

OBSERVATION: BRIEF RESEARCH REPORT

Feasibility of Separate Rooms for Home Isolation and Quarantine for COVID-19 in the United States

Background: Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is believed to spread mainly through respiratory droplets between persons who are in close quarters. Such droplets are produced when an infected person coughs, sneezes, or talks. As a result, infected and exposed persons are instructed to separate themselves from others to limit further spread. The World Health Organization and the Centers for Disease Control and Prevention advise those who are infected with or have been exposed to coronavirus disease 2019 (COVID-19) to isolate or quarantine at home in a separate bedroom and bathroom if possible (1, 2).

Objective: To determine the feasibility of separate rooms for isolation and quarantine for housing units in the United States.

Methods and Findings: We obtained data on residential dwelling units (excluding group quarters) and occupants from the most recently available (2017) American Housing Survey. This survey includes a representative national sample of housing units and was done by the U.S. Census Bureau, with a response rate of 80.5% (3). We determined the number of bedrooms, bathrooms, and occupants per unit; the type and age of units; and respondent demographics.

We estimated the proportion of dwellings where optimal isolation or quarantine was impossible because separate bedrooms and bathrooms were unavailable. We considered a separate bedroom to be available in all single-occupant dwellings and in multioccupant dwellings where allowing 1 occupant a private bedroom would not impose overcrowding (defined as >2 occupants per bedroom) on other household members. A separate bathroom was considered available in single-occupant dwellings with at least 0.5 bathrooms and in multioccupant dwellings with at least 1.5 bathrooms.

We generated descriptive statistics (means, proportions, and SEs) for all variables. Logistic regression was used to determine the bivariate relationship between a separate bedroom or bathroom being unavailable and characteristics of housing units and occupants. We used survey procedures in SAS, version 9.4 (SAS Institute), with weights and replicate weights provided by the American Housing Survey to generate national estimates, SEs, odds ratios, and 95% CIs using the balanced repeated replication method (4).

The 57 984 occupied dwellings in the sample represented 121.57 million dwellings nationwide that housed about 303 million residents; the dwellings averaged 2.80 bedrooms, 1.82 bathrooms, and 2.49 occupants (Table). Single-family detached homes, newer units, and those occupied by higher-income households had more rooms.

Isolation or quarantine was impossible in 25.29 million dwellings (95% CI, 25.04 million to 25.48 million dwellings), accounting for 20.8% of all U.S. residential units, because they lacked sufficient bedrooms, bathrooms, or both. This included almost 30% of the 88.2 million units with more than 1

occupant. Overall, about 81 million persons lived in units unsuitable for isolation or quarantine.

Relative to White, non-Hispanic persons, Native American and Hispanic persons had 2 to 3 times higher odds—and Black and Asian persons had 1.7 times higher odds—of occupying units unsuitable for isolation or quarantine. Apartments, older buildings, and dwellings in the Northeast were more likely to be unsuitable for isolation or quarantine.

Discussion: More than 1 in 5 U.S. homes, housing about one quarter of all Americans, lack sufficient space and plumbing facilities to comply with recommendations to isolate or quarantine to limit household spread of COVID-19. This proportion is particularly high among homes occupied by minority and poor individuals and among apartments, a pattern that mirrors both the high incidence of COVID-19 in those groups and racial discrimination in access to housing that was federal policy until the 1960s and, unfortunately, persists today.

Several limitations apply to our findings. Respondents might under- or overreport the number of occupants and rooms. We could not directly assess individuals' ability to isolate or quarantine; in dwellings with large bedrooms, 3 or more occupants might be able to safely occupy 1 bedroom without overcrowding. Some persons may have altered their living situations in response to the pandemic, causing us to underestimate crowding—for example, if college students returned home or families doubled up because of job loss. Wearing face masks, physical distancing, and bathroom disinfection might prevent transmission even where separate rooms are unavailable.

Policymakers should consider offering (but not requiring) persons needing isolation or quarantine the option of staying at no cost in underutilized hotels, under medical supervision, with free meal delivery and internet and telephone access. Similar strategies have been used successfully by several Asian countries (5) and might decrease COVID-19 transmission, particularly in minority communities. This might reduce medical costs and economic damage from work absenteeism and job loss, as well as the risks to and burdens on many families.

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Table. U.S. Residential Dwelling Units, Number of Occupants and Rooms, and Suitability for Isolation and Quarantine, 2017*

Characteristic	All Residential Dwelling Units				Residential Dwelling Units With Insufficient Rooms to Allow Isolation/Quarantine				
	Sample Size (Weighted Sample Size [millions of units]), n (n)	Mean per Unit (SE), n			Percentage of All Units (SE)			Mean Occupants per Insufficient Unit (SE), n	Odds Ratio That Unit Is Insufficient (95% CI)
		Occupants	Bedrooms†	Bathrooms‡	Insufficient Bedrooms§	Insufficient Bathrooms	Unit Insufficient¶		
Total dwelling units	57 984 (121.57)	2.49 (<0.01)	2.80 (<0.01)	1.82 (<0.01)	8.2 (0.07)	18.0 (0.10)	20.8 (0.10)	3.21 (<0.01)	Not applicable
Respondent race/ethnicity									
White, non-Hispanic	35 707 (80.51)	2.34 (<0.01)	2.87 (<0.01)	1.88 (<0.01)	4.7 (0.08)	14.4 (0.13)	16.0 (0.13)	2.89 (0.01)	Reference
Black, non-Hispanic	8297 (15.81)	2.36 (<0.01)	2.63 (<0.01)	1.65 (<0.01)	8.2 (0.19)	20.9 (0.30)	24.0 (0.32)	3.13 (0.02)	1.65 (1.59-1.72)
Asian/Pacific, non-Hispanic	3738 (6.13)	2.91 (0.02)	2.79 (0.01)	1.97 (<0.01)	16.4 (0.38)	18.6 (0.42)	24.1 (0.45)	3.42 (0.03)	1.67 (1.58-1.75)
Native American, non-Hispanic	426 (1.03)	2.79 (0.05)	2.71 (0.03)	1.56 (0.03)	12.9 (0.88)	28.3 (1.71)	33.9 (1.76)	3.57 (0.08)	2.69 (2.30-3.15)
Other, non-Hispanic	672 (1.55)	2.61 (0.04)	2.63 (0.02)	1.71 (0.02)	12.6 (0.81)	23.3 (1.04)	25.8 (1.10)	3.36 (0.11)	1.82 (1.63-2.03)
Hispanic	9144 (16.52)	3.17 (0.01)	2.64 (<0.01)	1.64 (<0.01)	21.0 (0.26)	31.7 (0.29)	38.5 (0.30)	3.80 (0.02)	3.28 (3.16-3.39)
Respondent age									
<35 y	10 623 (22.05)	2.66 (<0.01)	2.46 (<0.01)	1.60 (<0.01)	15.5 (0.21)	30.3 (0.24)	34.2 (0.26)	3.14 (0.01)	3.93 (3.79-4.07)
35-49.9 y	15 634 (32.14)	3.20 (<0.01)	2.96 (<0.01)	1.90 (<0.01)	11.3 (0.15)	19.4 (0.20)	24.3 (0.21)	3.73 (0.02)	2.42 (2.33-2.52)
50-64.9 y	16 869 (36.72)	2.37 (<0.01)	2.92 (<0.01)	1.89 (<0.01)	5.6 (0.10)	15.5 (0.18)	17.3 (0.19)	3.01 (0.02)	1.58 (1.52-1.64)
≥65 y	14 858 (30.66)	1.79 (<0.01)	2.73 (<0.01)	1.82 (<0.01)	2.7 (0.08)	10.9 (0.16)	11.7 (0.16)	2.54 (0.02)	Reference
Any occupant aged ≥65 y									
Yes	16 999 (34.93)	1.97 (<0.01)	2.78 (<0.01)	1.85 (<0.01)	3.7 (0.08)	12.0 (0.15)	13.4 (0.16)	2.81 (0.02)	Reference
No	40 985 (86.64)	2.70 (<0.01)	2.81 (<0.01)	1.81 (<0.01)	9.9 (0.09)	20.5 (0.12)	23.8 (0.13)	3.30 (<0.01)	2.02 (1.96-2.08)
Household income									
<\$25 000	14 383 (27.94)	1.87 (<0.01)	2.32 (<0.01)	1.47 (<0.01)	8.1 (0.16)	21.4 (0.22)	23.2 (0.22)	2.99 (0.02)	2.14 (2.06-2.22)
\$25 000-\$49 999	12 200 (26.92)	2.29 (<0.01)	2.60 (<0.01)	1.64 (<0.01)	9.8 (0.16)	22.3 (0.21)	25.4 (0.23)	3.17 (0.01)	2.40 (2.32-2.49)
\$50 000-\$99 999	16,029 (35.50)	2.65 (<0.01)	2.87 (<0.01)	1.85 (<0.01)	9.0 (0.12)	19.4 (0.18)	22.8 (0.19)	3.27 (0.02)	2.09 (2.02-2.16)
≥\$100 000	15,372 (31.25)	3.05 (<0.01)	3.32 (<0.01)	2.26 (<0.01)	5.9 (0.10)	9.8 (0.15)	12.4 (0.15)	3.48 (0.03)	Reference
Type of housing unit									
Single-family, detached	34 129 (76.84)	2.68 (<0.01)	3.24 (<0.01)	2.03 (<0.01)	3.7 (0.06)	13.2 (0.12)	15.1 (0.13)	3.33 (0.02)	Reference
Single-family, attached	5012 (8.95)	2.40 (0.01)	2.56 (<0.01)	1.82 (<0.01)	9.2 (0.27)	17.9 (0.30)	22.0 (0.33)	3.40 (0.03)	1.58 (1.52-1.65)
Apartment	16 178 (28.98)	2.03 (<0.01)	1.75 (<0.01)	1.30 (<0.01)	19.4 (0.20)	31.6 (0.21)	35.8 (0.22)	2.97 (0.01)	3.12 (3.04-3.21)
Other	2665 (6.79)	2.46 (0.02)	2.64 (<0.01)	1.71 (<0.01)	9.0 (0.30)	15.0 (0.40)	19.7 (0.45)	3.61 (0.04)	1.37 (1.30-1.45)
Year built									
<1960	16 224 (35.21)	2.41 (<0.01)	2.66 (<0.01)	1.49 (<0.01)	10.0 (0.15)	31.5 (0.20)	33.6 (0.21)	3.06 (0.01)	5.18 (4.96-5.40)
1960-1979	14 785 (30.64)	2.45 (<0.01)	2.75 (<0.01)	1.70 (<0.01)	9.0 (0.13)	20.1 (0.21)	23.1 (0.21)	3.19 (0.02)	3.07 (2.94-3.22)
1980-1999	15 779 (32.38)	2.48 (<0.01)	2.85 (<0.01)	2.00 (<0.01)	6.9 (0.12)	10.1 (0.15)	13.3 (0.18)	3.42 (0.02)	1.57 (1.50-1.65)
≥2000	11 196 (23.34)	2.70 (<0.01)	3.01 (<0.01)	2.22 (<0.01)	6.1 (0.12)	6.0 (0.14)	8.9 (0.16)	3.63 (0.03)	Reference
Region									
Northeast	8977 (21.83)	2.45 (<0.01)	2.69 (<0.01)	1.62 (<0.01)	9.7 (0.19)	26.5 (0.23)	28.6 (0.23)	3.04 (0.02)	2.04 (1.97-2.12)
South	22 074 (45.46)	2.47 (<0.01)	2.86 (<0.01)	1.92 (<0.01)	6.4 (0.09)	13.8 (0.18)	16.4 (0.19)	3.23 (0.02)	Reference
Midwest	10 812 (27.06)	2.41 (<0.01)	2.83 (<0.01)	1.76 (<0.01)	5.9 (0.13)	19.1 (0.20)	21.1 (0.20)	3.05 (0.02)	1.36 (1.32-1.41)
West	16 121 (27.21)	2.66 (<0.01)	2.77 (<0.01)	1.88 (<0.01)	12.0 (0.17)	17.4 (0.16)	21.6 (0.19)	3.50 (0.02)	1.40 (1.36-1.45)

* All figures in table are for residential dwelling units. Race/ethnicity and age are for the individual in each unit who responded to the survey.

† Respondents reporting 0 bedrooms were assumed to live in a studio and classified as having 1 bedroom.

‡ Respondents reporting "more than 3" bathrooms were classified as having 4 bathrooms.

§ A multioccupant dwelling unit where allowing 1 occupant a private bedroom would impose overcrowding (defined as >2 occupants/bedroom) on other household members.

|| A multioccupant dwelling unit with <1.5 bathrooms, or a single-occupant dwelling unit with <0.5 bathrooms.

¶ Either insufficient bedrooms or insufficient bathrooms for isolation/quarantine.

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