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Applying the Social Ecological Model to Understand Support for Home Healthcare Workers and Covid-19 Vaccine Uptake in N.J.

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Abstract

More than 3.6 M home healthcare aides are key parts of the U.S. healthcare workforce, serving older adults and individuals with disabilities living in the community. This study used a social ecological framework (SEM) to identify facilitators and barriers to Covid-19 vaccination among home healthcare aides and administrators in N.J. Key informant interviews with a purposive sample of home healthcare aides along with federal and state policy review were used to develop a survey of home healthcare administrators (HHA), which was sent to all home healthcare agencies in N.J. Results show that completed vaccination series rates among HHA were the same or higher than statewide and national rates, but there was skepticism about the utility of a booster among both aides and HHA. While organizational policy and information support around Covid-19 from the agencies to the staff was inconsistent, overall agencies acted as a driver for higher vaccination rates. At the intrapersonal level, individual self-assessment of risk was not consistent with actual risk, impeding vaccination. When all levels of the SEM are working in concert it can increase completed vaccinations. Key areas to target addressing the call for yearly boosters include organizational policy and intrapersonal factors aligning perceived and actual risk.

Keywords

home healthcare, Covid-19, vaccination, social ecological model, state policy, federal policy

Introduction

The Covid-19 pandemic has highlighted the critical role that home healthcare workers play in the healthcare system, including alleviating the strain on healthcare facilities and resources by minimizing the number of patients who require hospitalization. Vaccination against Covid-19 helps ensure that home healthcare workers reduce the risk of transmitting the virus to their patients, are able to provide uninterrupted care, and minimizes their own risk of illness. Early pandemic studies of home healthcare workers indicated they felt forgotten on the front lines and unsupported in their efforts to keep themselves, their families, and their clients safe from Covid-19. They reported not having support in acquiring appropriate personal protective equipment (PPE) or Covid-19 related education to protect themselves. Some home healthcare workers highlighted the challenge of balancing their financial well-being and their own health.[1,2] This study aimed to identify facilitators and barriers to Covid-19 vaccination among home healthcare workers in N.J. using the social ecological model (SEM) as the theoretical framework. Key informant interviews, a policy review, and a survey were used to assess each level of the SEM model. This front-line healthcare group has been underrecognized in the research literature and in policy, due to the hidden nature of the job which by definition occurs not in a traditional healthcare setting but within the homes of individuals who are at high risk for severe Covid-19 infection. Yet home healthcare workers themselves are often members of socio-demographically vulnerable populations.[3] This study addresses the gap in knowledge around beliefs, attitudes, informational, instrumental, and policy support around Covid-19 vaccination for home healthcare workers as a key occupational group of essential workers. Due to cognitive, functional, or social limitations, approximately 7 million older Americans will require care in their homes,[4] highlighting the important role of home healthcare workers in the U.S. A 2020 report on

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home healthcare workers in the U.S. show that average income was at or below poverty level, there is a majority minority workforce, and 31% of workers were foreign born. Over 80% of home healthcare workers are female and the median age is 46.[5] Sociodemographic risk factors for severe Covid-19 are high in this occupational group and this is compounded by occupational risk for infectious disease transmission, including working in multiple people's homes performing intimate tasks such as bathing, toileting, and dressing. In a qualitative study of home health care workers employed by 24 different agencies in New York City, the workers self-reported being at increased risk for both contracting and transmitting Covid-19.[1]

Vaccine infrastructure, workplace support, policies, and individual vaccine hesitancy can affect both flu and COVID-19 vaccination rates, making flu vaccination rates a good historical marker for Covid-19 vaccination. The research literature shows that vaccination rates for influenza vary by healthcare profession and setting. 2019 to 2020 flu vaccination coverage was lowest among healthcare aides and non-clinical personnel, indicating that Covid-19 vaccination rates may be lower in this group.[3] Multiple studies of Covid-19 vaccine uptake among healthcare workers in different settings across the U.S. showed disparities by job category, with aides having the lowest coverage.[6,7] In addition, a 2019 national survey of home healthcare agencies showed that infection control infrastructure and policies were suboptimal, with only 26.4% of agencies reporting that their staff vaccination rates were higher than 95% during the last flu season and only 39.7% providing N95 respirators to their clinical staff.[8] According to the U.S. Bureau of Labor Statistics there were over 3.6 million home healthcare workers in 2021.[9] Addressing vaccination facilitators and barriers among home healthcare aides confronts the intersection of low vaccination uptake and low workplace support among this occupational group.

The SEM engages with the complex interactions between multiple societal levels that can create or address health problems. These levels include intrapersonal (individual), interpersonal (group such as friends and family members), organizational (including the workplace), community (such as the built environment), and public policy that shape health behavior and health outcomes.[10] This model has been applied previously in different vaccination contexts, including HPV and H1N1.[11,12] In the context of home healthcare aides, the organizational level is the home healthcare agency employer. Guidelines provided by the Occupational Safety and Health Administration (OSHA) stress the concept that healthcare workers who believe their employer provides them with a safe and healthy workplace environment are more likely to report to work during a widespread disease outbreak.[13] Good risk communication in the workplace is key during infectious disease outbreaks. Direct and clear communication is critical so that the workplace can support self-efficacy in physical and behavioral health among healthcare workers, and the employees can feel confident that their workplace prioritizes their safety.[14,15] Home healthcare aides work outside of hospital and healthcare systems, supporting clients in the local community with activities of daily living and instrumental activities of daily living. Within the policy environment, home healthcare agencies in the U.S. are licensed by the state in which they provide services and if they serve Medicare/Medicaid clients they are certified by the Centers for Medicare & Medicaid Services (CMS).

Materials and Methods

This study used a mixed-method design. Utilizing the existing literature on the impacts of Covid-19 on home healthcare, as well as information on Covid-19 vaccination uptake, we developed key informant interviews. These key informant interviews were sent to both a home healthcare clinician and an expert in aging research who were part of the study team for pre-testing before deployment. Purposive sampling was used to recruit home healthcare aides for the key-informant interviews and this information, along with the literature review, and a federal and state policy review, were used to develop the theoretical framework for the home healthcare administrator survey. A review of validated surveys related to identified key themes was performed and used to develop the survey instrument. The survey was then assessed for content and construct validity by experts in the field before deployment to a census of all of the home healthcare agencies in N.J. A graphical representation of this study methodology overview can be found in Figure 1. Details of each of these stages of the study are described below.

Study Recruitment

For the key informant interviews, purposive stratified sampling was used to represent all geographic regions (north, central, and south) in N.J., since there are differences in both populations served and in neighborhood level factors such as urbanicity that varies by region. In addition, the key informants represented both agency and self-hired aides such as those being paid through N.J.'s Medicaid waiver Personal Preference Program (PPP) or the Personal Assistant Services Programs (PASP). Recruitment emails and flyers were sent out through home healthcare agencies' email and fax numbers identified through agency websites, through N.J. county level area Agency on Aging offices, and through direct recruitment on social media sites. An initial screening was used to identify if the individual was an adult currently working as a home healthcare aid in N.J. Recruitment ended when we had representatives from all 3 geographic regions and both agency and PPP or PASP funded self-hired aides' representatives.

The home healthcare administrator survey was sent to a census of all home healthcare agencies in N.J. that were identified from the listings found online at the Home Care

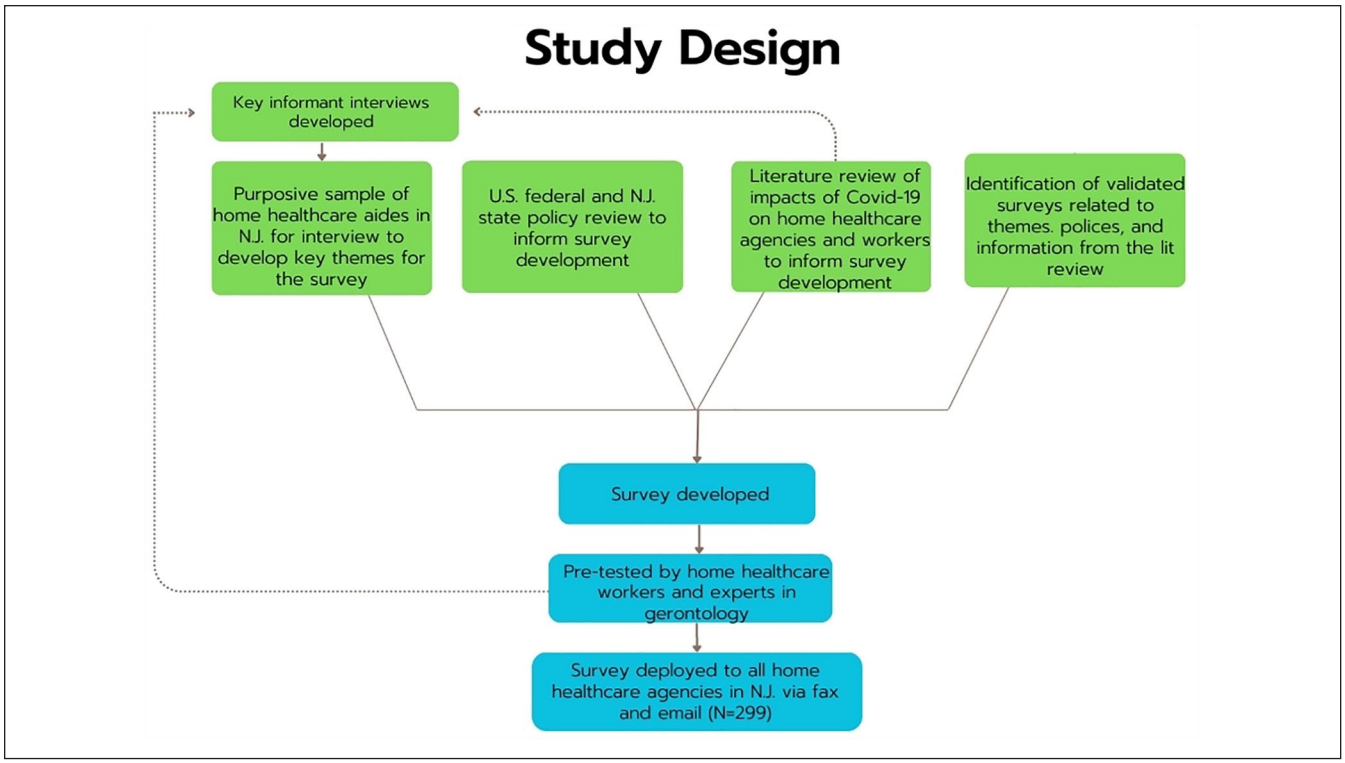

Figure 1. Study design and survey development.

Association of New Jersey and the CMS website. The survey was sent via email and fax in October 2022 to all 299 home healthcare agencies identified. This number includes offices that are run by one overarching company, but have offices in different counties throughout N.J. The survey was open for 4 weeks and participants who completed the survey were offered the option to enter into a raffle with the possibility of winning 1 of 2 tablet computers.

Study Procedures

Using purposive stratified sampling we recruited home healthcare aides for key informant interviews in order to identify key themes in knowledge, attitude, and beliefs about self and community protection against Covid-19 (intrapersonal), as well as informational systems and instrumental supports (interpersonal, organizational, and community level) that may play an important role in vaccination decisions and the impact of Covid-19 on this occupational group. The themes identified from the key informant interviews were used to develop the survey instrument that went out to the home healthcare agency administrators.

Five interviews were conducted and took place in January and February 2022. The key informant interviews used semi structured interview guides developed around the SEM model. A deductive descriptive coding schema was created based on published research designed to identify facilitators and barriers around Covid-19 as well as vaccine behavior. This schema described personal beliefs and the various types of support that people receive from their networks, including family and friend groups and personal relationships with healthcare providers. Support from organizations included the workplace. Community level factors included transportation and the role of health insurance. The respondents were asked about home healthcare specific vaccination policies. This coding schema was tested by 3 coders with 20% of the interviews and additional codes identified based on inductive analysis. Through an assessment of the inter-coder reliability and congruence of qualitative feedback by the coders, the final codebook was generated. Discussion of areas of difference in coding among the 3 coders was used to develop the final coding schema, which was then applied to all of the transcripts of the key informants' interviews in order to identify major themes. These themes were then used to develop the survey instrument for the home healthcare administrators (HHA) in conjunction with the federal and state policy review.

A review of federal and N.J. Covid-19 vaccine policy specifically as it applies to home healthcare was conducted. As a result of the Covid-19 pandemic, various federal and state level policies affecting home healthcare agencies were put into place. Key informant interviews, a literature review, and the policy review were used to develop the theoretical framework for an online survey for administrators. Many survey questions were adopted or adapted from the CDC's recommended survey items on Covid-19 vaccine confidence and uptake. The survey addressed all levels of the SEM, and

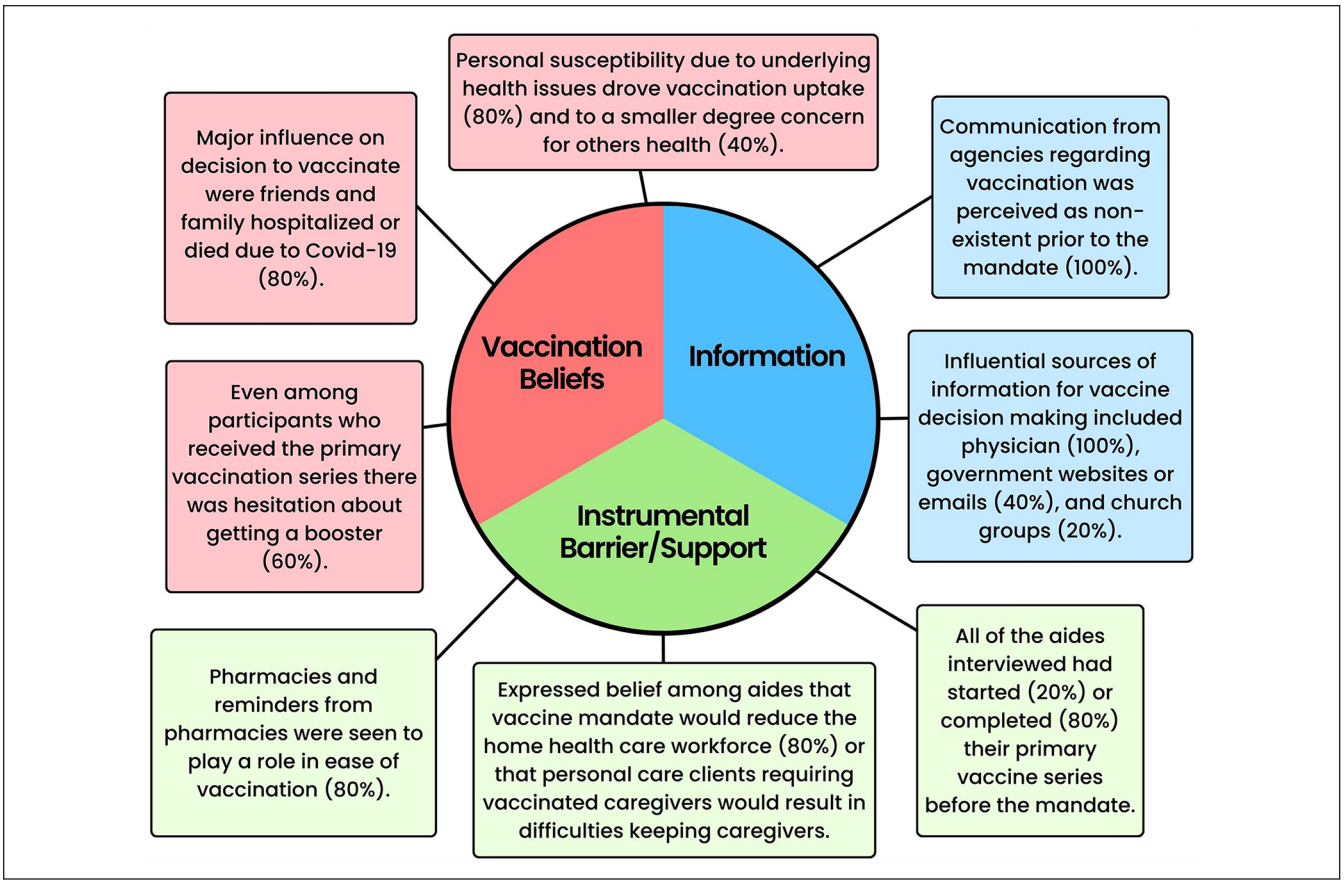

Figure 2. Key themes in home healthcare aide interviews.

asked home healthcare administrators about personal knowledge and beliefs (intrapersonal), information from friends, family, and personal healthcare providers (interpersonal), workplace information dissemination and policy (organizational), coordination with local, state, and federal health organizations (community), and state and federal policy impacts (policy). This survey was assessed for content and construct validity by experts in the field, including a home healthcare clinician and a gerontological researcher. The results were analyzed using descriptive statistics.

Results

Participant Covid-19 Vaccine Status

All of the home healthcare aides that we spoke to in the process of developing the survey and the majority of home healthcare agency administrators (95%) received at least one dose of a Covid-19 vaccine. This is comparable with overall vaccination levels in N.J. as of November 2022, showing that 95% of all N.J. adult residents 18+ have received at least one dose of a Covid-19 vaccine (91.5% for U.S. overall). This number drops slightly for home healthcare administrators (HHA) completing their primary vaccine series (87%), but is about the same or slightly better than the numbers for N.J. (86%) and nationally for adult residents (74%).[16]

Home Healthcare Aide Key Informant Data

The participants interviewed were all female, 3 of them were 65+ years old, one was 50 to 59, and the fifth participant was between 18 and 29 years old. All participants had a high school diploma, while 4 went to college or technical school but did not obtain a degree. Interview participants had worked as a home healthcare aide for a minimum of 6 years and a maximum of 44 years (average 19 years as a home healthcare aid) and 3 of them reported being part time employees.

Three main themes (Figure 2) emerged from the qualitative analysis of the participants` interviews: (1) Informational Barriers/Supports [Information], (2) Vaccination Beliefs, and (3) Instrumental Barrier/Supports. Each theme contained multiple levels from the SEM, showing the complex interactions that create health behaviors.

The first main theme, Information, highlights how the communication sent from the home healthcare agencies regarding Covid-19 vaccination was perceived by the home healthcare aides. All the individuals reported not recalling receiving information about vaccination from their agencies

prior to the federal vaccination mandate. Participants reported that the main source of Covid-19 vaccine decision making information came from their own physicians, governmental sources such as official websites and emails, and from their social groups such as church friends, among others. Interpersonal information from their personal healthcare provider seemed to play the most consistent role, mentioned by all participants as an influential source of information. Organizational level information from their workplace was seen as non-existent, but governmental information was seen as reliable and used for decision making among many of the participants.

The second theme, Vaccination Beliefs, clustered home healthcare aides' perceptions on intrapersonal beliefs that ultimately contributed to their decision making to get vaccinated. The experience of having friends and/or family members who died or were severely sick or hospitalized due to Covid-19 played a major role in deciding to receive the Covid-19 vaccine among the majority of participants. Multiple participants also acknowledged as a major influencing factor their own susceptibility to severe Covid-19 infection due to underlying health issues. Despite that, even among participants who received the primary vaccine shots, there was hesitation about getting a booster among the majority of respondents.

The third theme discusses instrumental barriers and supports encountered by the home healthcare aides to get vaccinated against Covid-19. Availability of the vaccine at local pharmacies (community level) and the constant reminders sent by the pharmacies (organizational level) were recognized by the aides as a support for vaccination. As a consequence, all of them had started or completed their vaccine series before the federal mandate deadline. At the policy level participants largely believed that the federal and state mandate for Covid-19 vaccination of home healthcare workers would have a negative effect on the home healthcare workforce, increasing turnover.

Macro-Policy Environment Review

There are currently 3 primary vaccine series against the virus SARS-Co-V2 that have been approved in the U.S. The Food and Drug Administration (FDA) issued Emergency Use Authorization (EUA) for the first vaccine in persons aged 16 years and older in December 2020.[17] Boosters were rolled out through an EUA beginning September 2021. Please see Figure 3 timeline for specific dates related to vaccine approval.

The initial distribution of the Covid-19 vaccines occurred in phases to ensure limited vaccines were distributed in an equitable manner. These phases varied by state. New Jersey's phased approach to Covid-19 vaccines began with Phase 1a on December 15, 2020. Healthcare personnel and long-term care residents were eligible to receive the Covid-19 vaccine during the Phase 1a distribution. Although home healthcare aides were eligible during this phase, they were not directly

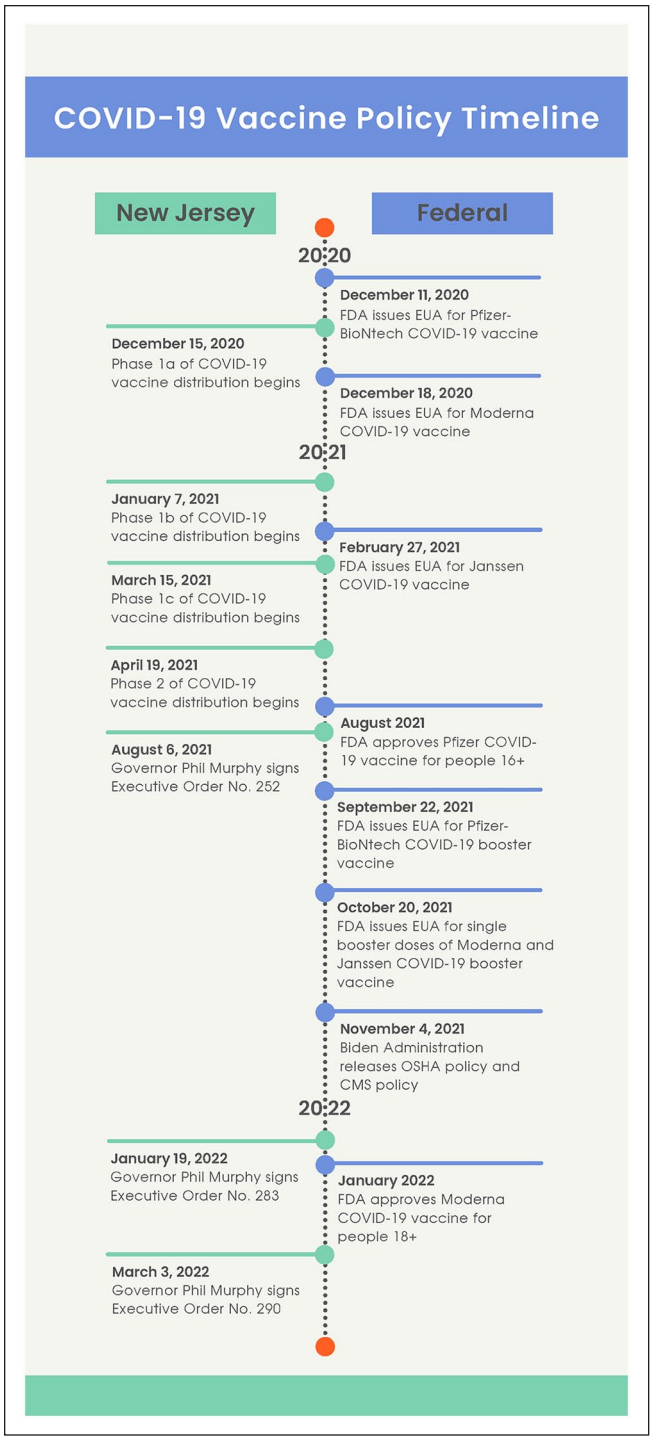

Figure 3. State and federal Covid-19 vaccine policy timeline.

mentioned as an eligible population. The vaccine distribution at this phase primarily occurred at hospital health systems throughout the state, which may have limited access by home healthcare aides who often work outside of healthcare systems. Phase 1b distribution (January 2021) allowed front line first responders, persons aged 65 and older, and persons aged 16 to 64 with one or more medical conditions that increases or

might increase the risk for severe Covid-19 to become eligible for vaccination.[18] These high-risk conditions include cancer, chronic kidney disease, chronic obstructive pulmonary disease (COPD), heart conditions, immunocompromised state (weakened immune system) from solid organ transplant, obesity, severe obesity, sickle cell disease, smoking, type 2 diabetes mellitus, and pregnancy.[19] Phase 1c reduced age eligibility to 55, and included people aged 16 and older with intellectual or developmental disabilities, as well as expanding professional eligibility to include people working in higher education, media, retail financial institutions, sanitation, utilities, and librarians. The general population (all individuals ages 16 and older) became eligible for Covid-19 vaccines in the Phase 2 distribution on April 19, 2021.[20]

At the federal level, on November 4, 2021, the Biden Administration announced 2 policies which expanded vaccination requirements among healthcare workers.[21] The first policy was from the Occupational Safety and Health Administration (OSHA) which required healthcare employers with 100+ employees to ensure that each of their workers are fully vaccinated 2 months later (January 4, 2022) or undergoes testing for Covid-19 at least once a week.[22] This policy also required employers to provide paid time off for staff to obtain Covid-19 vaccinations and ensure all unvaccinated staff wear a face mask in the workplace.[21] The second policy from Centers for Medicare & Medicaid Services (CMS) established the requirement of Covid-19 vaccinations among the staff of Medicare and Medicaid certified providers and suppliers. Affected facilities were required to ensure all eligible staff received the first dose of a 2-dose Covid-19 vaccine or a one-dose Covid-19 vaccine by December 6, 2021. By January 4, 2022, all eligible covered workers must have received the full primary vaccine series.[23] Many home healthcare agencies were included among the facilities where these CMS policies applied.

In conjunction with the federal orders, New Jersey's Governor Phil Murphy signed Executive Order No. 252 on August 6, 2021. This established the requirement that all workers in state private health care facilities and high-risk congregate settings, including licensed home healthcare agencies, be fully vaccinated against Covid-19 by September 7, 2021, or be subject to Covid-19 testing at least once a week.[24] This is an expansion on the federal order since it included smaller agencies (<100 employees) and agencies that do not fall under the CMS. On January 19, 2022, Governor Murphy signed Executive Order No. 283. This executive order required workers in healthcare facilities and high-risk congregate settings to be up to date with their Covid-19 vaccinations, including having received a booster dose.[25] Licensed home health care agencies operating within the state of New Jersey were specifically included within this executive order. Executive Order No. 290 signed on March 3, 2022, updated the timeframe for up to date Covid-19 vaccinations, including booster vaccines, to align with CDC recommendations and modified the timeframe to require eligible workers to obtain their Covid-19 booster dose by April 11, 2022 and submit proof of up to date vaccination by May 11, 2022.[26]

Home Healthcare Agency Administrators

There were 37 HHA respondents (survey response rate of 12%) who completed 85% of the survey or more. Of those respondents, 73% had a Bachelors degree of higher. The majority of respondents had been working as an HHA for 4 or more years, so their experience as an HHA has predated the pandemic. Only 8% of respondents had begun their career in HHA during the pandemic. The HHAs overwhelmingly identified as White (83.8%), female (86.5%), and non-Hispanic (94.6%). Please see Table 1 for the demographics of the HHA survey respondents.

Eighty-three percent of HHA respondents were "early adopters" of vaccination, meaning that they received their first dose between December 2020 and March 2021. This time period corresponds to Phase 1a and b in N.J., when only healthcare workers and high risk groups were allowed to get the vaccine. This also translated to high rates of booster doses among HHA (81%) compared to the adult booster rates in N.J. (42%) and nationwide (34%).[16] However, only 38% of HHAs reported getting a flu shot for the 2022 season. This may reflect the perceived severity of Covid-19 compared to the flu. Since the majority of HHA were Covid-19 vaccine early adopters, it was not the federal mandates, that went into effect in November 2021, that were driving the higher vaccination rates against Covid-19.

Community support. Almost all (94%) HHA reported getting information about Covid-19 from a N.J. public health agency about Covid-19, while 81% reported getting information from an Area Agency on Aging (state or local), federal agencies such as CDC, and state public officials such as the Governors' office. Coordination with agencies for vaccination was not as common, as only 47% of HHA reported coordination with local health departments, 31% with state public health, 28% with local health systems or state or local public officials. This indicates that information only flowed one way, from government agencies to the home healthcare agencies, and shows a lack of coordination between governmental entities and home healthcare agencies.

When reporting where they had received their most recent vaccine, 68% said that they received it at a free standing or in-store (in a grocery store or retail chain like Walmart) retail pharmacy, 14% at a health department clinic, and 11% at their workplace.

Organizational support. Looking at informational support from the home healthcare agency to the home healthcare aides, while in the key informant interviews the home healthcare aides said that they had not received information from their agencies, 100% of HHA said that they gave information

Table 1. Demographics of the Home Healthcare Administrator Survey Population.

Variable	Number (n = 37)	Percentage
Highest education level completed		
High school graduate or GED completed	4	10.8
Associate degree/Registered nurse	6	16.2
Bachelor's degree	14	37.8
Master's degree/Professional degree	10	27.0
Doctorate	3	8.1
Length working as a home healthcare administrator		
1 year or less	3	8.1
2-3 years	7	18.9
4 years or more	27	73.0
Age		
18-29	2	5.4
30-49	9	24.3
50+	26	70.3
Gender		
Male	5	13.5
Female	32	86.5
Race		
Asian	1	2.7
Black or African American	3	8.1
White	31	83.8
Other/I prefer not to say	2	5.4
Ethnicity		
Hispanic or Latino	2	5.4
Not Hispanic or Latino	35	94.6
Nativity		
Continental United States	31	83.8
Other country	6	16.2

on prevention of Covid-19 to staff in 2020 and 2021. This fell to 92% in 2022. Almost all HHAs also reported giving information on Covid-19 prevention to clients (97%) in 2020 and 2021, although this number all fell (92%) in 2022. The majority (97%), but not all, HHAs reported giving information to staff on how to get vaccinated in 2021 and 2022. This vaccine information was transmitted to staff via email (80%), in an in-person or zoom meeting (63%), though flyer or handouts at the home healthcare agency (63%), through one-on-one meetings with supervisors (54%), and information mailed to staff's homes (31%). Please see Table 2 for detailed response to home healthcare agency informational and instrumental support questions.

Focusing on instrumental support from the home healthcare agency to aides, 100% of HHAs reported giving personal protective equipment such as masks to staff in 2020 and 20021. This fell to 94% in 2022. Agency policy did not provide strong instrumental support for staff taking Covid-19 precautions. Only 83% of HHAs reported that their agency offered paid time off for staff if they had Covid-19. This dropped to 64% for paid quarantine following a Covid-19 exposure and to 47% for paid time off to care for a family member with Covid-19. In support of encouraging vaccination, only 58% of HHAs reported offering staff paid time off to get the Covid-19 vaccine. Policies around mask wearing were not universal, although the majority (93%) of HHA reported that it was required by the agency. Despite the federal and state mandate, only 85% of HHA respondents reported requiring staff to be vaccinated and boosted against Covid-19. The survey was distributed after the mandate but before the final implementation date. A small number of agencies tried innovate strategies to address the Covid-19 pandemic including changing sick time policies at the workplace (26%), offering a vaccination clinic at the agency (22%), requiring clients to be vaccinated (15%), and offering incentives for completed vaccinations (11%).

Interpersonal support. In terms of interpersonal influences on vaccine uptake among HHA respondents, 39% said that they felt their employer tried to influence them to get vaccinated and 30% said that their co-workers did. Only 3% felt that their employer tried to influence them to not get the Covid-19 vaccination, and 14% felt co-workers tried to influence them against vaccination. Apart from interpersonal influences at the workplace, family was reported as the top group trying to influence the HHA to get vaccinated (41%), followed by healthcare providers (38%), and friends (32%). No one tried to influence me against the Covid-19 vaccine was

Table 2. Informational and Instrumental Support Given by Home Healthcare Agencies to Staff.

Variable	Number	Percentage
*Agency offers paid time off to staff for the following (n = 36)		
To get a Covid-19 booster dose, or recover from side effects	21	58.3
If you get sick from Covid-19	30	83.3
If you need to quarantine following a Covid-19 exposure	23	63.9
If you need to care for a family member with Covid-19	17	47.2
Agency provided Covid-19 transmission information to staff. . . (n = 36)		
In 2020	36	100.0
In 2021	36	100.0
In 2022	33	91.7
*Covid-19 vaccine information provided to staff through. . . (n = 35)		
Emailed information	28	80.0
In person or Zoom staff meeting	22	62.9
Flyers or handouts at home healthcare agency	22	62.9
One-on-one with supervisor	19	54.3
Mailed information to home	11	31.4
Asked home healthcare aides for proof of Covid-19 vaccination. . . (n = 36)		
In 2021	33	91.7
In 2022	32	88.9
*Agency implemented the following due to Covid-19 concerns. . . (n = 27)		
Require staff to wear masks while working with clients	25	92.6
Require staff to be vaccinated or boosted against Covid-19	23	85.2
Send educational information or offer staff workshops	22	81.5
Send educational information for clients or clients' family	22	81.5
Give paid time off for staff to be vaccinated	15	55.6
Change sick time policies at your workplace	7	25.9
Offer a vaccination clinic at your workplace	6	22.2
Require clients to be vaccinated or boosted against Covid-19	4	14.8
Offer incentives such as prizes or money for completed vaccinations	3	11.1
Covid-19 vaccine requirement will negatively affect agency staffing (n = 32)		
Yes, I see evidence of this now	23	71.9
Yes, I think it will in the future	2	6.3
No, I don't think it will affect staffing	7	21.9
*Agency received Covid-19 communication from. . . (n = 32)		
State public health agency	30	93.8
State or local agency on aging	26	81.3
State public officials	26	81.3
Federal agencies such as the CDC or Medicare/Medicaid	26	81.3
State or federal licensing organizations	24	75.0
*Agency coordinated with the following organizations for staff vaccination (n = 32)		
Local (municipal or county) public health departments	15	46.9
State public health agency	10	31.3
Local hospitals/health systems	9	28.1
Local (municipal or county) public officials	9	28.1
State public officials	9	28.1

*Respondents can choose more than one response. Percentages may sum to >100%.

the top response from HHAs (43%). However, 32% reported that family tried to influence them against the vaccine, and 30% said that friends did. Of the respondents that reported having a primary care provider, 86% said that the primary care provider had recommended that they get vaccinated against Covid-19. Out of all HHA respondents, only 8% said that they had not received a recommendation from any health care provider to get a Covid-19 vaccine.

Intrapersonal- knowledge, belief, and attitudes about covid-19 and vaccination. Underlying health conditions and risk behaviors can put individuals at higher risk for severe

Covid-19 infection. The survey asked respondents if they consider themselves at high risk and it also asks questions about main high risk categories, including underlying chronic diseases, immunocompromised status, obesity, and smoking behavior. Out of the survey respondents, 38% of those that fall into one of the high risk categories did not self-identify as high-risk, indicating that there may be a lack of understanding of the factors that put someone at high risk for severe Covid-19 outcomes. Almost everyone (90%) with an underlying chronic disease understood that they fell into a high-risk category, but this understanding broke down when it came to smokers (only 33% identified themselves as high-risk) and being overweight (60% identified themselves as high-risk). There was however no association between perception of high risk or actually falling into a high-risk category and level of concern about Covid-19 or giving a high ranking to the importance of getting a vaccine to protect yourself against Covid-19.

Overall, 73% of respondents reported that getting a Covid-19 vaccine was very important in protecting yourself against Covid-19. Importantly, 81% strongly or very strongly agreed with the statement that they had a responsibility to get the Covid-19 vaccine in order to protect other people. Among the HHA, 19% thought it was somewhat important and 8% of the HHA thought it was not at all important to get the vaccine to protect themselves, while 5% somewhat agreed and 14% did not agree that it was their responsibility to get the vaccine to protect other people. When the respondents were asked if they felt the need to get the Covid-19 vaccine so that they could participate in a particular activity, 89% said that they felt they need the vaccine to go to work, 84% to social with family, and 76% to socialize with friends.

The majority of respondents (73%) felt that the vaccine was safe or very safe, while 19% thought it was somewhat safe, and 8% thought it was not at all safe. It is important to note that one person who felt that the Covid-19 vaccine was not at all safe had completed the primary series, while the other 2 had not. Among the subset of respondents who had not gotten their booster yet, the most common reason cited was that they were worried the booster would make them sick. No one reported cost or transportation as a barrier to getting the booster.

Significantly, HHAs believe that vaccine mandates have had a negative impact on staffing, exacerbating an already existing home healthcare staff shortage. Seventy-eight percent of administrators report seeing or expecting to see in the future a negative influence of vaccine requirements on staffing. Respondents were asked an open ended question about the impact of Covid-19 on their agency. The following quotes illustrate the fact that home healthcare agency administrators feel that state and federal vaccine mandates negatively impacted their agencies ability to provide services in the community, as well as a negative sentiment toward the stick versus carrot approach to getting the workforce vaccinated. Both quotes reflect a generally negative sentiment on the part of the HHAs toward vaccine mandates.

> *We lost many patients due to them being scared of the virus, some patients passed away, and a huge loss of staff workers. We are incredibly under staffed many workers prefer not to take the vaccine and also are able to get higher paying jobs doing less work as being a caregiver is a demanding job that pays little.*

> *When vaccinations became mandatory, that did more to deflate their spirits than all the other challenges combined. The majority would and still will get vaccinated on their own. But to tell them they have no choice regardless of what they, personally, have put on the line . . . makes me speechless, and very sad. In today's world where it doesn't seem to matter, those vaccinated and unvaccinated both are contracting Covid. So why further demean healthcare workers with mandatory boosters. Give them some kind of a perk for vaccinating, not a deterrent.*

Discussion

At each level of the SEM model there were factors that worked to increase vaccination rates, but these effects at some levels were inconsistently applied and/or mixed with factors that may discourage vaccination. At the intrapersonal level, the survey results show that a feeling of responsibility toward others, and secondarily a desire to protect themselves, was a large driver of getting the Covid-19 vaccine among HHA. This is consistent with other research looking at Covid-19 vaccination among all healthcare workers, which found that common reasons for getting vaccinated included protecting patients, friends, family, and self from Covid-19 infection.[27] Notably, there was a disconnect between actual and self-perceived risk when it came to severe Covid-19 among HHAs. Individuals who smoked or were obese were unlikely to see themselves as high-risk, meaning that they underestimated the protection that a vaccine could offer.

At the interpersonal level, home healthcare staff did not recall receiving information and support from their agencies about Covid-19 and vaccinations, but almost all HHA say that this was provided. These differences in reported informational support from agencies between administrators and home health healthcare aides may be due to the methods that the agencies used to send out the information, primarily via email, which is easy to overlook. It may also be related to the remote nature of home healthcare aide work, where aides are out of the agency setting the majority of the time. Especially during a pandemic when offices were closed, this may have presented fewer opportunities to relay information person to person, resulting in this apparent disconnect. Family members, employers, clinicians, and fellow employees were seen as the main influences for vaccine uptake. Despite the disconnect in communication between home healthcare agencies and staff, HHA perceived the workplace as a strong positive influence for their decision to vaccinate against Covid-19.

This research highlights the importance of workplace, healthcare provider, and family and friends support for vaccination. The data shows both that HHA felt that their employer and colleagues were encouraging vaccination, and that they felt they needed to get vaccinated to continue to work at the agency, prior even to the state and federal workplace mandates. In addition, the majority of HHAs reported that a healthcare provider had recommended vaccination. This was independent of the high-risk status of the individual HHA. Family and friends seemed to be a mixed influence on vaccination, with almost equal numbers reporting that family and friends had tried to influence against as for vaccination. However, getting the vaccine to socialize with family and friends was reported as a large motivator.

At the community level, information flow was mostly one way (from state to agency to staff) and there was little coordination between home healthcare providers and public health/government institutions. This echoes research by Sama et al who found that home healthcare agencies felt invisible as hospitals and nursing homes were the main focus of early Covid-19 pandemic guidance, training, and educational resources.[28] Community pharmacies were the main way that HHAs reported getting their vaccines and home healthcare aides mentioned text reminders and information from pharmacies as prompts for vaccination. The geographic availability of pharmacies across N.J. and the fact that vaccines were distributed through these businesses seems to have made vaccine uptake easier.

At the organizational level, workplace policies that support vaccine uptake were not universally adopted, which may be due to differences in resources and/or beliefs about efficacy of vaccine. Agency HR policies do not generally support Covid-19 safe practices, such as paid time off from work related to a Covid-19 infection or earlier in the pandemic a known Covid-19 exposure. Interestingly, a few agencies attempted to protect both clients and staff by requiring clients to receive the Covid-19 vaccine. This policy may have addressed home health aides concerns that they were putting themselves and their families at risk by working in multiple homes with a high risk group when their work activities require close contact.[1,29,30] However, there were some agencies that tried innovative methods of increasing vaccination rates, including offering the vaccine at work (which decreases associated time costs and signals organizational support for vaccination) and offering a financial incentive for completed vaccinations. Prior research shows that workplace vaccination campaigns can increase vaccination uptake,[31] but financial incentives have more mixed results. While it has been shown to increase intention and vaccination overall, it has not been shown to move the needle among individuals who are vaccine hesitant.[32,33]

As elucidated in the policy review, home healthcare specific policies around Covid-19 vaccination were first implemented at the state level in N.J., and then reinforced at the federal level through CMS. The state policies more comprehensively targeted all home healthcare agencies in N.J. than the federal polices, which may have left out smaller agencies and those that do not take Medicare and Medicaid reimbursement. At the policy level, both home healthcare aides and HHAs believe that vaccine mandates have had a negative impact on staffing, exacerbating an already existing home healthcare staff shortage. The home healthcare industry has faced retention issues long before the pandemic, with the Covid-19 pandemic exacerbating long-standing retention issues.[34] Studies show reasons for the high attrition among home healthcare workers include low wages, insufficient paid hours, lack of benefits, and pursuit of better career opportunities.[5,35] In response to a question about the impact of the vaccine mandates on home healthcare aides, one aide said,

Even the threat of losing their jobs wouldn't change their minds because let's face it, most [home] health care workers don't get paid a whole lot to begin with. They could certainly leave. Okay, so they lose their job they just go find another job. It's not like we're talking, that they're in a very high paid position.

Anecdotal evidence from the New York state mandate support the perception that vaccine mandates will increase home healthcare worker shortages.[36]

Limitations of this study include the fact that vaccination rollout and vaccination policy is different state by state, therefore the experience of N.J, may not exactly represent the experiences in other states. In addition, vaccination recommendations changed during the project period with the rollout of booster shots and changes to federal and state vaccination policy. The dynamic nature of Covid-19 means that the snapshot this research provides is within a specific policy and pandemic context. However, the booster and policy requirement changes were captured in both the qualitative and survey instruments. The survey was sent to a census of all the home healthcare agencies in N.J. The low response rate may limit the generalizability of the survey data. The response rate may result in non-response bias, whereby individuals who work at agencies who had less supportive policies around staff Covid-19 vaccination or whom were personally not supportive of Covid-19 vaccinations may have selectively decided to not respond to the survey. In addition, some of the key informant interviews and survey questions required the respondents to recall actions and knowledge from earlier in the Covid-19 pandemic. Recall bias may have impacted the respondents answers for this subset of the questions. However, the outcomes of this study are consistent with other studies looking at home healthcare during the Covid-19 pandemic.[1,2,27,28]

Looking to the future of Covid-19 vaccinations, many administrators and staff do not seem to see the utility of boosters. Qualitative feedback indicates that some respondents believe that they don't provide additional protection against Covid-19 infection. A survey of healthcare workers in a large academic medical center showed a high percentage

of concern about the efficacy of boosters. Over half felt that it a booster may not be effective against new strains of Covid-19.[36] Even individuals who received the primary series may be reluctant to get a booster, as evidenced by qualitative data from the home health aides and the lower rates of booster vaccination among the HHA, despite the state and federal mandates requiring the booster for home health providers.

Conclusions

The HHA survey data shows the importance of all levels in the SEM model working together toward vaccine uptake. When federal and state policy (CMS and N.J. Executive Order), community access (vaccine availability at local pharmacies), organizational informational and instrumental support in the workplace, and interpersonal messages from healthcare providers, friends, and family align it can support or change intrapersonal knowledge and beliefs to encourage vaccine uptake. The rates of completed primary series vaccination and booster uptake rates are higher among HHA respondents compared to state (N.J.) and federal rates. In cases where policy conflicts with intrapersonal beliefs, the home health agency (organizational level) may not prevail, since there are underlying issues of pay and workplace satisfaction that are exacerbated by the disconnect between policy and beliefs. In addition, policy supports such as paid time off to help keep staff healthy are inconsistently offered. In January, 2023 the FDA proposed a once a year Covid-19 vaccine be implemented.[35] Without a policy mandate we may see vaccination uptake rates reflect the lower rates of influenza vaccination uptake among home healthcare workers. With a mandate we may continue to see exacerbated shortages of this key occupational healthcare group. This research identifies a disconnect in actual and perceived risk for severe Covid-19, as well as a disconnect between reported and perceived informational support between agencies and home healthcare aides. Clinicians should continue to provide consistent messaging to patients about the importance of vaccination and boosters, as this played an important role in vaccine decision making. It is also clear that clinicians and public health messaging should emphasize the high risk nature of factors like obesity and smoking for severe Covid-19, since there was a significant gap between actual and perceived risk for these lifestyle factors. Consistent and universal home healthcare agency policies that provide instrumental support for vaccination and staying heathy (paid time off for vaccination, sick-time) could help to address the negative perception of the mandate and its potential effects on retaining home healthcare aides, especially among vaccine hesitant individuals. These are potential mutable factors that could increase vaccine uptake and make home healthcare aides feel supported in their efforts to keep themselves and their clients healthy. Information from this study on informational and instrumental support roles in vaccine uptake among home healthcare workers should be used to identify specific messaging and organizational policy that encourages booster uptake, which was seen with skepticism among all levels of the home healthcare workforce.

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Institutional Review Board Statement

The study was conducted in accordance with the Declaration of Helsinki, and approved by the Institutional Review Board of TCNJ (protocol code IRB-2021-0394 approval on 12/19/2021).

Informed Consent Statement

Informed consent was obtained from all subjects involved in the study.

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Data Availability Statement

Survey data presented in this study are available on request from the corresponding author. The data are not publicly available because of potential identifiability concerns due to the small and specific nature of the sample.

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