

Estimated Healthcare Savings from Decompressing Connecticut's Emergency Shelters During COVID-19

SPRING 2021



EXECUTIVE SUMMARY

- In response to the COVID-19 pandemic, Connecticut worked to move households experiencing homelessness from congregate emergency shelters to safer non-congregate housing settings, saving an estimated **\$4.2M** in COVID-19 related healthcare costs.
- Housing is healthcare. Prior analyses demonstrate that provision of housing reduces individual healthcare costs by \$6,033 per year.⁹ As a result of shelter decompression, healthcare costs were reduced by an additional \$1,917 per person for a total estimated cost savings of \$7,950 per individual housed during the pandemic.
- The benefits of shelter decompression went beyond direct cost savings, including prevention of secondary infections, reduction of premature deaths, and loss of quality adjusted life-years
- The findings further underscore the importance of providing households with non-congregate permanent housing options to ensure the health and safety of our most vulnerable residents during the public health emergency and beyond

BACKGROUND and OBJECTIVES

The COVID-19 pandemic, brought new meaning to the importance of the safety and stability of permanent, private housing.^{12,15} People experiencing homelessness are at especially high risk for infection and severe illness from COVID-19 due to underlying risk factors and barriers to social distancing.

With support from Federal funding and the state of Connecticut, regional homeless service providers decompressed emergency congregate shelters and rapidly relocated households into non-congregate permanent or hotel-based housing to protect populations experiencing homelessness.

Prior research has estimated that stable housing reduces social costs through lower healthcare utilization by an inflation-adjusted \$6,033 per housed individual. In this brief, we estimate the additional healthcare cost savings from decompressing emergency shelters in the setting of the COVID-19 pandemic from March 2020-2021.



APPROACH

Base estimates reflect the healthcare savings achieved from decompressing shelters in favor of non-congregate housing arrangements for Connecticut’s population experiencing homelessness. Non-congregate housing settings reduce transmission risk and infection rate by facilitating proper social distancing and thereby decrease COVID-19 related health care utilization and spending.

I

Homelessness and COVID Infection Risk: Estimate the number of symptomatic COVID infections amongst people experiencing homelessness in Connecticut.

Incorporate underlying demographic risk factors (e.g. race, ethnicity, age, gender, medical co-morbidities) and housing risk factors (inability to social distance) relative to the general population for Status Quo (Scenario A). Estimate infection rate without housing risk factors to reflect the decompression Intervention (Scenario B) .

A

Status Quo
 General CT Infection Rate
 x
 (Population Demographic Risks +
 Congregate Housing Risks)

B

Intervention
 General Infection Rate
 x
 Population Demographic risks

Apply adjusted infection rate to the homeless population at-risk across the study period

Number of infections if no housing intervention

Number of infections with housing interventions

II

Outcome Risk: Apply case-outcome rates adjusted for demographic risk factors present in Connecticut’s population of people experiencing homelessness.

Number of emergency department, hospitalizations, hospitalizations with ICU , and death

Number of emergency department, hospitalizations, hospitalizations with ICU, and death

III

Healthcare Utilization Costs: Apply average cost per outcome to find total COVID related healthcare costs by scenario

Healthcare costs from COVID if no housing intervention

Healthcare costs from COVID despite housing intervention

IV

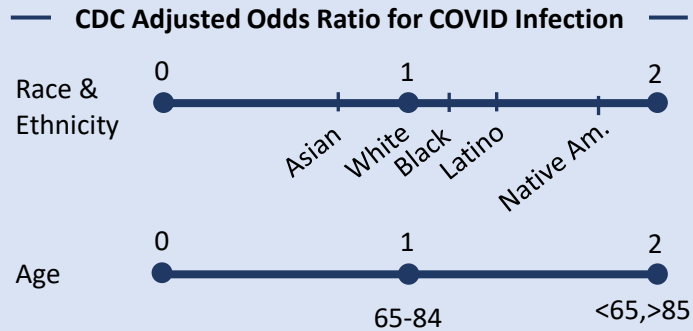
Compare total cost projections by scenario to create Base Estimate

HOMELESSNESS and COVID-19 INFECTION RISK

Relative to Connecticut’s general population, residents experiencing homelessness are at risk for elevated COVID-19 infection rates due to A) demographic risk factors and B) barriers to social distancing

A. Demographics:

The population experiencing homelessness is disproportionately older, and due to structural racism, disproportionately Black and Latino. Given this demographic distribution, the weighted average relative risk of COVID-19 infection for the population experiencing homelessness in Connecticut, is ~2.1x the general population

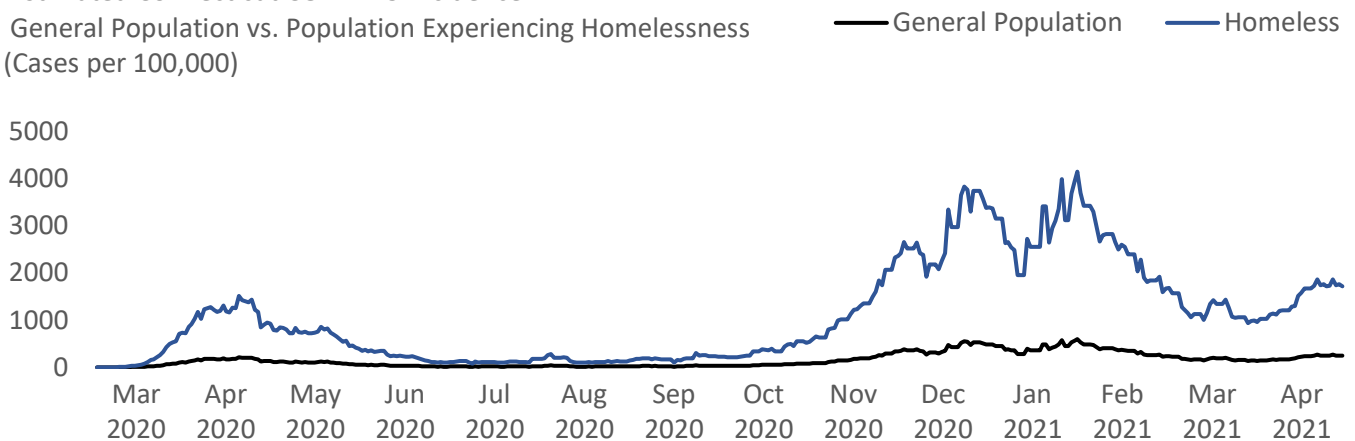


B. Barriers to Social Distancing:

Crowded living arrangements like congregate shelters are associated with an estimated 2.7-3.4x increased relative risk of COVID-19 infection¹⁴

Residence Crowding Score	Adjusted Odds-Ratio (95% CI, p-value)
Low Crowding	1.0 (reference)
Medium Crowding	2.7 (1.5-5.1, 0.0020)
High Crowding	3.4 (1.7-6.9, <0.0001)

Estimated Connecticut COVID-19 Incidence
General Population vs. Population Experiencing Homelessness
(Cases per 100,000)



- Persons experiencing homelessness that remained in congregate settings during the pandemic faced a ~3x higher infection rate than those who were moved to non-congregate settings, and a ~6x higher rate than the general population.
- Without shelter decompression efforts, approximately 56% of Connecticut’s citizens experiencing homelessness would have contracted COVID-19 at some point during the past year, compared to the ~9% in the general population.

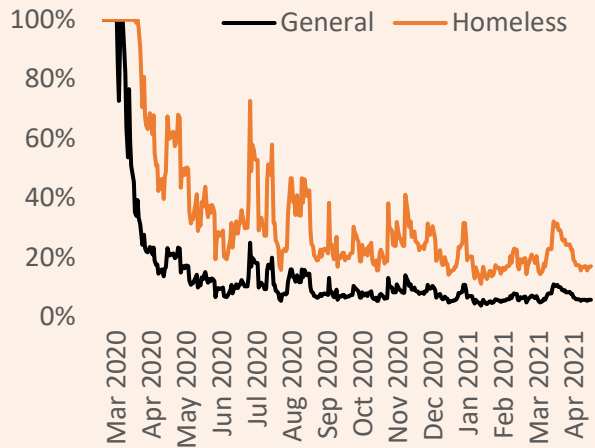
HOMELESSNESS and COVID OUTCOME RISK

In addition to increased risk of infection, characteristics of the population experiencing homelessness independently increase their risk for more severe disease and hospitalization from COVID-19: specifically demographic characteristics and high rate of comorbid conditions.

The estimated risk of hospitalization from COVID-19 for populations experiencing homelessness is 20-fold that of the general population.¹³

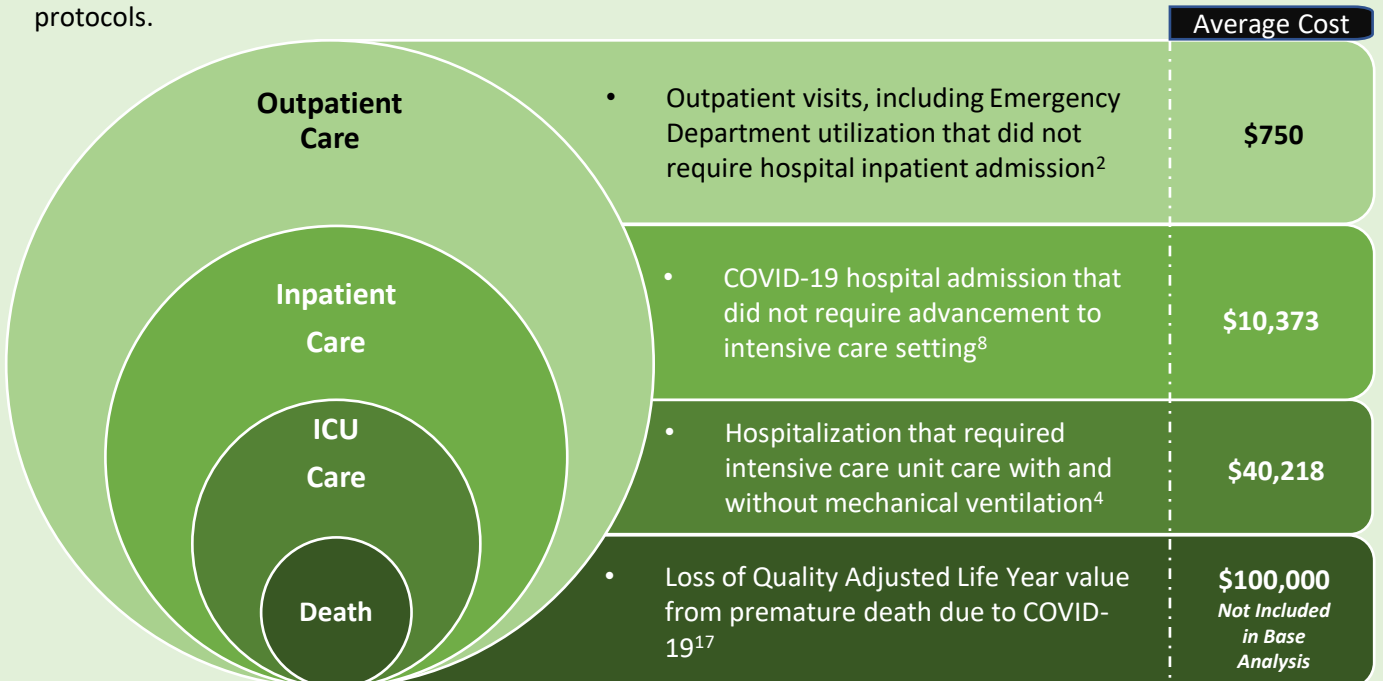
As observed throughout the pandemic, case hospitalization rates (hospitalizations per diagnosed COVID-19 infection) for all populations have declined.

Estimated CT COVID Hospitalization Rates General vs. Homeless Population



COVID-19 HEALTHCARE UTILIZATION COSTS

Disease severity from COVID-19 is variable. While some patients are cared for in outpatient settings, other patients require emergency care and/or hospitalization and even treatment in the intensive care unit – resource intensive settings. Hospitalization rates, utilization of ICU-level care, as well as patient outcomes, including case-fatality rates, varied over the past year with advancements in COVID testing and care protocols.



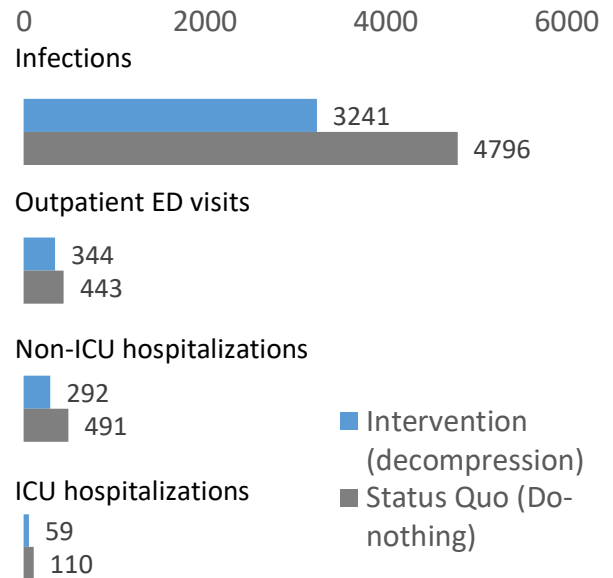
IV: COST-SAVINGS (BASE ESTIMATE)

In March 2020, regional homeless service providers, supported by the Department of Housing, Connecticut Coalition to End Homelessness, and other partners, worked to decompress the emergency shelter system by moving households to temporary housing options and rapidly exiting households to permanent housing

These efforts are estimated to have significantly reduced COVID-19 infection and healthcare utilization of this population – an estimated cost savings of **\$4.2M**.

Infections saved	1,555
Outpatient ED encounters saved	99 → \$74K
Non-ICU hospitalizations saved	199 → \$2.07M
ICU hospitalizations saved	51 → \$2.03M
Lives saved	9

Mutually exclusive Modeled COVID-19 Outcomes: Decompression vs. Status Quo



COST-SAVINGS (ADDITIONAL BENEFITS)

— SECONDARY INFECTION PREVENTION —

SARS-CoV-2 is a highly contagious pathogen that spreads easily. R_0 , the reproductive number of the virus, represents the average number of additional people infected by each COVID-positive person.

Applying the daily estimated R_0 for Connecticut across the study period, we find that decompressing shelters prevented an additional 1,556 secondary infections, 296 ED visits without hospitalization, 251 hospitalizations, and 51 hospitalizations requiring ICU care. We estimate the prevention of these secondary infections in estimation would save an additional **\$4.86M** in healthcare costs.

— VALUE of a STATISTICAL LIFE —

Beyond the healthcare costs, health economists, including those at the independent Institute for Clinical and Economic review, often also consider the cost of a statistical life in understanding the economic impact of interventions. The Quality-Adjusted Life Year (QALY) is a common unit of measurement for these analyses and values a year of fully-able life between \$50-\$150K.

Incorporating QALYs into this analysis, we estimate that 65-127 QALY's were saved by this decompression effort, **\$6.5M-12.7M** in additional social value (at \$100K per QALY).

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Data and Methodology

DATA SOURCES:

- Infection rate: Connecticut COVID data (free, public): <https://data.ct.gov/browse?COVID-19>
- Case-hospitalization rate: Connecticut COVID data (free, public): <https://data.ct.gov/browse?COVID-19>
- Demographic risk factors for infection and outcomes: United States Centers for Disease Control (free, public):
 - Race / Ethnicity: <https://www.cdc.gov/coronavirus/2019-ncov/covid-data/investigations-discovery/hospitalization-death-by-race-ethnicity.html>
 - Age: <https://www.cdc.gov/coronavirus/2019-ncov/need-extra-precautions/older-adults.html>
- Secondary Infections: COVID reproductive number (free, public): <https://rt.live/us/CT>
- Congregate housing risk Medical literature (see references, report page 5)
- Demographics and number of people experiencing homelessness in CT: CT Department of Housing (queried, not publicly available)

METHODOLOGY:

INFECTIONS: We modeled the estimated risk of COVID-19 infection in the population experiencing homelessness by adjusting the weekly COVID infection rate in Connecticut to account for demographic and social factors that increase risk in this population.

- We used data from the Center for Disease Control to determine relative risks of infection associated with demographic factors (age and race).
- We used estimates in the medical literature (see references) to derive relative infection risk associated with congregate settings.
- For demographic risk factors, the weighted average of each variable (race/ethnicity, age) were utilized.

Example: Infection Risk Weighted by Race/Ethnicity (numbers illustrative only)

*If risks relative to White, non-Hispanic persons were 1.2x for Black, 1.3x for Hispanic, 1.0 for Asian, and 1.5 for Native Americans, and the population experiencing homelessness at a particular week was comprised of 68% White, 20% Black, 10% Hispanic, 1% Asian, and 1% Native American, the weighted average demographic risk factor for infection would be $(1.0*68\%)+(1.2*20\%)+(1.3*10\%)+(1.0*1\%)+(1.5*1\%)$.*

These demographic and housing weighted average risk factors were applied to the weekly COVID-19 incidence rate for the state of Connecticut (CT.gov) to estimate a risk adjusted COVID-19 incidence rate for the state's population experiencing homelessness. Risk-adjusted incidence rates were then applied to point-in time estimates of the population experiencing homelessness in Connecticut week by week, consistent with the historical incidence of new homelessness or churn of people re-entering homelessness. The estimated number of infected individuals were removed from the at-risk population each week to represent the population experiencing homelessness and at risk for SARS-CoV-2 infection (given low risk of re-infection).

OUTCOMES: We modeled the estimated risk of hospitalization for severe COVID-19 infection in the population experiencing homelessness by adjusting the weekly US hospitalization rate to account for demographic and social factors that increase risk of severe infection in this population.

- We used data from the Center for Disease Control to determine relative risks of severe infection associated with demographic factors (age and race).
- Weekly hospitalization rate was derived from state-level COVID hospitalization data per case identified across the period of study.
- A risk modification coefficient was developed based on the weighted average risk from demographic factors such as age, comorbid conditions, and race/ethnicity and used as an adjustment to the weekly hospitalization rate.
- Severe COVID-19 outcomes including intensive care unit utilization, mechanical ventilation, and in-hospital mortality were estimated using CDC data on percent of hospitalizations by demographic characteristics, weighted according to the demographics of the Connecticut population experiencing homelessness.

Limitations

PURPOSE AND METHODOLOGY: The aim of this analysis is to conservatively estimate the financial impact of transitioning to non-congregate housing; specifically saved healthcare costs directly related to COVID-19. The analysis does not attempt to provide the academic rigor of a traditional cost effectiveness analysis or epidemiological model. For the purposes of providing a practical tool we focus on the explicit medical costs and savings. We do not incorporate into base estimates the dollar value of life lost, a common practice in health economics.

DATA: Data for COVID-19 infection was limited, emerging, and changing throughout the period of analysis. When available we used data as specific to Connecticut as possible, including the baseline infection and hospitalization rates, as well as estimates for the reproductive number to calculate secondary infections. Other data were more difficult to obtain, including risk estimates for congregate housing and the costs for intensive care unit stays paid by Connecticut Medicaid. Where the specific data was not available the best-available free data were used.