

Research Brief

Research Brief: Closing the Flu Vaccination Gap By William F. Davenhall

Abstract

This study was undertaken to attempt to evaluate the practicality of leveraging national published influenza vaccination rates in estimating the potential vaccination gap that US counties might face in 2022. The commercial availability of population projections by smaller geographical units, such as Counties and Census Bureau's more granular geographical units (such as Block Groups) encouraged the author to take an in-depth look at how this could actually help those whose job it is to get more of the population vaccinated.

The study methodology had three major components: 1.) Convert the CDC published vaccination rates into a data matrix that could be subsequently matched to similar age and racial\ethnic cohorts of future population projections; 2.) Acquire population estimates, by the same racial and ethnic groupings for a future year (in this study we used 2022) for areas such as States, Counties, and Block Groups. 3.) Link the influenza vaccination age/ethnicity rates to the population estimates to produce on-demand vaccination gap estimates for both standard (e.g. States, Counties, Block Groups) and non-standard geography (e.g. travel distances and times) anywhere in the United States.

The study confirmed that the selected methodologies were adequate and useful in arriving at future estimates of a vaccination gap when dis-aggregated into non-standard geographies. As a test of the usefulness of the methodologies employed, a database was generated of the projected number of people that would likely remain un-vaccinated for the seasonal influenza season of 2021-2022, by age and race/ethnicity for all 3,142 counties. This analysis revealed that an estimated vaccination gap of 175 million people would likely exist in 2022. Counties were subsequently ranked and only 136 contributed 50% of the total vaccination gap projected.

In conclusion, the study suggests that greater precision in terms of computerized methodologies and use of more granular geographic units of analysis must be introduced into the important work of the entire vaccination and immunization ecosystem. The author contends that greater use of these population based marketing analytical technologies could have a profound impact on extending the reach of public health programs as well as help equip the chain pharmacies with better market information suited to the delivery of health services in many more places.

Closing the Flu Vaccination Gap

William F. Davenhall

Background

The year 2022 is not far off and neither is 2035 – 4 years or 17 years – take your pick. Either way the future holds some anxiety for those responsible for making sure that life-threatening diseases don't spread out of control.

Two important demographic trends are pressing on American society over the next 20 years – the baby boomers continue to age and teenagers are becoming scarcer. In about 18 years it's projected that the traditional growth curve will cross and head in opposite directions – the first time since America was founded! **People over 65 will surpass the number of children under 18.** Think there will be some significant challenges for public health?

So, it's not surprising that demographic research is back "in" – and is going to have a significant contribution to make on understanding solutions for almost every health and social program American society relies on today. This research brief was prepared to illustrate and highlight some important factors and analytical methods that will impact how the immunization and vaccination ecosystem participants understand and serve this health service market.

The Purpose of the Research

The academic health and medical community has conducted numerous studies to back-up the impact of vaccination programs as well as to identify the barriers to better immunizations results. The research is extensive and it adequately portrays a nation where about 50% of the people at any given time are "properly" immunized, or vaccinated. It also reveals that depending on the age of the citizen and their race and ethnicity, the likelihood of wanting and/or receiving a vaccination varies significantly from group to group as well as from season to season, and disease to disease. As public health resources face increasing demands, the need to become more specific as to the implementation and management of public facing programs will grow more important. While some communities achieve very impressive vaccination rates, they may also be places where fewer people live, perhaps more isolated geographically, and will face more problematic situations such as poverty, political sentiment, and religious beliefs about the effectiveness of disease prevention vaccinations.

The primary goal of the research was to see if by applying national vaccination rates adjusted by age, race and ethnicity we could help identify small and more useful geographies in order to grasp the vaccination gap that would result from population shifts such as those we have been observing for the past decade – such as the aging of the baby boomers, the decline of fertility rates, and the increase of racial and ethnicity diversity across America. The research was not about the usefulness of the national vaccination rates but rather how useful could the national rates be if people had better tools to apply those rates at a more "local" level. From our perspective, only more specific geographically relevant vaccination rates would add value to future research. On the other hand, the expenditure to conduct such research might outweigh the value of and timeliness of what we already could know.

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Research Limitations

A great deal of population health research is limited by one important factor – funding. This usually means smaller sample size, constraints on geographical sampling frameworks, and inability to apply results widely. This is not good news to those that must implement programs at local levels. In this study, the CDC's vaccination rates are national and generated from rather small samples that limit their usefulness in a local community. Similarly, the Census Bureau generates estimates of population change from annual samples. While these are limiting factors, it's the best data available. The ability to use these data both creatively and in a timely manner becomes a worthwhile challenge to overcome. This particular research was conducted to try to help the immunization community (primarily public health programs and community pharmacies) to better identify demographic gaps and potential geographical barriers that plague the immunization community. It was not undertaken to confirm the work of the hundreds of academic researchers and healthcare professionals, but rather to apply what they have learned in a more granular way using modern information technologies – such as geographic information systems and sophisticated demographic data vending methods. The precision population health analytical approach described herein is intended to increase the usefulness of the academic work in ways that help provide clues to problems or new opportunities. It's not a substitute for the original research.

The Research Methodology

Three distinct methodologies were employed in the research as follows:

1. Create a “use rate” for a non-vaccination, adjusted by age and race\ethnicity for five age cohorts.

There is a large number of diseases that the CDC monitors on a continuous basis where a vaccination is involved. You can find a complete description of these diseases and their respective programs by visiting the immunization branch site on the Internet. This research relied on the seasonal influenza vaccination rates published in the Fall of 2017 and represented the “early” part of the 2017-2018 influenza season and the “later” part of the same flu season. Typically, there is an increase, across the board in vaccination rates, as the flu season gets in “full swing.” In between the annual “flu seasons” the CDC publishes more specific immunization results (e.g. How many people got the shot were actually immunized and counts of deaths and morbidities). It was not the purpose of this research to assess the effectiveness of the any vaccination program to immunize a given population.

A data matrix was subsequently constructed using the CDC’s rates and linked to appropriate population estimates. The rates provided by the CDC represent those receiving the influenza vaccination and therefore the reciprocal was actually computed and used as the vaccination gap rate (VGR) for each specific age/racial/ethnic cohort. The final step was to generate a new database of every standard Census geography along with the number of people who would likely NOT receive a vaccination for the seasonal flu in 2022. The initial test run used all 3,142 counties as the geographical target. Previous research elsewhere has documented the primary reasons why people don’t get vaccinated. It has considerable insights as to the behavioral and structural impediments that suppress vaccination and we would suggest readers examine this body of research to learn more about how vaccination rates could be enhanced from a programmatic perspective.

2. Acquire population projections at all standard Census geographies segmented by age and racial/ethnic characteristics. This data was sourced from US Census Bureau samples and a commercial demographic data organization.
3. Test the flexibility of commercial demographic analytical methods and systems.

An evaluation of the use of analytical tools typically used in commercial and retail market research was carried out. The study employed a “demographic data vending” system that was capable of generating on-hoc, on-demand data about demographics, especially estimates and projections of population changes. The ability to generate estimates of “vaccination gaps” anywhere in the US and at any specific geographic level, such as States, Counties, Zip Codes, and Census Tracts, Block Groups and variable radii (fractions of a mile or estimated travel times) from a pharmacy, clinic or other healthcare provider. Such geographic flexibility, from the standpoint of operational matters, can provide more relevant information more quickly. With the emergence of retail healthcare services, retail market analytical tools that help target “customers” could be extremely beneficial in the immunization business. Our goal was to determine how well that would work for the use by the immunization and vaccination ecosystem.

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Research Findings

Analysis revealed overall that between 165-175 million people living in the United States in 2022 would go without a seasonal influenza vaccination. More importantly 50% of this gap would be concentrated in about 139 counties, or about 5% of all counties in the US. There are 3,142 counties in the US. If the absolute number of vaccinations delivered is a surrogate measure of “success” then most of the efforts to boost the number of people vaccinated will center on these 139 counties. As the CDC updates it’s 2017-2018 Seasonal Influenza Estimates of Vaccinations, this number will likely change, perhaps increasingly significantly, if the population did not respond to the CDC’s “emergency request” for people to get vaccinated with the flu shot even if they had not been sick.

When the estimated vaccination gap was examined by age and racial/ethnic characteristics the gap revealed that certain counties would experience less of a gap among selected population groups. Accelerating the knowledge about population sub-groups that require greater effort could lead to better outcomes. Vaccination rates varied widely among racial/ethnic group more widely than one would ordinarily expect. A good example of this is among the Asian population where vaccination rates ranged from 86.2% to 43.3%. Non-Hispanic Blacks saw the absolute lowest flu vaccination rate (29.8%) in the 18-49 age group. The absolute vaccination gap was spread across each age group as follows:

- 6 % under 5
- 16% between 5-17
- 42% between 18-49
- 26% between 50-64
- 13% over 65

Implications of the Research

The research confirmed that the selected methodologies were workable using data already publicly available from both the US Census Bureau, the CDC, and commercial demographers. While applying national rates to sub-national geographies has its own set of statistical issues, the fact remains that in order to produce “working” operational scenarios for critical operatives across the vaccination-immunization ecosystem, these methods are both economical and moderately efficient. While greater levels of statistical significance could be realized, getting more people vaccinated. in specific geographical places, appears more critical. With additional resources for increasing CDC’s sampling sizes, more specific vaccination rates could dramatically provide better information for vaccination program marketing and operations.

The absolute number of vaccinations delivered to the public is probably the ultimately litmus test of protecting individuals and regions of the United States from certain diseases. Thus, getting immunizations shots to the greatest number of persons the fastest way possible is paramount and will require age/racial/ethnic group prioritizing and geographic targeting.

A limited literature review found a plethora of research articles that described the myriad of barriers to increasing vaccination rates as well as an equal number of papers citing ideas and suggestions on how to improve vaccination rates. Improving vaccination rates is still a work in progress. Groups who work in public health have long suffered from not having all the data they need nor the information technology to address a somewhat complex “retail” activity – essentially targeting the “walking well” who are not in a hospital, clinic or doctor’s office on a

regular basis. This is a different analytical environment that most traditional health service programs have found themselves.

Conclusions

The success of most population health initiatives eventually gets measured and evaluated by how long and well populations actually live. Setting realistic goals for vaccinations and immunizations is one thing but actually getting the public to want and receive a recommended vaccination is quite another matter. Some disease threats will be more important to some people than others. Retail marketing systems have demonstrated their ability to help target organizations market goods and services in ways few could have imagined just a decade ago. Health service providers and their planners should seriously engage in learning more about the data and systems that are used by the retail and service sectors to reach their “business” goals.