

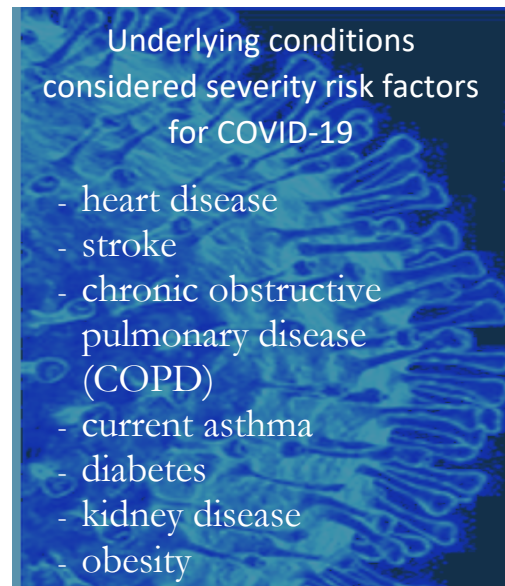
April 2, 2020

Mapping the Areas at Highest Risk of Severe COVID-19 in Dallas, Austin and San Antonio

Orders to stay at home and to practice social distancing are now in place in the largest metro counties in Texas. The number of COVID-19 cases continues to increase, with its peak predicted to be several weeks away. The White House's Coronavirus Task Force Coordinator issued a stark warning a few days ago: "Every metro area should assume that they will have an outbreak equivalent to New York."¹ New York County currently has over 48,000 confirmed cases.² Early estimates from Hubei Province put the hospitalization rate at about 20% of those infected. The current data reported from Dallas and Bexar Counties puts that figure at just over 30%.³ Moreover, among those hospitalized, a significant percentage, over 36%, will require critical care beds and ventilators. Under these circumstances, and in anticipation of increasing numbers of cases, local officials are finding ways to expand hospital capacity to meet the expected need. Convention Centers in Dallas and San Antonio, for example, will soon be converted to field hospitals. While we are getting a better idea of how soon we will need this capacity, based on advanced modelling, the question remains, where will it be needed the most and by whom?

With the onset of community transmission, we can no longer predict from travel history, or case contact alone, who will develop COVID-19. When it comes to hospitalization, however, the data are clearer. Among the infected, those over age 60 or with one or more underlying medical condition, weakening their response to the virus, will make up at least 2/3rds of the cases needing a hospital bed or critical care. The US Centers for Disease Control and Prevention (CDC) has identified these conditions as risk factors for hospitalization and critical care.⁴ They include: heart disease, stroke, chronic obstructive pulmonary disease (COPD), current asthma, diabetes, kidney disease, and obesity.

CDC recently published preliminary estimates of the prevalence of selected underlying health conditions among COVID-19 cases in the US from February 12–March 28, 2020.⁵ Complete information on underlying conditions or risk factors was available for only 7,162 cases. Of these, 37.6% had underlying conditions, with cardiovascular disease, chronic lung disease and diabetes among the most frequent. More importantly, among the 184 fatalities, 94% (173) were reported to have had at least one underlying condition.



Knowing how these conditions as risk factors are distributed throughout the population of a large metro area can help local officials identify where the greatest need for health care will emerge. Maps of these high-risk areas can assist in prioritizing surge hospital capacity and in targeting additional precautionary measures to prevent fatalities.

Efforts to control the spread of the virus have put substantial numbers of people out of work. Some will be able to file for unemployment benefits, while others will need to draw down savings, or rely on the social safety net of local programs for support. The number of people needing such support will require efforts to shore up the social safety net in metro areas. Among the hardest hit areas are those with households already falling below the Federal Poverty Level. Mapping neighborhoods where poverty is concentrated focuses attention on areas likely to be in even greater financial distress as a result of the pandemic.

From our work in Houston, we expect that many of the chronic conditions, considered risk factors for severe COVID-19, are likely to be concentrated, disproportionately, in areas of lower income. Our twofold purpose, then, is to identify the areas where severe cases requiring hospitalization are most likely to emerge, and to also designate areas where the social safety net is most likely to be stressed. Areas where these two factors coincide represent the most vulnerable segments of the metro population and should be assigned priority in: 1) the outreach efforts of hospitals and community-based organizations, and 2) the resource planning and allocation decisions of local authorities.

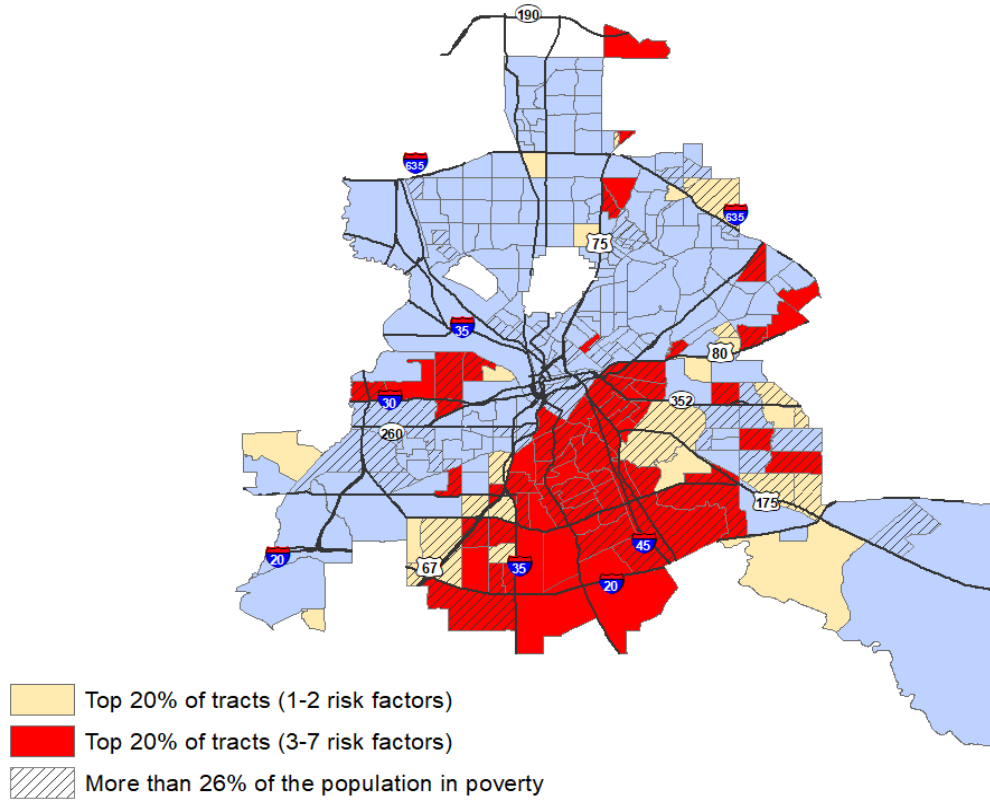
Extending our earlier analysis of Houston, we map the risk factors for severe COVID-19 infection for the three other metro areas in Texas that currently have the highest confirmed case counts: Dallas, Austin and San Antonio. The data are drawn from two federal sources: the American Community Survey 5-year Summary, from the US Census Bureau, released in December of 2019, and the 500 Cities Project from the CDC. The 500 Cities Project offers chronic disease data, based on respondent self-reports from the annual Behavioral Risk Factor Survey.⁶ These data are presented at the census-tract level for the 500 largest cities in the US. We combine the two data sources for each of the three cities and report them in the maps that follow. Since our intent is to highlight the areas with the highest risk across each city, we rank tracts for each city separately and identify the top 20% of tracts with the highest values.

Mapping high-risk areas, where underlying conditions are concentrated, to support

- Outreach efforts of hospitals and community-based organizations
- Resource planning and allocation by local authorities

City of Dallas

MAP 1a. Risk Factors for COVID-19 Severity in the City of Dallas



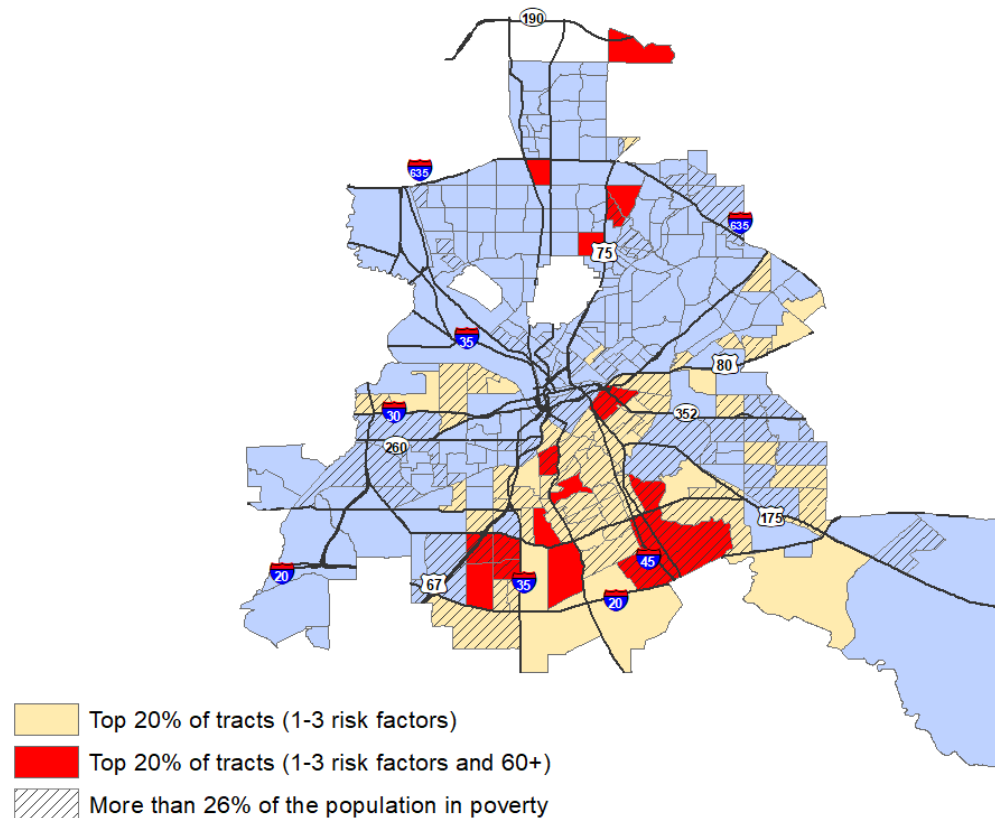
Sources: 500 Cities Project using 2017 BRFSS data; American Community Survey 5-Year Summary, 2018.

Map 1a shows the areas of Dallas with the highest concentrations of risk factors for severe COVID-19 disease. The tan areas fall in the highest 20% (of 304 city tracts) for 1 to 2 of the risk factors. The areas shown in red are in the highest 20% for prevalence of 3 to 7 risk factors – clearly, these are the areas where cases are the most likely to need hospitalization, based on current guidelines from the CDC. Note that the hatched areas, showing the highest concentrations of residents in poverty, coincide with many of the same areas at highest risk of severe disease. The red, hatched areas, many located in the central south and southwest of the City (east of Route 67 and west of Route 175) represent the areas of greatest need, both in terms of financial support and severe and critical medical care. Although ZIP Codes do not correspond very well to census tracts, we can suggest some general ZIP areas to watch.

Main ZIPs - 75216, 75241, 75212, 75232, 75203, 75210, 75215

Age has been a conspicuous risk factor for hospitalization since the earliest COVID data were first reported. Instead of presenting the age distribution across the City, we want to capture the higher cumulative risk represented, when age is combined with one or more chronic conditions. In the next map, we consider areas that are highest in one or more of three chronic conditions, heart disease, COPD, and diabetes and then designate places within those areas with the highest concentration of residents age 60 and over.

MAP 1b. Heart disease, COPD, Diabetes and Age 60 and older in the City of Dallas

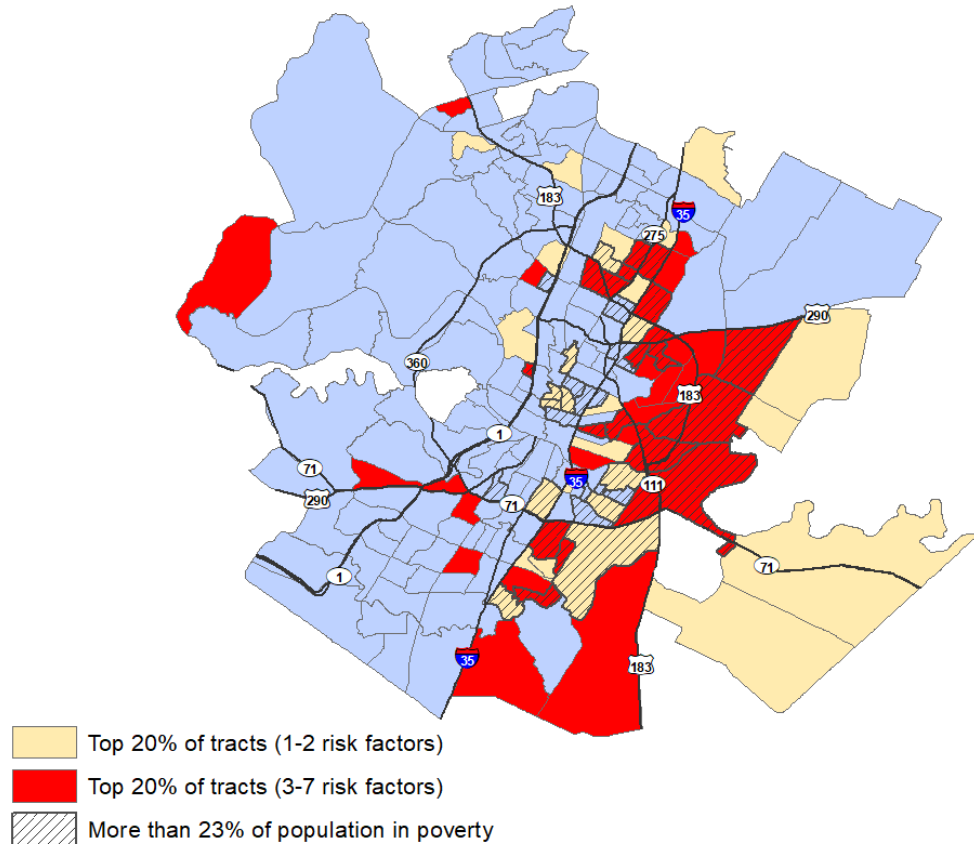


Sources: 500 Cities project using 2017 BRFSS data; American Community Survey 5-Year Summary, 2018.

Map 1b shows the areas with the highest rates of heart disease, COPD and diabetes, and then marks places within those areas with the highest concentration of people 60 and older. Again, the South Central area, adjacent to Interstate 20 on the Southside and Interstate 45 on the East, presents the highest risks.

City of Austin

MAP 2a. Risk Factors for COVID-19 Severity in the City of Austin



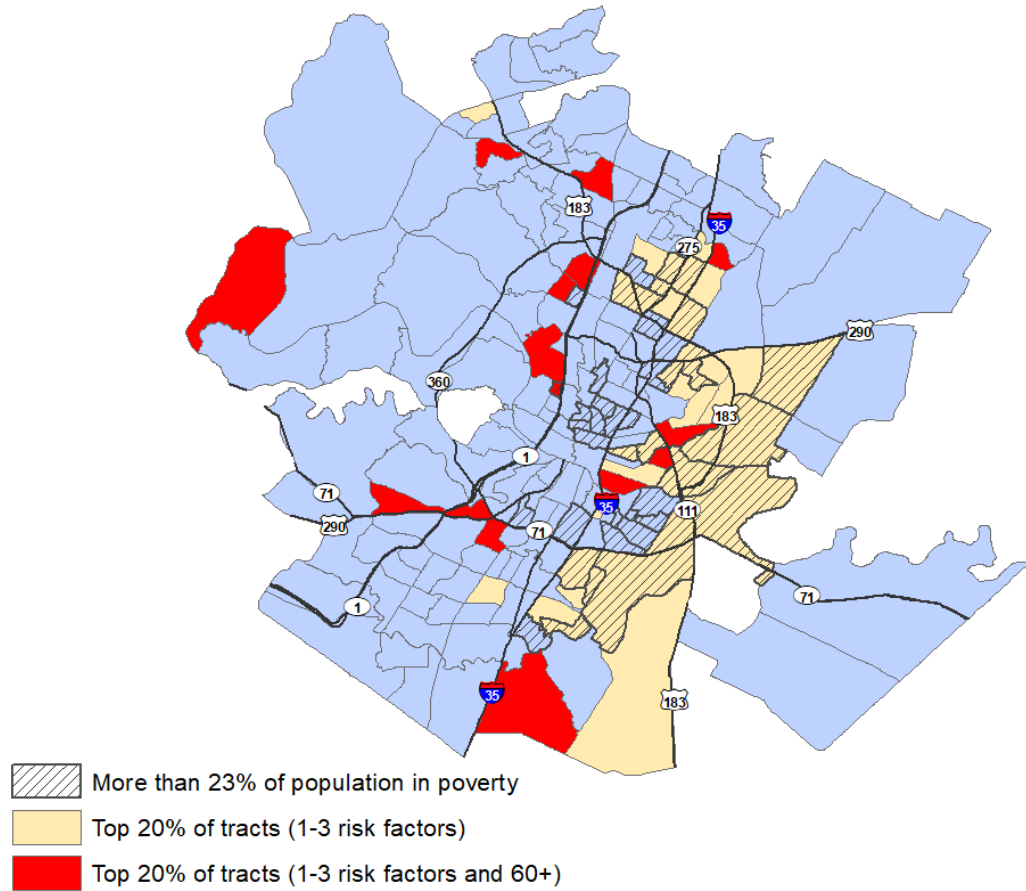
Sources: 500 Cities project using 2017 BRFSS data; American Community Survey 5-Year Summary, 2018.

Map 2a shows the areas of Austin with the highest concentrations of risk factors for severe COVID-19 disease. The tan areas represent the highest 20% of 198 City tracts with either 1 or 2 risk factors present. The areas in red are tracts falling in the highest 20% for prevalence of 3 to 7 risk factors. These are the areas where hospitalization needs are likely to be highest. The hatched areas show tracts with the highest concentrations of residents in poverty. When the red areas are hatched, highest risk of severe disease is combined with highest financial need. These areas are predominantly in East Austin (east of I-35 and north of Highway 71) and in North Austin (north of Highway 290 and east of the MoPac Expressway). Although ZIP Codes do not correspond exactly to census tracts, we can suggest some general ZIP areas where the red-hatched census tracts appear.

Main ZIPs – 78721, 78723, 78742, 78753, 78758

In the next map, we consider age 60 and older as a risk factor when combined with one or more of our three main chronic conditions: heart disease, COPD, and diabetes.

MAP 2b. Heart disease, COPD, Diabetes and Age 60 and older in the City of Austin



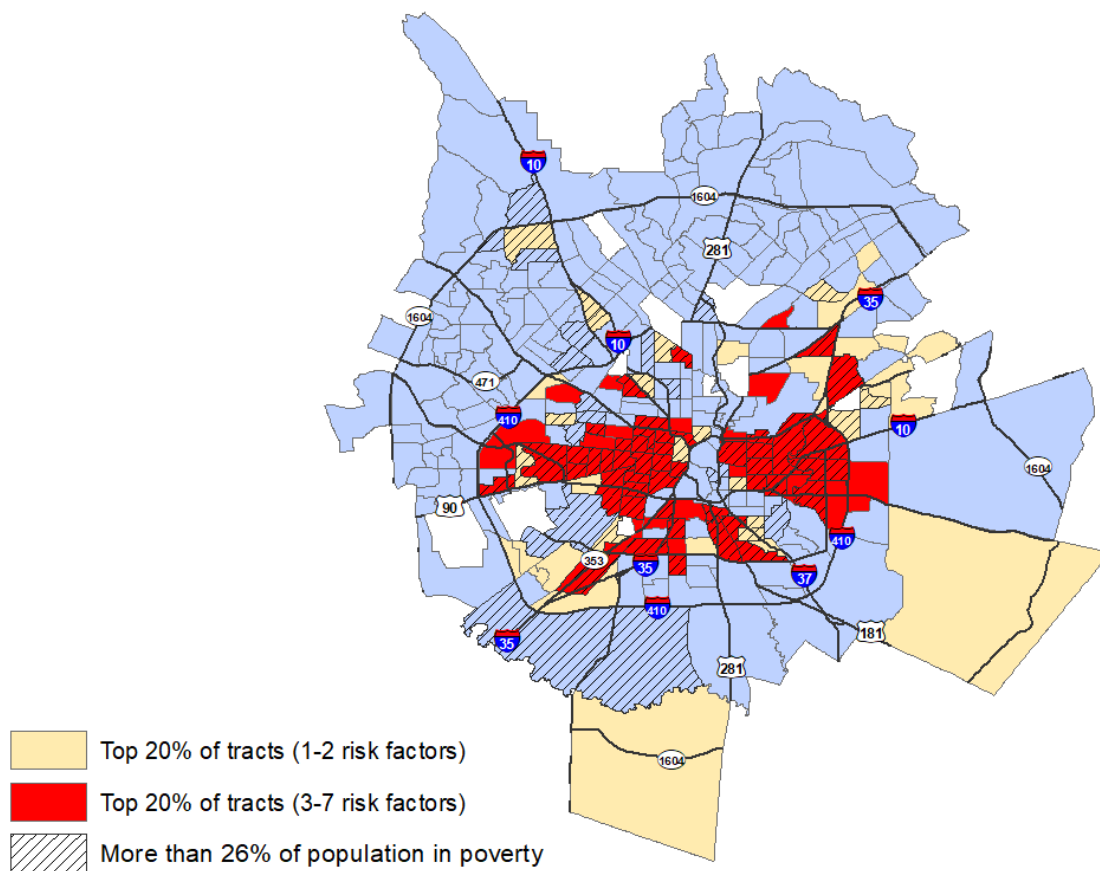
Sources: 500 Cities project using 2017 BRFSS data; American Community Survey 5-Year Summary, 2018.

For Map 2b, the tan areas represent tracts with the highest rates of heart disease, COPD and diabetes, roughly similar to the areas shown in Map 2a. The red areas, on the other hand, show the locations where age 60 and older is combined with 1 or more of the three risk factors. Again, only the top 20% of areas with these combinations are shown. East Austin near the City limits on the South side has one of these areas. Another is located on the West side in the Lakeway/Lake Travis area. ZIP Codes by observation are 78747 and 78732, respectively. Other areas are found along MoPac in Central and Northwest Austin. The hatched areas are concentrated on the East Side with a few in North Austin. None of the red areas, combining age 60 and older with chronic diseases, are hatched. The areas of highest poverty on the East side tend to be younger.

City of San Antonio

Map 3a, consistent with our previous maps, highlights the areas of San Antonio with the highest concentrations of risk factors for severe COVID-19 disease, showing where cases will most likely require clinical care. Tan areas show the top 20% of tracts (among 311 city tracts) for 1 to 2 of the risk factors. Areas shown in red are in the highest 20% for 3 to 7 risk factors. In other words, these red tracts have the highest concentrations of residents who have chronic disease across 3 to 7 of those diseases. Areas with the highest concentrations of residents in poverty, shown by hatching on the map, overlap with many of the same areas at highest risk of severe COVID-19 disease.

MAP 3a. Risk Factors for COVID-19 Severity in the City of San Antonio



Sources: 500 Cities project using 2017 BRFSS data; American Community Survey 5-Year Summary, 2018.

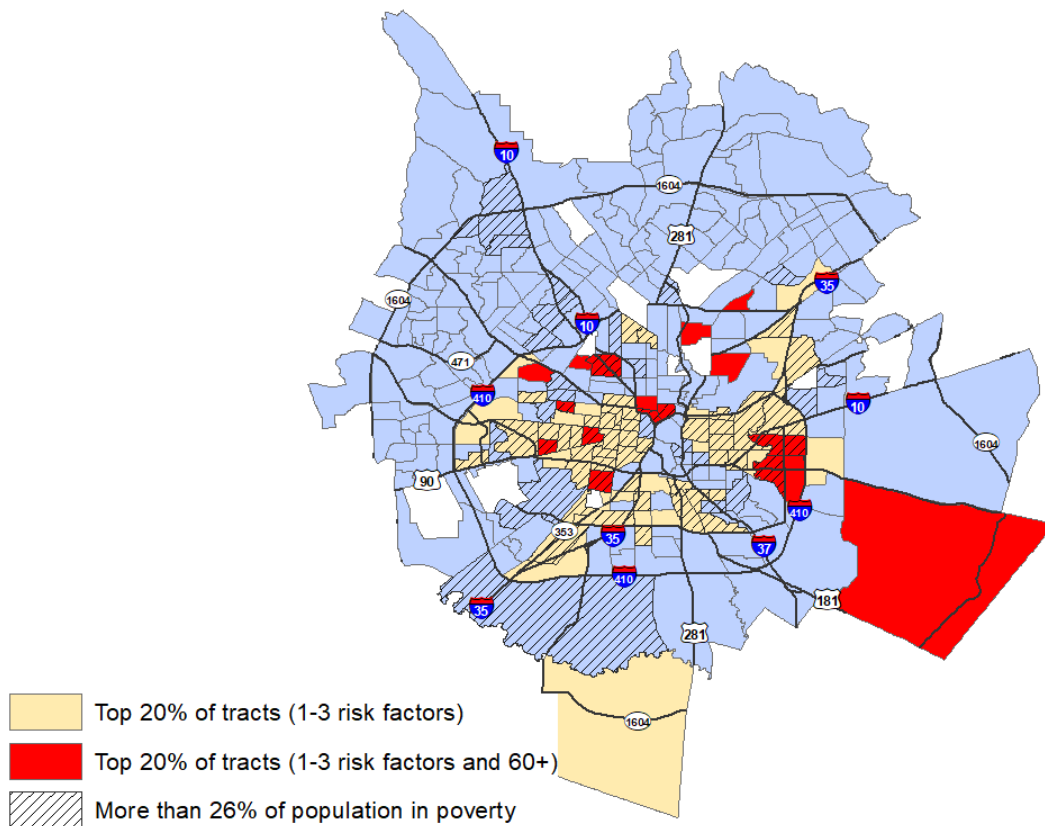
They are located in three segments: East and Southeast of Downtown, above and below I-10 but inside Interstate 410 (Connally Loop); in the South Central area, but above the Southwest Military Drive; and in the Western part of the city, above I-35 and then above Highway 90.

ZIP Code areas that might be disproportionately impacted in terms of service needs and health care necessities include the following ZIP Codes.

Main ZIPs – 78207, 78237, 78227, 78211, 78255, 78214 partial, 78223 partial, 78222 partial, 78202, 78203, 78220, 78219 partial, 78218 partial, 78201 partial, 78213 partial

Map 3b depicts in tan, the clusters of census tracts that have the highest rates of one, two or three chronic conditions, namely, heart disease, COPD, and diabetes. Locations within those areas that also have a high concentration of residents age 60 and over are shown in red. Similar to the pattern of red areas shown in Map 3a, high rates of diabetes, heart disease, or COPD appear on the East and West sides of Downtown, and in the South-Central area above the 410 Loop. Areas in red shown here designate tracts within this 1-3 risk-factor group that also have the highest concentration of residents aged 60 years and older. Red areas appear in the far Southeast, along the East 410 Loop, and to the North and West of Downtown. A majority of these red locations are also relatively high poverty areas, as shown by the hatching on Map 3b.

MAP 3b. Heart disease, COPD, Diabetes and Age 60 and older in the City of San Antonio



Sources: 500 Cities project using 2017 BRFSS data; American Community Survey 5-Year Summary, 2018.

Given limited data on the underlying conditions of those being hospitalized and of case fatalities, our current definition of risk factors for severe COVID-19 is neither exhaustive nor definitive. Still, it does represent the best of what we have learned to date. Similarly, our use of the 500 Cities Project, as a source of population-level, chronic disease prevalence, also has shortcomings, but gives us a picture of risk patterns within cities that cannot be drawn by administrative or reimbursement data alone. These risk patterns are our best-informed estimates of potential clinical severity to support decisions now being made by authorities, hospitals and service organizations. The latest (March 31st) CDC Morbidity and Mortality Weekly Report⁵ notes that cases with severe COVID-19 disease, accompanied by the following underlying health conditions -- neurologic disorders, chronic liver disease, current smoking, and pregnancy -- are too few to determine whether these should be added to our list of known risk factors.

Table 1 shows the range of prevalence rates among the seven risk factors, poverty rates, and percentage of the population ages 60 and older for the highest ranked tracts in each city.

Table 1: Rates for the Top 20% of Census Tracts

Risk Factors & Population Estimates	Dallas	Austin	San Antonio
Heart Disease	6.8-19.6%	5.2-11.8%	7.8-11.6%
COPD	7.4-11.8%	5.2-14.3%	6.7-11.1%
Current asthma	10.6-13.6%	8.8-10.9%	8.6-11.2%
Diabetes	15.9-24%	10.2-20.4%	17.9-24%
Kidney disease	4-7.3%	2.8-5%	4.2-6%
Stroke	4.3-8.5%	2.7-6.4%	4-7.6%
Obesity	41.3-50.2%	30.8-46.1%	40-46.9%
Age 60 and older	23.4-58.2%	19.8-39.4%	22.3-40.9%
Households in Poverty	26.1-54.8%	23.8-87.1	26.2-68%
Total population (n)	1,382,639	1,058,375	1,660,688
Number of census tracts with highest rates of 3-7 risk factors (n)	61	41	64
Population residing in census tracts with highest rates of 3-7 risk factors (n)	278,204	192,228	282,891

Sources: 500 Cities project using 2017 BRFSS data; American Community Survey 5-Year Summary, 2018.

References

¹NBC Meet the Press interview, Dr. Deborah Birx, 03/29/20. Accessed at <https://www.nbc.com/meet-the-press/video/meet-the-press-032920/4140612>.

²Accessed at <https://covid-19.direct/US>.

³Accessed at <https://www.dallascounty.org/covid-19/>
and at

<https://cosagis.maps.arcgis.com/apps/opsdashboard/index.html#/d2c7584fe9fd4da1b30cb9d6cc311163>.

⁴Rachel E Jordan, Peymane Adab, K K Cheng. Covid-19: Risk Factors for Severe Disease and Death. A long List is Emerging from Largely Unadjusted Analyses, with Age near the Top. Institute of Applied Health Research, College of Medical and Dental Sciences, University of Birmingham, Edgbaston, Birmingham B15 2TT, UK

⁵Preliminary Estimates of the Prevalence of Selected Underlying Health Conditions Among Patients with Coronavirus Disease 2019 — United States, February 12–March 28, 2020. MMWR Morb Mortal Wkly Rep. ePub: 31 March 2020.
DOI: [http://dx.doi.org/10.15585/mmwr.mm6913e2external icon](http://dx.doi.org/10.15585/mmwr.mm6913e2external%20icon).

⁶500 Cities Project, US Centers for Disease Control and Prevention. Accessed at <https://www.cdc.gov/500cities/index.htm>.

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