

COVID-19 risk mitigation behaviors among rural and urban community-dwelling older adults in summer, 2020

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Abstract

Purpose: Risk mitigation behaviors are important for older adults, who experience increased mortality risk from COVID-19. We examined these reported behaviors among rural and urban community-dwelling adults aged 65 and older.

Methods: We analyzed public use files from the National Health and Aging Trends Study, which fielded a COVID survey from June to October, 2020, restricted to community-dwelling adults ($n = 2,982$). Eight behaviors were studied: handwashing, avoid touching face, mask wearing, limiting shopping, avoiding restaurants or bars, limiting gatherings, avoiding contact with those outside the household, and distancing. Residence was defined as urban (metropolitan county) or rural (nonmetropolitan county). Difference testing used Chi Square tests, with an alpha level of $P = .05$. Multi-variable logistic regression was used to calculate adjusted odds ratios.

Results: Rural residents constituted 18.8% (\pm Standard Error 3.6%) of the study population. In bivariate comparisons, rural older adults were less likely to report 5 of 8 studied behaviors: keep 6-foot distance (rural: 88.3% \pm 1.0%, urban 93.2% \pm .08%), limit gatherings (rural 87.5% \pm 1.8%; urban 91.6% \pm 0.8%), avoid restaurants/bars (rural 85.3% \pm 1.9%, urban 89.6% \pm 0.8%), avoid touching face (rural 83.1% \pm 2.3%, urban 88.6%, 0.8%), and avoid contact with those outside the household (rural 80.4% \pm 2.4%, urban 86.2% \pm 1.0%). After adjusting for demographic characteristics, only maintaining a 6-foot distance remained lower among rural older adults (AOR 0.58, 95% CI: 0.42-0.81).

Conclusions: Within older adults, reported compliance with recommended behaviors to limit the spread of COVID-19 was high. Nonetheless, consistent rural shortfalls were noted. Findings highlight the need for rural-specific messaging strategies for future public health emergencies.

KEYWORDS

COVID, health education, older adults, risk behaviors

Beginning in late summer 2020, both incidence and death rates for COVID-19 in rural communities began to exceed those in urban America.^{1,2} By February 2, 2021, case rates in rural counties had reached 8,320 per 100,000 residents, versus 7,903 per 100,000 in

urban counties.³ Multiple factors contributed to excess deaths once COVID-19 had reached rural communities, including an older population, greater rates of poverty, more individuals with pre-existing health risks, lack of health insurance, and greater distance to health care

providers.¹ In addition, personal behaviors can influence the exposure risk for COVID-19. Previous work has indicated that rural adults are less likely to report protective health-related behaviors.^{4,5}

Risk mitigation behaviors, such as mask wearing and physical distancing, have been documented to reduce COVID-19 spread.⁶ Evidence for rural adoption of risk mitigation behaviors is ambiguous. While one online survey in late April 2020 found rural and urban residents equally concerned with COVID and willing to engage in social distancing and avoidance of public spaces,⁷ lower use of risk mitigation behaviors in rural areas has been documented in both surveys⁸⁻¹⁰ and observational studies.¹¹

Individuals aged 65 years and older are at higher risk for death due to COVID-19.¹² Prior research documented that older adults had higher compliance rates for recommended risk mitigation behaviors than their younger peers during the summer months of 2020.^{10,11} However, little research to date has explored potential rural disparities in risk mitigation within this vulnerable population. We extend the recent work of Callaghan and associates,⁹ which used an online survey to explore rural-urban differences in COVID-19 risk mitigation among US adults. This analysis found that rural adults were less likely to report mask wearing and working from home, but otherwise did not differ from urban respondents. Given rural internet gaps, however, an online survey may not adequately reach vulnerable rural populations, such as older adults.¹³ The purpose of this study is to examine the adoption of Centers for Disease Control and Prevention (CDC)-recommended risk mitigation behaviors among a population-based sample of community-dwelling older adults, that is, individuals not in assisted living, nursing home, or other congregate settings.

METHODS

We analyzed early release public use files from National Health and Aging Trends Study (NHATS), an established, longitudinal panel survey of a nationally representative sample of Medicare beneficiaries aged 65 and older, funded by the National Institute on Aging.¹⁴ During late June-late October 2020, the NHATS mailed a survey addressing behaviors related to the COVID-19 pandemic to all study participants; it achieved an 83.4% response rate.¹⁵

The NHATS COVID-19 data set contained 3,188 responses, with most responses received in July (1,929) and August (758).¹⁵ Analysis was restricted to community-dwelling persons, that is, individuals not in assisted living, nursing home, or other congregate settings ($n = 2,982$). Response rates to individual items varied, with about 5% of participants either indicating “does not apply” or skipping an item entirely across items. Item response rates did not vary with residence, which was defined at the county level and characterized following the Office of Management and Budget definition as metropolitan (urban) or non-metropolitan (rural).

Respondent characteristics included in our analysis draw from Anderson’s Behavioral Model of healthcare use, as available in the COVID-19 data set.¹⁶ These characteristics were sex, age (56-74, 75-84, 85+ years), race (White/non-White), marital status (currently married/living together; divorced/separated/widowed; never married),

workforce participation (working/not) and US Census region (North-east, South, West, and Midwest). Race was included because reported mortality was higher in non-White populations.¹² Workforce participation was included as a possible indicator of exposure to risk. Income was not included due to high levels of missingness (28% of unweighted observations).

Risk mitigation behaviors: The NHATS COVID survey asked, “During the COVID-19 outbreak, have you ever done the following to keep the disease from spreading?” Options for all items except handwashing included “does not apply;” analyses were restricted to “yes” and “no” responses only. The number of valid responses for each behavior are shown below. Nine activities were listed, of which we examined 8:

1. Frequently wash your hands or use sanitizer ($n = 2,916$)
2. Avoid contact with people *not* living with you ($n = 2,823$)
3. Stay at least 6 feet away from people not living with you ($n = 2,833$)
4. Limit group gatherings like get-togethers with family *not* living with you (2,732)
5. Avoid being in restaurants and bars ($n = 2,817$)
6. Limit shopping and other errands ($n = 2,855$)
7. Wear a face mask when going out ($n = 2,877$)
8. Avoid touching your face when you are out ($n = 2,846$)

A ninth item, “Avoid contact with people living with you” was not examined due to a high degree of missingness (25.3% indicated “does not apply” and 4.8% were missing).

We did not attempt to create an index of preventive behaviors. The likelihood of failing to respond to at least 1 of the 8 items, thus invalidating a summary score, was found to be biased, with men, persons who are not married or living together, and adults in the older age categories more likely to have skipped an item than their counterparts (data not shown).

All analyses incorporate recommended sampling weights and procedures for developing estimates for the structured NHATS sample and were conducted in STATA (Stata Corp LLC, College Station, TX). Rural-urban differences were tested using Chi Square, with an alpha level of 0.05. Multivariable logistic regression was used to calculate adjusted odds ratios. This research was categorized as “not human subjects” by the Institutional Review Board at the University of South Carolina.

RESULTS

NHATS COVID respondents principally resided in urban versus rural counties ($81.2\% \pm 3.6\%$ vs $18.8\% \pm 3.6\%$; Table 1.) A slight majority of respondents were women ($54.7\% \pm 1.2\%$), most were younger than 85 years of age, $16.9\% (\pm 1.1\%)$ were still in the workforce, and $38.3\% (\pm 1.3\%)$ lived in the South. Rural older adults were more likely than urban residents to identify themselves as non-Hispanic White versus other categories ($91.4\% \pm 2.2\%$ vs $81.0\% \pm 1.5\%$; $P = .0035$) and to be married or living with a partner versus other situations ($64.0\% \pm 2.4\%$ vs $57.6\% \pm 1.4\%$; $P = .0246$); no other characteristics differed with residence.

TABLE 1 Characteristics of respondents to NHATS 2020 COVID-19 survey, by residence (n = 2,982)

| | Urban n = 2,376 | | Rural n = 606 | | Total n = 2,982 | | P value |
|---------------------------------|-----------------|------|---------------|------|-----------------|------|---------|
| | Est % | SE % | Est % | SE % | Est % | SE % | |
| Population distribution | 81.2 | 3.6 | 18.8 | 3.6 | 100.0 | | n/a |
| <i>Characteristics</i> | | | | | | | |
| Interview month | | | | | | | .2313 |
| June/July | 62.6 | 1.8 | 65.1 | 2.9 | 63.1 | 1.5 | |
| August | 26.6 | 1.6 | 27.9 | 3.3 | 26.9 | 1.4 | |
| September/October | 10.8 | 1.0 | 7.0 | 1.4 | 10.1 | 0.9 | |
| Gender | | | | | | | .2958 |
| Male | 45.8 | 1.4 | 43.1 | 2.3 | 45.3 | 1.2 | |
| Female | 54.2 | 1.4 | 56.9 | 2.3 | 54.7 | 1.2 | |
| Age | | | | | | | .6970 |
| 65-74 years | 42.6 | 1.1 | 43.4 | 2.3 | 42.7 | 1.0 | |
| 75-84 years | 44.9 | 1.3 | 45.2 | 2.3 | 44.9 | 1.1 | |
| 85+ years | 12.6 | 0.6 | 11.5 | 0.8 | 12.3 | 0.5 | |
| Race/ethnicity | | | | | | | .0035 |
| Non-Hispanic White | 81.0 | 1.5 | 91.4 | 2.2 | 83.0 | 1.1 | |
| Other | 19.0 | 1.5 | 8.7 | 2.2 | 17.0 | 1.1 | |
| Marital status | | | | | | | .0246 |
| Married or living with partner | 57.6 | 1.4 | 64.0 | 2.4 | 58.8 | 1.2 | |
| Separated, widowed, or divorced | 39.6 | 1.3 | 34.9 | 2.2 | 38.7 | 1.1 | |
| Never married | 2.8 | 0.5 | 1.0 | 0.5 | 2.5 | 0.4 | |
| Workforce participation | | | | | | | .1302 |
| Working for pay | 17.6 | 1.2 | 13.6 | 2.2 | 16.9 | 1.1 | |
| Not working for pay | 82.4 | 1.2 | 86.5 | 2.2 | 83.2 | 1.1 | |
| Region | | | | | | | .0642 |
| Northeast | 20.2 | 2.0 | 6.5 | 5.9 | 17.7 | 1.2 | |
| Midwest | 17.5 | 2.4 | 45.0 | 9.1 | 22.7 | 1.1 | |
| South | 40.9 | 2.5 | 27.3 | 8.8 | 38.3 | 1.3 | |
| West | 21.4 | 2.4 | 21.2 | 8.5 | 21.4 | 0.9 | |

Abbreviations: Est, weighted estimate to represent the national population; SE, standardized linear error of the estimate.

Older adults, regardless of residence, reported high levels of compliance with recommendations regarding frequent handwashing or sanitizing (97.6% \pm 0.4%) and mask wearing (96.6% \pm 0.4%), with no rural-urban differences (Table 2). Similarly, there were no differences between rural and urban respondents regarding limiting shopping and errands (87.4% \pm 0.7%). Rural older adults were significantly less likely than their urban peers to report 5 other behaviors: maintaining a 6-foot distance, limiting gatherings, avoiding restaurants/bars, avoiding face touching, and avoiding people not in their household (Table 2). The lowest rate of reported risk mitigation behaviors among rural older adults was 80.4% (\pm 2.4%), for avoidance of contact with persons not in the household.

Analyses adjusting for age, race, sex, marital status, workforce participation, and region, as well as rurality, were conducted for the 5 risk mitigation behaviors which rural adults were less likely to report than

their urban peers (Table 3). In adjusted analysis, residence remained significantly associated with reduced reporting of maintaining a 6-foot distance from persons not in the household (AOR 0.58, 95% CI: 0.42-0.81) but not with other activities. Men had a lower likelihood of reporting all risk mitigation behaviors except maintaining a 6-foot distance (Table 3). Non-White respondents had higher odds of reporting limiting gathering, avoiding restaurants, avoiding touching the face, and avoiding persons outside the household.

DISCUSSION

Paralleling earlier research,⁸ we found that compliance with recommended risk mitigation behaviors was high among community-dwelling older adults, with 97.6% of NHATS respondents reporting frequent

TABLE 2 Self-reported adoption of COVID-19 risk mitigation measures among community-dwelling adults age 65 and older, by residence, 2020 NHATS

| Behaviors | n | Urban | | Rural | | Total | | P value |
|--|-------|-------|-----|-------|-----|-------|-----|---------|
| | | % | SE | % | SE | % | SE | |
| Frequently wash hands | 2,916 | 97.9 | 0.5 | 97.9 | 0.9 | 97.6 | 0.4 | .2002 |
| Wear a mask when going out | 2,887 | 96.9 | 0.5 | 95.4 | 1.3 | 96.6 | 0.4 | .2426 |
| Stay 6 feet away from people not in household | 2,833 | 93.2 | 0.8 | 88.3 | 1.0 | 92.2 | 0.7 | .0006 |
| Limit group gatherings | 2,732 | 91.6 | 0.8 | 87.4 | 1.8 | 90.8 | 0.8 | .0166 |
| Avoid being in restaurants, bars | 2,817 | 89.6 | 0.8 | 85.3 | 1.9 | 88.8 | 0.8 | .0178 |
| Limit shopping and other errands | 2,855 | 88.0 | 0.9 | 84.8 | 1.4 | 87.4 | 0.7 | 0.0699 |
| Avoid touching face | 2,846 | 88.6 | 0.8 | 83.1 | 2.3 | 87.6 | 0.7 | .0271 |
| Avoid contact with people not living with respondent | 2,823 | 86.2 | 1.0 | 80.4 | 2.4 | 85.1 | 0.9 | .0237 |

Abbreviations: Est, weighted estimate to represent the national population; SE, standardized linear error of the estimate.

handwashing and 96.6% reporting mask wearing (96.6%). The “worst” risk mitigation behavior rate was avoiding contact with persons outside the household. Specifically, only 80.4% of rural older adults, 4 of every 5 rural adults, were compliant with this public health recommendation. Disparities between rural and urban populations across multiple risk mitigation behaviors, however, may increase vulnerability to infection among rural adults. Rural disparities may have implications for rural older adults’ response to future disease emergencies.

As progress is made in controlling COVID-19 through vaccination and other public health measures, there needs to be a way to identify public health messaging best suited to rural populations, in preparation for future time-sensitive emergencies. “Rural” is not monolithic and caution is needed when interpreting reports of “rural” behavior and behavioral intentions. Available survey data are difficult to interpret, with some researchers finding attitudes among rural and urban respondents to be similar,⁷ while others find sharp differences in opinion regarding the seriousness of COVID-19.¹⁷ However, some inferences may be possible.

Commentators have suggested that messaging for both risk mitigation behaviors and vaccination needs to be adjusted to local audiences, particularly rural ones.¹⁸ Rural residents as a whole have been found to be less likely than urban or suburban residents to perceive COVID as a severe threat, but a majority (86%) said that they would trust their personal health care provider to give them accurate information.¹⁷ Effective rural messaging could draw on local spokespersons and appeal to a sense of community.¹⁹ Messaging that focuses on protecting others in the community through mitigation behaviors may be more effective than appeals that promote personal safety.

Similarly, tailored messages may be appropriate for men, who have higher mortality rates from COVID-19 than their female counterparts.²⁰ We found that rural men over age 65 were less likely to engage in all risk mitigation behaviors except maintaining a 6-foot distance. Research in the HIV/AIDS field suggests that certain definitions of masculinity may drive risky behaviors.²¹ Messaging that appeals to

men as a protector of their communities/families may help improve the uptake of risk mitigation behaviors in this population.²²

Our results have several limitations. With self-reported data, high rates of risk mitigation behaviors may represent a desire to appear to comply with public health directives. However, some of our results, such as lower reported risk mitigation behaviors by men versus women, correspond with observational work,⁹ suggesting that respondents reported actual behavior. Second, the data set used do not allow us to examine the frequency of the risk mitigation behaviors. Third, there were too few non-White respondents in the relatively small NHATS sample to allow analyses focused on individual rural minority populations, such as rural Black or Hispanic adults, which might have allowed better assessment and better planning for future health crises. Furthermore, the COVID-19 pandemic evolved through a rapidly changing national picture, with reported behavior changing from month to month. Late summer of 2020, the time frame for the bulk of NHATS COVID responses, coincided with high national rates for risk mitigation behaviors, such as mask wearing.⁸ Finally, the NHATS COVID survey did not explore beliefs and concerns underlying risk mitigation behaviors, which restricts the ability to deduce appropriate educational interventions.

Assessing behavior during a rapidly changing epidemiological and political situation is difficult. In the June-October 2020 period, a majority of rural community-dwelling older adults had adopted risk mitigation behaviors in response to the COVID-19 pandemic. Projecting future preventive behaviors, such as receipt of COVID-19 vaccination, based on our findings is difficult. Recent polls suggest that a lower proportion of rural adults as a group, versus all urban adults, intend to obtain a COVID-19 vaccination.²³ However, as of March 15-29, 2021, 68% of rural adults age 65 years and older surveyed reported having already received a COVID-19 vaccine, and only 10% reported they would “definitely not” seek vaccination.²³ It is thus likely that vaccine uptake in this high-risk population will be high. Even with high vaccine uptake among older adults, the potential for new COVID-19 variants

TABLE 3 Adjusted odds^a associated with rural residence, use of selected COVID-19 risk mitigation behaviors, 2020 NHATS

| | Stay 6 feet apart | | Limit group gatherings (N = 2,732) | | Avoid restaurants, bars (N = 2,817) | | Avoid touching face (N = 2,855) | | Avoid persons not in household (N = 2,846) | |
|--|-------------------|-----------------------|------------------------------------|-----------|-------------------------------------|------------|---------------------------------|-----------|--|-----------|
| | AOR | 95% CI | AOR | 95% CI | AOR | 95% CI | AOR | 95% CI | AOR | 95% CI |
| Rural residence ^a | 0.58 | LCL, UCL 0.42-0.81 | 0.69 | 0.45-1.04 | 0.80 | 0.59-1.10 | 0.69 | 0.43-1.10 | 0.74 | 0.52-1.05 |
| Gender (ref female) | | | | | | | | | | |
| Male | 0.70 | 0.57-1.5 | 0.55 ^b | 0.38-0.79 | 0.70 ^a | 0.52-0.95 | 0.32 ^c | 0.24-0.43 | 0.56 ^c | 0.41-0.77 |
| Age group (ref: 65-74) | | | | | | | | | | |
| 75-84 | 0.94 | 0.57-1.55 | 1.04 | 0.72-1.51 | 1.04 | 0.73-1.49 | 0.69 | 0.47-1.00 | 1.07 | 0.78-1.47 |
| 85 or older | 0.64 | 0.37-1.08 | 0.89 | 0.56-1.41 | 1.09 | 0.71-1.66 | 0.56 ^b | 0.39-0.81 | 0.87 | 0.61-1.26 |
| Race/ethnicity (ref: White) | | | | | | | | | | |
| Non-White | 1.73 | 0.96-3.11 | 2.49 ^c | 1.50-4.12 | 7.69 ^c | 3.99-14.80 | 3.09 ^b | 1.57-6.07 | 2.10 ^c | 1.50-2.94 |
| Marital status (ref: married or living together) | | | | | | | | | | |
| Separated/divorced/widowed | 0.93 | 0.62-1.39 | 0.93 | 0.64-1.35 | 1.18 | 0.84-1.65 | 0.85 | 0.65-1.10 | 0.79 | 0.60-1.02 |
| Never married | 2.13 | 0.63-7.23 | 2.81 | 0.82-9.67 | 1.32 | 0.55-3.19 | 0.78 | 0.31-2.00 | 1.45 | 0.63-3.35 |
| Work status (ref: not working) | | | | | | | | | | |
| Working | 0.94 | 0.60-1.46 | 0.73 | 0.47-1.12 | 1.03 | 0.68-1.56 | 0.97 | 0.63-1.47 | 0.63 ^a | 0.43-0.93 |
| Region (ref: Northeast) | | | | | | | | | | |
| Midwest | 1.01 | 0.51-2.00 | 0.81 | 0.45-1.45 | 0.70 | 0.41-1.17 | 0.80 | 0.48-1.33 | 0.71 | 0.47-1.08 |
| South | 1.14 | 0.58-2.24 | 0.83 | 0.50-1.38 | 0.79 | 0.45-1.38 | 1.00 | 0.64-1.55 | 1.01 | 0.69-1.49 |
| West | 0.72 | 0.33-1.56 | 0.93 | 0.47-1.86 | 0.78 | 0.41-1.47 | 0.63 | 0.40-1.00 | 0.86 | 0.56-1.34 |

^aP < .05.

^bP < .01.

^cP ≤ .001.

may lead to renewed focus on risk mitigation behaviors. Continued local tracking of vaccine implementation will be needed to ensure that rural populations are not left behind. Looking forward, findings from current research, such as the information provided here, can be used to guide the development of public health interventions for future public health emergencies.

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