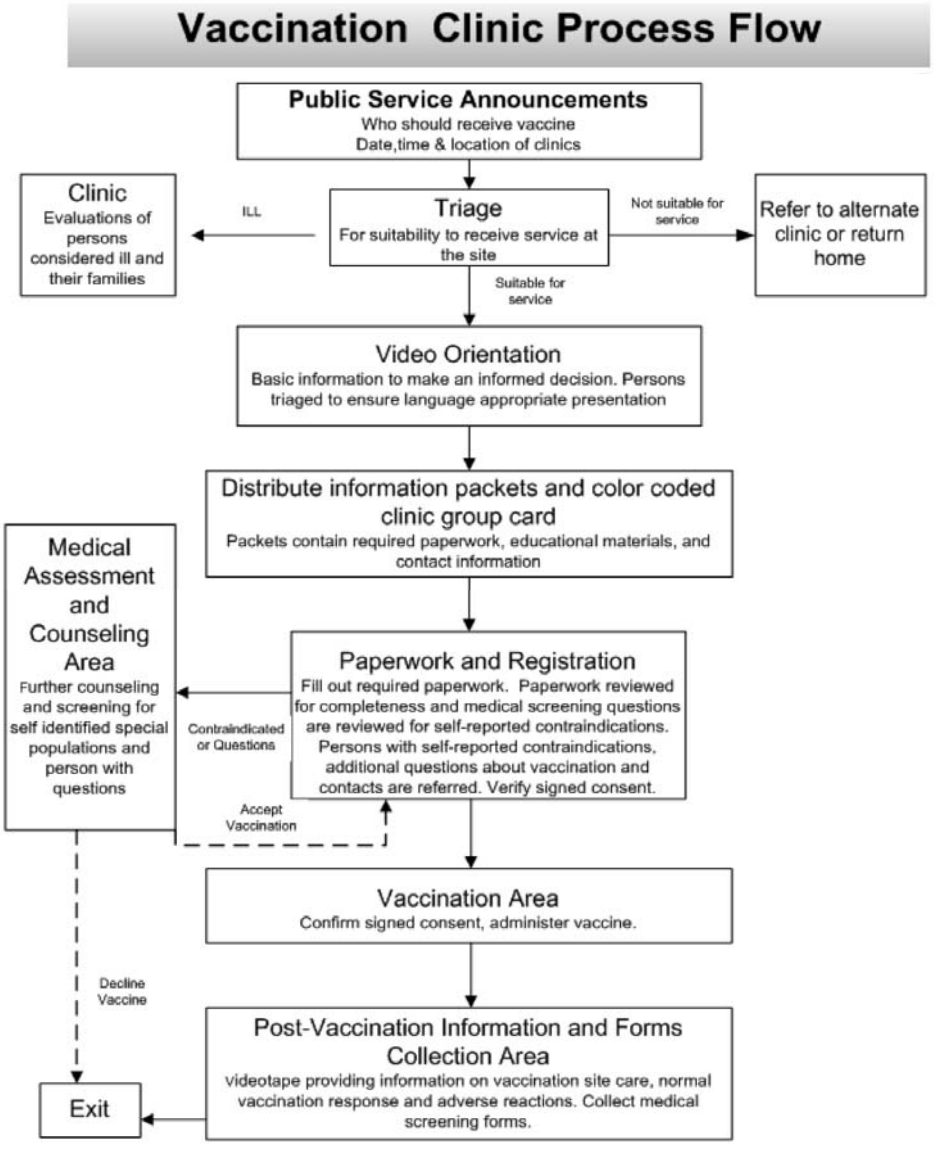


FIGURE 4: VACCINATION CLINIC FLOW DIAGRAM.

barriers that typically result in lower rates of immunisation than in urban communities (Gamm & Hutchinson, 2004). This makes the successful high rates of coverage in the rural counties especially encouraging and suggests further research into the model is warranted. It is possible that close ties within rural communities, where residents often have multiple personal and professional relationships with each other, results in greater dissemination of information by word of mouth and support for the immunisation efforts due to closer personal connections to POD volunteers. It is equally likely that rural communities are more independent and self-reliant because they typically lack adequate resources, which makes this model including aspects of community self-determination an excellent fit for the rural culture. It is unclear if this is really the case or if other mechanisms are in effect. Further research is necessary in order

Table 1: Information on counties, population, number of PODs, locations of PODS, number of vaccinations given, and vaccination rate for Idaho residents

| County | Population | No. PODs | Location(s) | No. Vaccinations Idahoans (out-of-staters) | Population vaccination rate (%) |
|---|---|---|---|---|---|
| 1 | 80,812 | 5 | School and mall | 7,842 (23) | 9.73 |
| 2 | 5,789 | 3 | School and ambulance bay | 1,010 (73) | 18.71 |
| 3 | 43,903 | 5 | Schools and churches | 4,204 (40) | 9.67 |
| 4 | 2,751 | 4 | Schools | 695 (12) | 25.70 |
| 5 | 6,826 | 3 | Schools | 1,020 (0) | 14.94 |
| 6 | 12,454 | 3 | Health District | 1,644 (178) | 14.63 |
| 7 | 4,130 | 2 | Health District | 988 (8) | 24.12 |
| 8 | 7,683 | 3 | Schools | 1,142 (0) | 14.86 |
| Total | 164,348 | 28 | Not Applicable | 18,545 (334) | n/a |

to identify the specific aspects of the model that are suited to rural communities.

In contrast, the relatively low immunisation rate in the targeted urban communities is particularly surprising. It is possible that this lower rate problem was the result of a particular weakness of this model: there is no specific formula as yet to estimate POD facility capacity needs for each community. Partners informally collaborated in making their 'best guess' as to an adequate location to the initial POD. Unfortunately, plans for the first POD in the largest county severely underestimated the public response to seeking the immunisation, and community members literally stood in long lines trailing outside the building for hours waiting to receive immunisations. These difficulties were reported by national newscasters and papers, and anecdotal reports indicate that many community members later avoided seeking immunisation due to their fear of similar difficulties. In southeastern Idaho, reportedly, when someone was able to go through a mass vaccination clinic quickly, they would call family members and friends and encourage them to get to the clinic because it was well-organised. Other possible explanations for the limited response in urban areas require further systematic research.

A few 'lessons learned' and potentially problematic aspects of the collaborative model were identified in the course of its implementation. As mentioned above, there was no systematic formula available for estimating public demand and POD capacity/facility needs during the initial planning stages. PODs relied solely on the expertise of collaborators in providing a 'best guess' and this led to underestimations at times. Approximately 2,000 people in the priority groups arrived at the first POD. Eager to receive their vaccination, the first people to arrive at the site and waited several hours outside. Subsequent PODs implemented a ticket distribution system for scheduling in order to reduce long lines.

During the H1N1 pandemic, vaccine production and shipping times were not consistent. Although the model allows communities to independently determine POD site dates based on community needs and projected vaccine availability, vaccine production difficulties resulted in postponed POD dates until sufficient vaccine became available. While this is perhaps uncontrollable, since vaccine originates from federal sources, formally allowing for such difficulties in scheduling may strengthen the model.

Limitations to this information are also clear. Despite the promising findings in this quasi-experimental design, clear comparison to a 'treatment as usual' public health district with similar population density would strengthen the ability to make clear conclusions. The relatively small sample size makes definitive conclusions pre-emptive as well. Further examination with a larger number of districts and counties is needed to confirm these results. It is unclear if fidelity to the model

can be maintained across different districts during winter travel difficulties if implemented in other regions. However, this initial effort at creating a 'rural friendly' model for addressing immunisation with the idea the 'disasters are local' shows promise. Relying on community members to recognise and use the unique characteristics of their rural communities is a particular strength of this model, but there remains much to be explored in refining and researching the model.

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