



# The Association of North Dakota Skilled Nursing Facility Characteristics with COVID-19 Outbreak Severity

RESEARCH

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## ABSTRACT

**Context:** COVID-19 exerted severe challenges on skilled nursing facility (SNF) residents and staff. A combination of internal and external factors predisposed SNFs to an increased propensity of COVID-19 spread.

**Objective:** The purpose of this paper is to examine which facility characteristics may have contributed to COVID-19 outbreaks within urban and rural North Dakota skilled nursing facilities.

**Methods:** A 23-question survey regarding facility characteristics was developed and distributed to all 78 North Dakota skilled nursing facilities (SNF).

**Findings:** Of the North Dakota SNF, 40 out of 78 total facilities (51.2%) participated in the survey. Of those participating, 38 of 40 (95%) were in counties with populations under 50,000, with the smallest county population being 1,876. A Spearman's rank test suggested a relationship between the community spread of COVID-19 and the COVID-19 positivity of SNF residents. Spearman's rank also suggested a positive association between the SNF resident COVID-19 positivity in relation to staff positivity (p-value 0.042) and county rates (p-value 0.045).

**Limitations:** While this is a comprehensive survey with a very good response rate, two key limitations are identified. First, the survey relies on self-reported data from SNF staff. Second, it is not clear what data would have been received from non-responding SNFs.

**Implications:** Substantial lessons have been learned, which may not only aid future pandemic preparedness but improve the quality of care for nursing home residents during a pandemic or other respiratory disease outbreaks. Proactively knowing susceptibilities and vulnerabilities ahead of time will allow local and state leaders to plan and allocate resources. Future state and local pandemic emergency plans need to be reviewed with the prioritization of skilled nursing facilities as front line facilities during a pandemic, rather than placing their "traditional" emphasis of emergency preparedness on hospitals.

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## INTRODUCTION

The COVID-19 pandemic continues to be an evolving case study, showing the disconnectedness of the United States public health emergency preparedness system. As a result of this disconnectedness, COVID-19 disproportionately affected skilled nursing facilities. Skilled nursing facilities (SNFs) are designed for older adults and individuals who have chronic medical conditions and need help with the basic activities of daily living. Common chronic diseases found among SNF residents include diabetes mellitus, coronary artery disease, chronic pulmonary diseases, and many other chronic conditions, all of which are significant risk factors for increased morbidity and mortality due to COVID-19. Prior to the COVID-19 pandemic, infectious disease outbreaks such as influenza and norovirus also frequently occurred in skilled nursing facilities, so it was well understood that SNFs need to be given heightened support and extra protections (Sugg et al., 2021).

As of March 2020, despite North Dakota's (ND) low population density, over 79% of North Dakota long-term care facilities in the state had experienced a COVID outbreak (Warner, 2021). As the pandemic accelerated, North Dakota led the world with the worst COVID-19 morbidity per capita between October 16, 2020 and November 31, 2020 (Health, 2021). Fourteen of North Dakota's counties had higher cumulative death rates than larger cities such as New York City, and 40 ND counties had higher cumulative death rates per capita than the United States overall (Emily, 2020; Paulin, 2020). North Dakota also had the highest nursing home resident infection and death rate in the country, with approximately one in every 50 residents dying from the disease (Emily, 2020; Paulin, 2020). The question asked by many is how a rural state had the highest COVID-19 morbidity per capita. One of the common factors found in most rural ND communities with high COVID-19 mortality rates was the presence of skilled nursing facilities (SNF).

The COVID-19 pandemic has had a marked impact on every sector of society, with skilled nursing facilities and older adults bearing a disproportionate amount of the disease burden and mortality. Within SNFs, personal protective equipment, timely testing and contact tracing were difficult, especially when the pandemic surged and the ability for case detection was outpaced by the community spread of COVID-19. The burden of infection and death from novel pathogens such as COVID-19 highlights the need for a critical review of public health emergency (PHE) capabilities at the federal, state, local and facility levels to translate public health policy into actionable practice. The ability to share accurate and actionable information will be necessary for future public health emergency responses (Tarantola and Dasgupta, 2021). The purpose of this study was to assess skilled

nursing facility (SNF) characteristics that may have led to the increased COVID-19 cases and death rates observed among North Dakota SNF residents.

## BACKGROUND

Since the beginning of the COVID-19 pandemic, the population of older adults aged 65 years and older within the United States has accounted for nearly 50% of all hospital and intensive care unit admissions and 80% of COVID-19 deaths (Werner et al., 2020). By the end of 2020, the death rate for non-nursing home residents was approximately 87 per 100,000, and the death rate for nursing home residents was more than 108 times that number at roughly 9,200 per 100,000 (Cronin and Evans, 2022). In the early stages of the pandemic, North Dakota was thought to be better isolated from the spread of COVID-19, as the state's population density is low and largely rural when compared to other states such as New York, which was one of the initial epicentres of COVID-19.

Rural areas are defined by the United States Census Bureau as, "any population, housing or territory not in an urban area" (Bureau, 2016). The smallest urban category, "Urban Clusters" are defined as having a population of less than 50,000 but at least 2,500. Consequently, rural can be understood as having a population of less than 2,500 people (Bureau, 2016). For the purposes of this study, the definition of a rural community was defined as a population of 2,500 or less, and all communities with a population greater than 2,500 were considered urban. Based on the definition of rural, 70% of skilled nursing facilities in North Dakota were in rural communities, and 90% of them were from counties with a total population of less than 50,000. North Dakota is an agricultural and predominantly rural state, with a 9.7 populous per square mile. According to the Census Bureau (2021), North Dakota's older adult population over the age of 65 is 15.7% of the state's population.

Skilled nursing facility residents are at increased risk due to factors including medical comorbidities, congregate living arrangements (especially double room occupancy), and close contacts with staff from the community who assist them with bathing, eating and other activities of daily living (Popejoy et al., 2020). Further compounding a skilled nursing facility's risk is that most community medical planning tools tend to focus on hospital and emergency medical services, and SNFs are often excluded and forced to plan on their own. In addition to facility characteristics, the level of community spread has also been shown to impact the rate of COVID-19 outbreaks in SNFs.

In a study of 13,709 SNFs, a statistical significance ( $p < 0.05$ ) between a higher level of community spread

and the higher rates of COVID cases in SNFs was observed (Sugg et al., 2021). Another study by Bagchi et al. (2021) evaluated nationwide SNF surveillance data from the Centers for Disease Control and Prevention (CDC) National Healthcare Safety Network (NHSN). Between June 2020 and November 2020, COVID cases among SNF residents increased to 11.5 COVID cases per 1,000 resident weeks, but declined to 6.3 cases per 1,000 residents in July 2020 with mitigation measures (Bagchi et al., 2021). Unfortunately, COVID-19 cases among SNF residents reached 23.2 cases per 1,000 resident weeks by late November 2020. During this time, a similar trend in COVID-19 community cases was also seen in communities surrounding the SNFs and among the SNF staff (Bagchi et al., 2021). Given that at this time, SNF residents were only exposed to SNF staff due to visitation restrictions, it appeared that community spread played a role in SNF resident infections (Bagchi et al., 2021). North Dakota had the greatest COVID-19 outbreak in the US between September 20, 2020 and November 30, 2020 (Management, 2022). During this time, North Dakota had the highest SNF resident infection and death rate in the country, with one in every 50 residents dying from COVID. North Dakota also had the highest SNF staff infection rate in the country, with more than 90 percent of nursing homes reporting one or more positive tests among staff (Warner, 2021).

Over the past two years, much blame has been pinned on skilled nursing facilities for their high COVID-19 case rates and deaths. However, there are likely multifaceted issues that predisposed SNFs to the disproportionate burden of the COVID-19 pandemic. One aspect that cannot be overlooked is the role of pre-existing systemic problems prior to the COVID-19 pandemic, which included the neglect of long-term SNF financial and infrastructure investment by state and local governments (Mills et al., 2020). Historical and ongoing trends of financial hardship for skilled nursing facilities contributed to a lack of necessary personal protective equipment (PPE), a lack of staffing and significant medical supply shortages, which inhibited a skilled nursing facility's resilience during the COVID-19 crisis. A tradition of low policy priority for the long-term care sector may have contributed to the relative unpreparedness and difficulties experienced by SNF response efforts to reduce COVID-19 transmission and resident mortality (Grabowski and Mor, 2020). Complicating the ability for SNFs to deal with COVID-19 has been the high skilled nursing facility staff turnover, with greater than 50% of nurses leaving their job within a year since the beginning of the pandemic (Popejoy et al., 2020). Many SNFs reported difficulties with their pandemic responses due to reduced staffing levels. Staffing for SNFs has been difficult compared to hospitals, as SNF jobs have historically been low paying but a highly demanding occupation (Warner, 2021).

## METHODS

A 23-question survey regarding skilled nursing facility characteristics was developed and distributed to all 78 North Dakota SNFs. The skilled nursing facility characteristics of interest included:

- Resident demographics, such as gender
- Infrastructure concerns, such as ventilation, air exchange rates and other factors which administrators felt were pertinent to their facility's COVID-19 outbreak.
- Personal protective equipment availability and use
- Pandemic preparedness plan availability and implementation

An initial 17 questions were designed to evaluate general information about facility characteristics, staffing, personal protection equipment and pandemic emergency preparedness during their COVID-19 response. The survey also included three open-ended qualitative questions regarding facility characteristics, resources and pandemic preparedness, which allowed respondents to elaborate further. In collaboration with the North Dakota Long-Term Care Association (NDLTCA), the target population identified for survey administration was the skilled nursing facility administrators population from the rural and urban North Dakota SNFs. All North Dakota skilled nursing facility administrators were surveyed, given the small number of skilled nursing facilities in North Dakota (N = 78). Based on the previous definitions of urban and rural communities, there were 44 (56.4%) rural SNFs and 34 (43.6%) urban SNFs in the sampling frame. Given the small and manageable number of SNFs (N = 78), a population census sample design was used.

Prior to the administration of the survey, face validity was conducted by having skilled nursing facility administrators and directors of nursing review the survey to ensure the questions would capture data that would be representative of the COVID-19 experience of North Dakota skilled nursing facilities. Content validity was performed by the research team in collaboration with skilled nursing facility administrators. Assisted living centers and basic care centers were intentionally excluded as part of the target population due to their different care models compared to skilled nursing facilities. A cover letter was formatted into an email invitation to participate and sent to the invited participants. Initially, surveys were administered via Qualtrics, a web-based survey tool. After one week, a mailed cover letter and paper survey were sent to administrators who had not responded to the electronic survey request. All respondents (n = 40) chose to complete the survey via paper.

For data analysis, the participating SNFs were divided into two cohorts based on their total licensed beds of 50 or fewer beds ( $n = 24$ ) and greater than 50 licensed beds ( $n = 16$ ). Survey data was then analyzed using descriptive statistics such as mean, median and quartile range utilizing statistical software. Additionally, a Spearman's rank correlation was utilized to evaluate for relationships between nursing home resident positivity, staff positivity and count rates. For statistical significance, a  $p$ -value of  $<0.05$  was used to represent significant findings. Data from the open-ended questions was analyzed and grouped according to the theme of the questions assessing infrastructure issues, resources lacked by the facility which impeded their response and lessons learned for future public health emergency responses.

## FINDINGS

Forty of the 78 (51.2%) North Dakota skilled nursing facilities participated in the survey (Table 1). Of those participating, 38 of 40 (95%) were in counties of populations less than 50,000, with the smallest county population being 1,876. The average number of licensed beds in the cohort was 43 beds per facility, with 24 facilities having less than 50 licensed beds. Twenty of the facilities (65%) were in rural communities with a population of less than 2,500.

Spearman's rank correlation showed a positive association between SNF staff positivity and resident positivity rates (Figure 1), with a  $p$  value of 0.042 when the three outliers were excluded. In addition, there was also a positive association between the level of COVID-19 community spread and the positivity of SNF residents with a noted  $p$  value of 0.045, emphasizing the significant potential role played by COVID-19 community spread in COVID-19 outbreaks within SNFs (Figure 2).

This study also evaluated SNF variables with regards to COVID-19 transmission. Table 2 illustrates numerous statistically significant findings between the size of SNFs and variables such as resident positivity, staff positivity, SNF resident deaths, county deaths and cumulative county cases. Facilities with greater than 50 beds had higher COVID-19 positivity and higher county mortality rates as well ( $p = 0.035$ ) compared to those with fewer than 50 beds ( $p = 0.003$ ). A similar trend was also seen when comparing county deaths and county case rates.

Further complicating the COVID-19 response were the staffing shortages experienced in long-term care, with the highest percentage (55%) of nursing homes reporting a shortage of nurses, aides (certified nursing assistants, nurse aides, medication aides and medication technicians) or both. As SNFs tend to be one of the larger employers in rural communities, the ability to maintain a healthy workforce is imperative to prevent further staffing shortages. In this study, as also noted in the review of

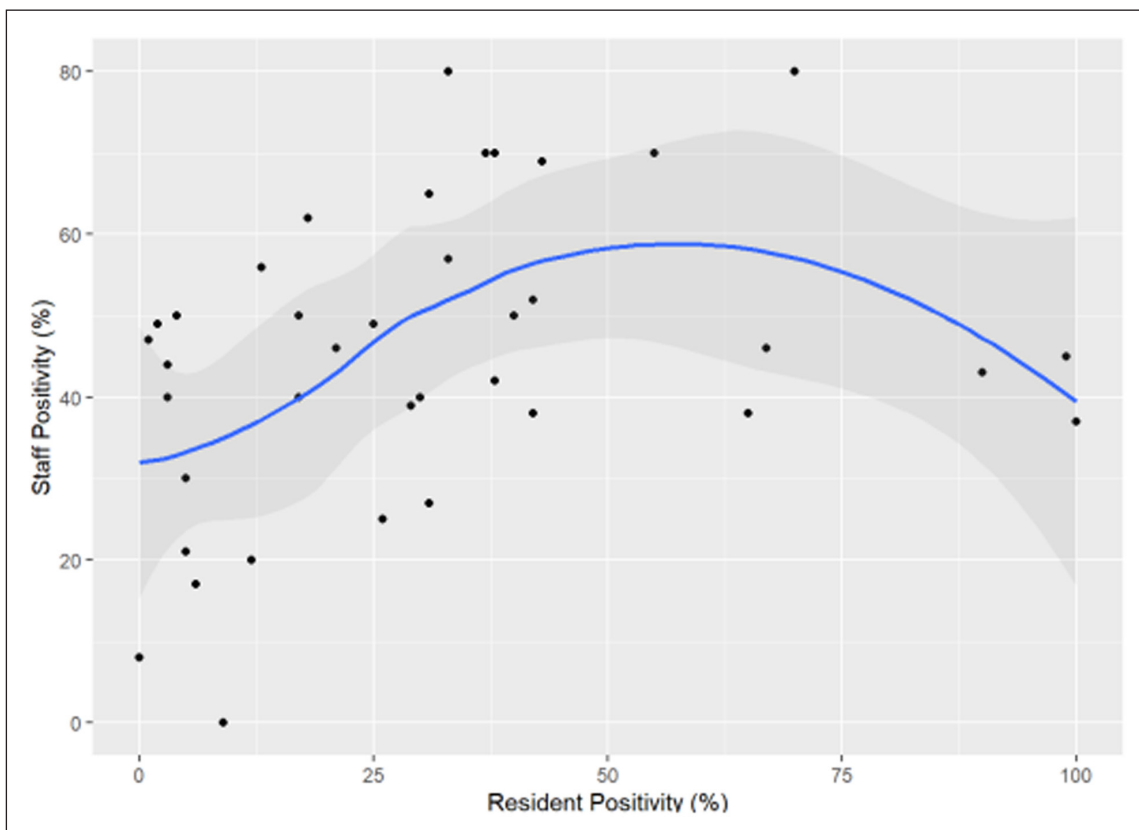
SURVEY RESPONSE (N = 40)	%	COUNT
<b>County Population Size of Facility Location</b>		
0–5,000	35	14
5,001–10,000	20	8
10,001–15,000	10	4
15,001–20,000	5	2
20,001–25,000	5	2
25,001–30,000	15	6
30,001–40,000	0	0
40,001–45,000	2.5	1
45,001–50,000	0	0
50,001+	7.5	3
<b>Total Number of Licensed Beds</b>		
0–30	15%	6
31–50	40%	16
51–75	20%	8
75–100	10%	4
101–150	7.5%	3
151–200	0%	0
2005	2.5%	1
Not answered	5%	2
Total	100%	40
<b>Ownership Status</b>		
Nonprofit	97.5%	39
For Profit	2.5%	1
Total	100%	40
<b>Rural vs Urban Setting</b>		
Rural	65%	26
Urban	35%	14
Total	100%	40
<b>Lacked PPE <sup>a</sup></b>		
Eye protection	8%	3
Masks	20%	8
N95s	25%	10
Gloves	12%	12
Gowns	12%	12

**Table 1** Characteristics of the Skilled Nursing Facilities.

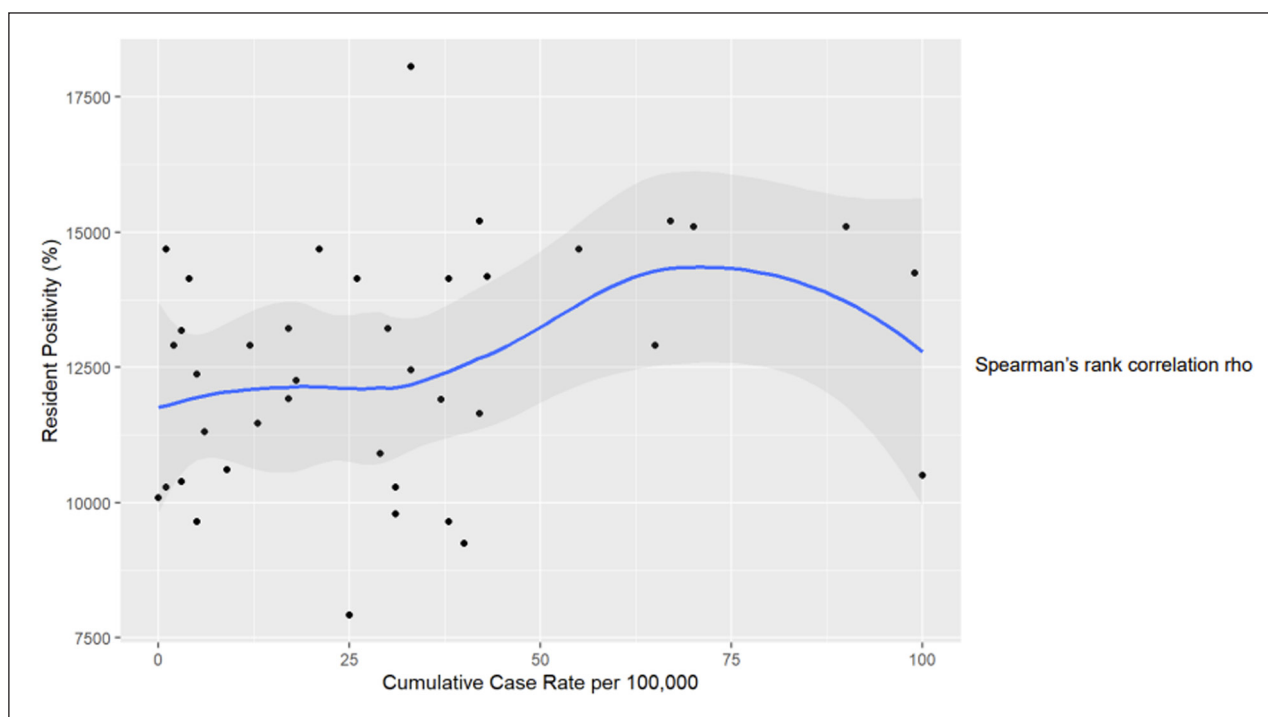
<sup>a</sup> These categories are not mutually exclusive.

the literature, the higher the COVID-19 positivity rate in a community, the more an individual's risk of contracting COVID-19 increased.

Currently, many SNFs have infection control programs, which are administered by their Director of Nursing or



**Figure 1** Spearman's Rank SNF Resident COVID Positivity and Staff Positivity.



**Figure 2** COVID County Rates and SNF Resident COVID Positivity.

other delegated staff members as part of a full time equivalent (FTE), rather than having a dedicated infection control preventionist. During the COVID-19 pandemic, infection control was one of the most significant issues reported by the ND SNFs, as there were not enough staff dedicated to the enormous amount of infection control

prevention and surveillance measures needed by their facility. During the COVID-19 pandemic, many facilities reported that infection control efforts required 40–220 staff hours per week, with a median of 40 hours. The heavy burden of infection control negatively impacted their staffing, as nursing staff had to be reallocated

from patient care to infection control management. To deal with staffing shortages, all participating facilities utilized registered nurses (RNs), licensed practical nurses (LPNs), certified nursing assistants (CNAs) and travel staff for staffing coverage. Early literature suggested that staff working at multiple SNFs had an increased rate of resident COVID-19 positivity. In this study, a box plot was performed, and there was no significant difference between residents' COVID-19 positivity and the amount of facility staff working in other healthcare settings (not shown).

When participants were given an opportunity to provide open-ended responses to questions regarding infrastructure, such as the age of the building, building configuration, ventilation systems, air exchange rates or other building factors, 28 of 40 participants responded (Table 3). With regards to infrastructure

concerns, 26 of 28 responded with comments such as “the building and ventilation were all issues”, “building configurations worked against us,” “difficulty moving residents to a COVID wing when you are at full census” and “older building with limited areas for isolation, and no negative air pressure rooms.” With regards to patient care resources, staffing was the most significant issue endorsed by participants, followed by patient care supplies and cleaning supplies. Respondents were also asked about lessons learned for future pandemic. Responses included, “have an emergency plan which has been exercised”, “stock more PPE”, “have quicker diagnostic testing” and “being prepared to manage patients on your own if hospitals are at capacity.”

### IMPLICATIONS

This study has elucidated some of the factors which likely contributed to the high COVID-19 morbidity and mortality rates within North Dakota’s skilled nursing facilities. In this study, there was a positive association with SNF staff positivity and resident positivity rates. In addition, there was also a positive association between the level of COVID-19 community spread and the positivity of SNF residents, emphasizing the significant potential role played by COVID-19 community spread in COVID-19 outbreaks within SNFs. There were also numerous statistically significant findings between the size of a SNF and variables such as resident positivity, staff positivity, SNF resident deaths, county deaths and

BED SIZE OF 50 AND GREATER	YES (N = 16)	NO (N = 24)	P-VALUE OVERALL
Percentage of Resident Positivity for COVID	47.4	20.4	0.003
Percentage of Staff Positivity for COVID	40.0	52.8	0.024
SNF Resident Death (per 1,000)	19.6	7.04	0.157
County Deaths (per 1,000)	67.1	27.0	0.035
Cumulative County Case Rates (per 100,000)	11,705	13,576	0.010

**Table 2** Facility Size Effects.

OPEN-ENDED QUESTION RESPONSES (N = 28)	%	COUNT
<b>Facility Infrastructure Affecting Response</b>		
HVAC system outdated	50	14
Lack of negative pressure rooms	100	28
Lack of private rooms	50	14
Lack of space to quarantine/isolate	46.4	13
<b>Lack of Resources Affecting Response</b>		
Staffing	32.1	9
Medical supplies (oxygen supplies, IV pumps, IV supplies, etc.)	28.5	8
Disinfectants/cleaning supplies	10.7	3
<b>Comments For Better Future Pandemic Preparedness</b>		
Have an emergency plan	14.2	4
Ensure state and local mask mandate to curb spread	10.7	3
Available diagnostic testing	7.1	2
Adequate amount of PPE stocked	7.1	2
Allow and involve skilled nursing facilities in planning/decision making	7.1	2

**Table 3** Factors Affecting Pandemic Response.

cumulative county cases. A similar trend was also seen when comparing county deaths and county case rates.

SNF settings allow for the care and support of some of society's most vulnerable persons. Skilled nursing facility residents tend to be older, more disabled, more cognitively impaired and have higher rates of comorbidities than people of comparable ages living in the community, which contributes to a significant reliance on others for their care (Werner et al., 2020). Many North Dakota SNFs were required to care for acutely ill patients in their facility, as there were no available hospital beds at local hospitals in which to transfer them. During times where SNFs were required to care for acutely ill residents, at least eight North Dakota facilities (28.5%) reported not having the necessary medical supplies such as oxygen supplies, IV pumps, medications and general patient care supplies to care for residents who had COVID-19.

Prior to the COVID-19 pandemic, most SNFs and medical systems were required to have disaster plans that addressed pandemic influenza. In this study, 100% of SNFs reported having a pandemic preparedness plan, but most were not part of a healthcare system pandemic plan. Historically, preparedness can be subject to "the paper plan" syndrome. Simply, this is an illusion of emergency or disaster preparedness due to the belief that preparedness can be merely accomplished by the completion of a written plan (Auf der Heide, 2007). Unfortunately, most community medical planning tools tend to focus on hospital and emergency medical services, and SNFs are often excluded and forced to plan on their own. Other factors that are usually part of preparedness planning but were reported by North Dakota SNFs as barriers to their response included: a lack of PPE early in the pandemic; a lack of medical supplies; and inadequate infrastructure, such as physical space and adequate ventilation due to time-worn facilities. As a result, preventing the introduction of COVID-19 into SNFs was difficult, and there was significant morbidity and mortality among residents.

At the start of the pandemic, COVID-19 testing capability was limited in many North Dakota SNFs, which was accompanied by slow turnaround times, making real-time assessments and contact tracing of staff and residents extremely difficult. Once community COVID-19 transmission became widespread, contact tracing became ineffective due to a high numbers of cases, as logistical support for effective data collection was limited. In this study, a Spearman's rank correlation test was performed to evaluate for a relationship between SNF resident COVID-19 positivity and staff positivity. A p-value of 0.04 was noted, suggesting that SNFs were unable to prevent the introduction of COVID-19 infections into their facilities once widespread community spread exposed the facility's staff caring for the residents. Additionally, noted in this study was the relationship between a higher number of SNF staff members who were COVID-19

positive, and the increased probability of an outbreak occurring in a SNF (p-value 0.024). Such findings are also similar to other studies regarding SNF resident COVID-19 positivity (Abrams et al., 2020; Bagchi et al., 2021).

A systematic review identified facility characteristics which contributed to COVID-19 cases and deaths, such as larger bed sizes and physical location in areas with high COVID prevalence (Konetzka et al., 2021). Skilled nursing facilities in areas with higher COVID-19 prevalence were also noted to be significantly at higher risk for COVID-19 cases and deaths. Unfortunately, once a SNF had COVID-19 introduced into their facility, mitigation strategies were difficult due to many facilities' aged infrastructure and a lack of space for COVID-19 isolation wings. Thus, better control of COVID-19 community spread could have been critical in mitigating morbidity and mortality in their community's skilled nursing facilities (Chatterjee et al., 2020; Giri et al., 2021).

Community spread could have likely been further mitigated in most communities with the enforcement of good public health measures, such as mask wearing or physical distancing when supported by the state government. When participants were asked if they believed in state mandate increased mask use, 92% agreed or strongly agreed. Interestingly, when asked about a local mask mandate, 42% of communities did not have such a mandate. Notably, the approach of ND leadership was to push authority down to the community levels of government, which resulted in a patchwork of community responses depending on individual communities' view of what was best practice for COVID-19 mitigation and containment.

## LIMITATIONS

While these findings are a call to action for the use of future proactive approaches in North Dakota to mitigate COVID-19 and other respiratory disease outbreaks in skilled nursing facilities, a few limitations are worth noting. One could be that the quality and reliability of the data used within this study could be compromised by the variability of allowing each individual facility to self-define their facility's COVID-19 outbreaks. Self-definition was preferred by the respondents when content validity was performed, given the varying timelines of COVID-19 outbreak occurrences within facilities. Another limitation of the study was unit non-response. While this is a comprehensive survey with a very good response rate, it is also not clear what data would have been received from non-responding SNFs.

## FUTURE RESPONSE RECOMMENDATIONS

The COVID-19 pandemic illustrated several vulnerabilities in our public health infrastructure and identified that as a nation, we are underprepared for protecting our most vulnerable citizens. After many decades and lessons learned, needs remain unmet for skilled nursing facility

infrastructure in the United States. There are many lessons to be learned from the COVID-19 pandemic, which will be discussed in terms of planning (to include logistics/funding) and leadership.

### STATE AND LOCAL LEADERSHIP

As with any new crisis, the COVID-19 pandemic created significant anxiety and uncertainty. Communities look to government leaders and policymakers for guidance during an emergency event, so clear guidance and messaging is crucial, along with accurate metrics when responding to a pandemic or other public health emergencies (PHE). At the onset of a PHE, state and local leaders in both the public and private sectors need to acknowledge and accept that the “usual operations” are disrupted during emergency events, and they should prepare their communities to operate in such an environment. Being able to do so requires reliable data and metrics, so leaders can be transparent and efficient with information sharing to help address the new risk presented by an emergency event like COVID-19. Unfortunately, during the COVID-19 pandemic, individualism had been the prevalent form of preferred mitigation by many at the federal, state and local levels of leadership in terms of following public health measures and recommendations. As a result, there was a patchwork approach to COVID-19 mitigation among communities across North Dakota, which created a non-uniform approach to mitigation that relied on local officials to take the brunt of responsibility for their community’s response to COVID-19. Effective public health policy must come from a whole set of community responses coordinated across the state. One of the significant factors to protect the vulnerabilities of SNF residents is limiting community spread through basic public health measures, such as the wearing of masks, vaccinations and good infection control policies. Support for public health policy needs to occur at all levels of government with the state government taking the lead.

### PLANNING AND PREPAREDNESS

At the onset of the pandemic, our limited understanding of the virus did not allow for sweeping claims about individual vulnerability, although older age quickly became associated with increased risk. Even after the resolution of the pandemic, COVID-19 will not be the last infectious disease outbreak of concern within skilled nursing facilities. Skilled nursing facilities will still have to deal with seasonal influenza, norovirus and RSV infections, or the threat of another novel respiratory pathogen, all of which will require additional planning for current and future preparedness and response efforts (Mills et al., 2020). There is an immediate need to know specific types of susceptibilities and vulnerabilities ahead of time to allow local and state health officials to plan and allocate resources accordingly. To avoid a repeated history of under preparedness for future respiratory

disease outbreaks or pandemics, policymakers will require a stronger political will to obtain further funding and resources to build enhanced skilled nursing facility infrastructure (Peters, 2020). The added costs and loss of revenue due to the pandemic will require investment in SNFs to address issues such as PPE supply chains, testing capability and incentives for work force sustainment (Gastfriend et al., 2021; White et al., 2021). Overall, the states that handle future disease outbreaks or pandemics the most effectively will be those that find ways to make sure SNFs have the appropriate best practice resources for testing, PPE, separation units and staffing (Van Houtven et al., 2021). Additionally, the Long-Term Services and Support (LTSS) system can no longer be given a low policy priority from funding sources and governmental authorities (Dawson et al., 2021).

Future state and local pandemic emergency plans need to be reviewed with the prioritization of skilled nursing facilities as front line facilities during a pandemic, rather than placing their “traditional” emphasis of emergency preparedness on hospitals (Mills et al., 2020). SNF pandemic preparedness should be refined to produce a more robust emergency response to mitigate outbreaks and reduce the mortality and morbidity of their residents in future respiratory pandemics (Fulmer et al., 2020; Stall et al., 2020). In future public health emergency events, SNFs also need to be part of the Incident Command Structure. For adequate and efficient future responses during a public health emergency, a whole series of community responses will be required to protect our most vulnerable population, rather than most of the response falling squarely on the shoulder of SNFs that are already understaffed and under-resourced. To mitigate unnecessary morbidity and mortality during future public health emergencies, skilled nursing facilities must be recognized as integral components of local health care systems, be prioritized for financial assistance and provided additional human and infrastructure resources as much as “traditional” medical systems. Without adequate SNF infrastructure and bed availability, traditional medical systems such as hospitals will not have an adequate outlet for patient discharges to address patients who need SNF services. As a result, crucial hospital bed resources would remain occupied longer, limiting necessary resources for those who are more acutely ill. The ability of SNFs to be better protected and prepared in the future will require policy makers and key stakeholders to view local and state public health preparedness through a lens based on flexibility, logistics and maintaining a continuous state of readiness.

To improve the state of readiness of SNFs, state and federal funding is desperately needed for skilled nursing facilities to modernize and update ventilation systems and build facility designs that allow for easier conversion to acute care units, such as those that were needed



during the COVID-19 pandemic. If SNFs are expected to perform acute care within their facilities as seen during the COVID-19 pandemic, logistical support in terms of medical supplies and equipment such as IV pumps, oxygen supplies and other patient care supplies will be needed from local healthcare systems for future events. Such partnerships have been reported in the literature and were found to be very beneficial for providing additional staffing, enabling infection prevention and control, and improving occupational health and operational support to nursing homes (Stall *et al.*, 2020). However, the logistical support from local healthcare systems could prove difficult given the supply chain shortages experienced during this pandemic, but future plans must address the logistical issue. Emergency planners will need to start planning and exercising plans for logistical support now in preparation for future pandemics and other disease outbreaks.

Current and future opportunities also exist to address staffing, which is an important component of emergency surge staffing. Skilled nursing facilities could consider collaboration with local universities to help facilitate training for skilled nursing facility staff during times when more acute care is needed, as acute care is not a normal skill set for SNF staff. Additionally, incentives and commensurate wages for nursing home staff comparable with the wages of hospital healthcare workers will also be critical for the recruitment and retention of SNF staff, particularly in rural areas where resource pools are limited.

## CONCLUSION

Since the beginning of the COVID-19 pandemic, substantial lessons have been learned, which will aid future pandemic preparedness and improve the quality of care for nursing home residents during disease outbreaks. The tragedy of the past two years has provided many critical lessons to inform future emergency preparedness for skilled nursing facilities. A combination of internal and external factors predisposed nursing homes to an increased propensity of COVID-19 spread, despite the numerous strategies employed as an attempt to mitigate the negative impacts. Future policies and priorities of local, state and federal leaders aimed at addressing future crises need to recognise the integral role of skilled nursing facilities within the community's preparedness rather than as a silo within the community. Effective public health policy must come from a comprehensive community response coordinated across the state. Finally, support for public health policy needs to occur at all levels of government, rather than adopting the individualism and patchwork mitigation driven by politics.

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## COMPETING INTERESTS


The authors have no competing interests to declare.

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