

Notes from the Field

COVID-19–Associated Mortality Risk Among Long-Term Care Facility Residents and Community-Dwelling Adults Aged ≥65 Years — Illinois, December 2020 and January 2022

Daniel Lee, MPH, MBA¹; Catherine Counard, MD²;
Angela Tang, MPH³; Sarah Brister, MPH³; Ngozi Ezike, MD⁴

U.S. adults aged ≥65 years are at increased risk for severe illness and death from COVID-19 (1). The communal nature of long-term care facilities (LTCFs), and the vulnerability of the LTCF population (typically aged ≥65 years, and often having underlying chronic conditions, cognitive and physical impairments, immunocompromised status, or other disabilities) further increases risk for COVID-19 infection, hospitalization, and death in this group (2). Although multiple studies highlight these risks (3), there is limited information comparing the risk among LTCF residents with that in an age-comparable population living in the community. This report estimates the risk for death among LTCF residents by comparing COVID-19–associated mortality rates among LTCF residents aged ≥65 years and persons aged ≥65 years who are not LTCF residents (community-dwelling adults) in Illinois. Illinois infectious disease registry data and population data from state regulatory sources and the U.S. Census Bureau were used to calculate COVID-19 death rates among persons aged ≥65 years living within and outside of LTCFs during a prevaccination baseline month (December 2020) and a comparison month 1 year after COVID-19 vaccination began (January 2022).

For Illinois LTCFs, data on total population, population aged ≥65 years, and vaccination coverage percentage were collected for four types of facilities*: 1) skilled nursing facilities (63,601, 48,973, and 88%, respectively)[†]; 2) veterans homes (560, 552, and 97%, respectively)[‡]; 3) assisted living facilities (22,859, 22,562, and 96%, respectively)[§] and; 4) supportive

living facilities (11,980, 10,954, and 92%, respectively).^{**} The population of community-dwelling adults was obtained by subtracting the LTCF group's population from the U.S. Census Bureau's July 2021 estimate for the overall Illinois population aged ≥65 years.^{††} COVID-19 vaccination coverage rates among community-dwelling adults were obtained from the Illinois Comprehensive Automated Immunization Registry Exchange.^{§§}

Numbers of COVID-19 deaths among LTCF residents^{¶¶} and community-dwelling adults were abstracted from the Illinois National Electronic Disease Surveillance System (I-NEDSS) for December 2020 and January 2022 and divided by the corresponding resident populations to produce death rates per 100,000 population for both groups. Only deaths classified as “from COVID-19” (i.e., COVID-19–related deaths, as opposed to COVID-19 cases in persons dying from a cause unrelated to COVID-19) in the I-NEDSS record are included in this analysis.^{***} To gauge the combined effect of focused COVID-19 control measures (e.g., vaccination, infection control, and a rigorous testing regimen) on the risk for death from COVID-19 among LTCF residents, their risk was compared with the risk among community-dwelling adults during a prevaccination month and a postvaccination month, both of which included a local maximum for deaths. This activity was reviewed by the Illinois Department of Public Health (IDPH) Institutional Review Board and was conducted in accordance with applicable laws and policies protecting human research subjects.^{†††} SAS statistical software (version 9.4M6; SAS Institute) was used for analyses.

Although the COVID-19 mortality rate has been lower among community-dwelling adults aged ≥65 years than among LTCF residents aged ≥65 years throughout the pandemic, the rate among the

* The four types of facilities are defined in the following Illinois state legislative acts: 210 ILCS 45/; 210 ILCS 9/; and 305 ILCS 5/. <https://www.ilga.gov/legislation/ilcs/ilcs.asp>

[†] Total and aged ≥65 years populations: Kaiser Family Foundation (<https://www.kff.org/state-category/providers-service-use/nursing-facilities/> and <https://www.kff.org/statedata/custom-state-report/?i=148824&g=il&view=3>, respectively); vaccination rate: National Healthcare Safety Network (NHSN) Long-Term Care (LTCF) COVID-19 Module. <https://www.cdc.gov/nhsn/ltc/index.html>

[‡] Illinois Department of Veterans' Affairs (<https://www2.illinois.gov/veterans/Pages/default.aspx>) internal data, supplied January 31, 2022.

[§] IDPH internal data, based in part on LTCF COVID-19 Vaccination and Testing Reporting Survey results supplied February 28, 2022 (survey form: <https://app-smartsheet.com/b/form/fa2d7abfb102490b9d2622a2ba490744> as of March 26, 2022).

^{**} Illinois Department of Healthcare and Family Services (<https://www2.illinois.gov/hfs/Pages/default.aspx>), Medicaid Management Information System internal data, supplied April 6, 2022.

^{††} <https://www.census.gov/quickfacts/IL> (Accessed March 26, 2022).

^{§§} <https://dph.illinois.gov/topics-services/prevention-wellness/immunization/icare.html> (Accessed March 26, 2022).

^{¶¶} I-NEDSS records are routinely matched with existing listings of LTCFs to ensure that persons associated with an LTCF are identified as such in the I-NEDSS database. LTCF deaths were distinguished by the presence of an LTCF identifier in either the patient residence or potential exposure fields.

^{***} The primary inclusionary criterion is that the term “COVID-19” or “SARS-CoV-2” or an equivalent is listed on death certificate as immediate or underlying cause of death or as a significant condition contributing to death. On a case-by-case basis, other evidence might be used to identify a COVID-19–related death (e.g., time from positive laboratory result to death, clinical history, medical records, or autopsy findings).

^{†††} 45 C.F.R. part 46, 21 C.F.R. part 56; 42 U.S.C. Sect. 241(d); 5 U.S.C. Sect. 552a; 44 U.S.C. Sect. 3501 et seq.

LTCF group declined 69% during the study period, from 1,932 per 100,000 at baseline (December 2020) to 594 during the comparison month (January 2022) ($p < 0.01$), whereas among community-dwelling adults, this rate increased by nearly 8%, from 120 per 100,000 to 129 (Table). The ratio of the COVID-19 mortality rate among LTCF residents to that among community-dwelling adults decreased by 71%, from 16.1 to 4.6, during this period. In January 2022, 91% of LTCF residents and 85% of community-dwelling adults were fully vaccinated, and 75% and 61%, respectively, had received a booster dose; no one in either group was fully vaccinated in December 2020.

These findings are subject to at least three limitations. First, a decline in mortality risk for LTCF residents would be expected over time even in the absence of prevention efforts, because of the disproportionate loss of the most susceptible members of this group (4). Thus, it is not possible to distinguish how much of the decrease in the mortality rate ratio might be attributable to specific mitigation measures (e.g., vaccination of residents and LTCF staff members, testing programs, and mask use). Second, the disproportionate distribution of deaths by race and ethnicity (5) was not assessed because Illinois LTCF population data stratified by race and ethnicity are not available. Finally, it was not possible to examine more discrete age groups; compared with community-dwelling adults, the average age of LTCF residents was likely higher and probably included larger shifts in age distribution over the period examined.

Throughout the pandemic, IDPH led efforts to strengthen adherence to core infection prevention and control measures in LTCFs, consistent with CDC, Centers for Medicare & Medicaid Services, and department-issued guidelines.^{§§§,¶¶¶,****} These measures included screening staff members for COVID-19

symptoms, restricting visitors, and rapidly identifying new cases through a combination of reverse transcription–polymerase chain reaction and rapid testing. Since March 2020, IDPH has been working with infection control specialists trained in long-term care procedures and processes to update LTCF COVID-19 guidelines; issue emergency rules; conduct weekly statewide webinars for local health departments, LTCF administrators, and clinical staff members; and deliver nearly 2,000 consultations for health departments and LTCFs on mask use, physical distancing, ventilation, and quarantine and isolation.

The COVID-19–associated mortality rate among Illinois LTCF residents aged ≥ 65 years declined markedly from December 2020 to January 2022, both in absolute terms and compared with the change in risk among community-dwelling adults. Vaccination coverage in January 2022 was high in both groups, suggesting that nonvaccine interventions also played a role in protecting LTCF residents. Uncontrolled variables, including differences in incidence and characteristics of virus strains circulating during those times, also likely had an effect.^{†††,§§§§} These findings reinforce that COVID-19 prevention and control strategies, including vaccination, can substantially reduce COVID-19–associated mortality among LTCF residents.

^{†††} <https://www.cdc.gov/mmwr/volumes/71/wr/mm7104e4.htm>

^{§§§§} https://www.cdc.gov/mmwr/volumes/71/wr/mm7106a4.htm?s_cid=mm7106a4_w

Acknowledgments

Pharmacy Partnership for Long-Term Care Program; Illinois Emergency Management Agency; Judy Kauerauf, Michael Orama, Lori Saathoff-Huber, Communicable Disease Control Section, Illinois Department of Health; Deborah Patterson Burdsall, Karen Trimberger, Hektoen Institute of Medicine; Suzanne Beavers, Carolyn B. Bridges, Anna Llewellyn, Clifford McDonald, Andrew Vernon, Cindy Weinbaum, CDC.

TABLE. COVID-19–associated deaths in long-term care facility residents and community-dwelling adults* aged ≥ 65 years — Illinois, December 2020 and January 2022

Metric	December 2020			January 2022		
	Total	LTCF residents	Community-dwelling adults	Total	LTCF residents	Community-dwelling adults
No. of adults [†]	2,040,107	83,041	1,957,066	2,040,107	83,041	1,957,006
No. of deaths	3,946	1,604	2,342	3,026	493	2,533
Rate [§]	193	1,932	120	148	594	129
Rate ratio [¶]	16.1	—	—	4.6	—	—

Abbreviation: LTCF = long-term care facility.

* Adults who are not residents of an LTCF.

[†] Total number of adults obtained from the U.S. Census Bureau estimate for the overall Illinois population aged ≥ 65 years; total number of LTCF residents obtained by various methods, depending upon facility type; total number of community-dwelling adults obtained by subtracting the number of LTCF residents from the total population. For the purposes of this analysis, population estimates were assumed constant across the study period; the effects of actual differences on results and conclusions, if any, would be negligible.

[§] Deaths per 100,000 persons aged ≥ 65 years.

[¶] Rate in LTCF residents divided by rate in adults living in the community.

Corresponding author: Daniel Lee, daniel.lee@illinois.gov.

¹Office of Preparedness and Response, Illinois Department of Public Health; ²Office of Disease Control, Illinois Department of Public Health; ³Office of Policy Planning and Statistics, Illinois Department of Public Health; ⁴Office of the Director, Illinois Department of Public Health.

All authors have completed and submitted the International Committee of Medical Journal Editors form for disclosure of potential conflicts of interest. No potential conflicts of interest were disclosed.

References

1. Yek C, Warner S, Wiltz JL, et al. Risk factors for severe COVID-19 outcomes among persons aged ≥ 18 years who completed a primary COVID-19 vaccination series—465 health care facilities, United States, December 2020–October 2021. *MMWR Morb Mortal Wkly Rep* 2022;71:19–25. PMID:34990440 <https://doi.org/10.15585/mmwr.mm7101a4>
2. Panagiotou OA, Kosar CM, White EM, et al. Risk factors associated with all-cause 30-day mortality in nursing home residents with COVID-19. *JAMA Intern Med* 2021;181:439–48. PMID:33394006 <https://doi.org/10.1001/jamainternmed.2020.7968>
3. Dykgraaf SH, Matenge S, Desborough J, et al. Protecting nursing homes and long-term care facilities from COVID-19: a rapid review of international evidence. *J Am Med Dir Assoc* 2021;22:1969–88. PMID:34428466 <https://doi.org/10.1016/j.jamda.2021.07.027>
4. Lipsitch M, Goldstein E, Ray GT, Fireman B. Depletion-of-susceptibles bias in influenza vaccine waning studies: how to ensure robust results. *Epidemiol Infect* 2019;147:e306. PMID:31774051 <https://doi.org/10.1017/S0950268819001961>
5. Weech-Maldonado R, Lord J, Davlyatov G, Ghiasi A, Orewa G. High-minority nursing homes disproportionately affected by COVID-19 deaths. *Front Public Health* 2021;9:606364. PMID:33829006 <https://doi.org/10.3389/fpubh.2021.606364>