

# THE 2020 CENSUS UNDERCOUNT IN TEXAS COUNTIES

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**Main Findings**

- 177 out of 254 counties (69.7%) in Texas experienced a net undercount of their population.
- Harris County, in the Gulf Coast region, experienced the largest numerical net undercount (255,057).
- Edwards County, in the South Texas region, experienced the largest net undercount rate (29.4%).
- Counties with a high numerical and rate net undercount predominate in the South and West Texas regions.
- Most counties with a high numerical and rate net overcount are located in the well-known Texas Triangle.
- 91.8% of Texas’ net undercount appears in four of twelve Texas regions (Gulf Coast, Alamo, South Texas, and West Texas).
- Net undercount is correlated to counties’ self-response rate in the 2020 census.
- A 1% increase in the Self-Response Rate is related to a 0.34% lower undercounting.
- The relationship between net undercount and the self-response rate is higher in counties with 30k people or less.

**Introduction**

An accurate census in the U.S. is paramount as census data serve as the foundation for informed decision-making across various sectors. The Census provides a comprehensive and up-to-date population demographic profile, offering crucial insights into the distribution, composition, and characteristics of communities. These data are instrumental in shaping public policies, allocating government resources, and ensuring fair political representation by apportioning congressional seats. The Project On Government Oversight (POGO) recently found that census-derived data were instrumental in geographically distributing \$150.3 billion to Texas in Fiscal Year 2020.<sup>1</sup> Overall, a reliable census is the cornerstone of a well-informed and equitable society.

Between January 2020 and February 2022, the U.S. Census Bureau performed a Post-Enumeration Survey (PES) to assess the quality of the 2020 Decennial Census.<sup>2</sup> It concluded that six states, including Texas, experienced a negative undercount in the 2020 Census. The PES suggests the 2020 Census was short on 547,968 people (1.92% of its 28,540,000-household population). According to the PES, the Texas population should have been 29,693,473 rather than the 29,145,505 estimate from the 2020 Census.

The undercount of Texas is the second-largest numerical undercount during the 2020 Census, and Texas is the second-largest state in terms of its population. On top of that, Texas is the state with the most counties: 254. However, there is no official information about its undercount at the county level, as PES’ results “...are not broken down by demographic characteristics or geographic areas within the state given the sample size for the PES and the assumptions required to make substate geographic estimates”.<sup>2</sup>

This study distributes Texas statewide 547,968-people undercount across its counties using projections as a benchmark. This approach builds on the work of Eric Jensen and Sandra Johnson and their use of demographic benchmarks to assess the 2020 Census.<sup>3</sup>

It is important to note that Jensen and Johnson’s approach is most accurately performed for children and

young children since those populations depend on highly accurate birth registration data.<sup>4-9</sup> Their demographic benchmark approach is inadequate for a study like this when analyzing all age groups. The closest approach to our knowledge is to use a county-level population estimate or projection that considers multiple different population gain and loss patterns across age groups and demographic categories.

In 2018, The Texas Demographic Center's (TDC) projection for 2020 Texas population was 29,677,668 (just 0.05% below the 29,693,473 estimated by the PES). Which suggests our *projection benchmark* approach might work within an acceptable range of reliability. Since the TDC projection is broken down to the county level, it is also a helpful resource to approximate undercounting at a county level. TDC makes its population projections annually. We use the Texas Demographic Center's (TDC) projection for the 2020 Texas population released in 2018 as it is the version that occurred closest to the Census and contains most of the updated data used to generate it.

We explore the spatial distribution of counties with a high numerical and rate net undercount (above 500 people, below -500, above 5%, or below -5%), allowing us to identify the counties whose considerable net undercount deserves a higher outreach effort from the Bureau and others, as well as different population projection strategies from both the Bureau and the TDC.

Building on the differences between census counts and TDC projections, we strive to identify the potential undercount at the county level, understand why the differences exist, and support initiatives that can improve the accuracy of the population count in Texas, either through improving self-response, advocating for measures that will remove structural barriers to an accurate count (PSAP, LUCA, etc.), or raising awareness around the importance of a complete count. Having the data disaggregated in this way will enable stakeholders to address localized challenges effectively, identify disparities, and implement interventions catering to diverse community needs.

## Data

This brief uses TDC's Projections of Texas counties' population and the U.S. Census Population Estimates.<sup>10,11</sup>

To keep county-level data accuracy within a high-quality standard, we do not use county data that might have been compromised by the 2020 Census' new *differential privacy* approach to protect respondent's identity in compliance with Title 13 and Title 26. This new privacy protection came at the expense of data accuracy and some counties experienced a high loss of data accuracy. Loving County, the county with the smallest population in the state, had a 17.1% difference due to *differential privacy*.<sup>12</sup> This phenomenon also occurred with the next two smallest counties, King and Kennedy County, with a 5.2% and 4.6% difference. We excluded these counties from our study to avoid preserving the inaccuracies from the Bureau's differential privacy. For reference, their combined population represents 0.002% of Texas' population, and reduces the sample to 251 counties.

## Methodology

We first estimate the difference between the population numbers. TDC Projections are subtracted from census counts to determine whether the difference is positive or negative. A negative value indicates net undercount, and a positive value indicates net overcount. The sum of the differences is -532,163. So, we adjust counties' differences by 1.0296996 (the ratio between -547968 and -532,163) to make counties' differences add up to the PES' NCE. We then estimate the share these differences represent from the TDC Projections to estimate undercount rates. We acknowledge that this method is different from the procedure performed by the U.S. Census Bureau when estimating net coverage errors (the PES); however, it allows us to identify the potential undercount at the county level. The similarities in outcomes give us confidence in the reliability of our numerical and rate undercount for Texas counties.

Giving special attention to counties with high undercounts and overcounts allows us to identify counties with a meaningful and potentially true undercount or overcount. We classify counties' differences as high based on four thresholds: undercount

rate above 5.0% or below -5.0% and numerical undercount above 500 or below -500 people. This approach has become a standard in the literature when comparing census counts to other benchmarks.<sup>3,8,9,13</sup> Given the potential small random errors in the 2020 Census and the TDC Projections, a small value between them might not necessarily reflect a meaningful or true undercount or overcount. Whatever the case, our contribution relies on identifying the potential undercounts and overcounts for Texas counties regardless of its size.

The lowest values of the census self-response rate have been associated significantly with net undercount by the U.S. Census Bureau.<sup>14</sup> In particular, the Bureau found a statistically significant net undercount (or negative NCE) for people living in the 20% of census tracts with the lowest self-response rates. A recent study by the National Academies of Sciences reinforced this finding, suggesting that "...[2020 Census] quality deteriorates the lower the self-response rate".<sup>15</sup>

Finally, we conclude our analysis by examining the relationship between the Texas counties' net undercount and their Census self-response rate. The net undercount has different practical implications according to its sign because a positive net undercount is associated with overcounting. Therefore, when exploring the relationship of the county-level net undercount with their self-response rate, it is important to separate counties into two subsamples: those with a negative and those with a positive net undercount.

Special Considerations

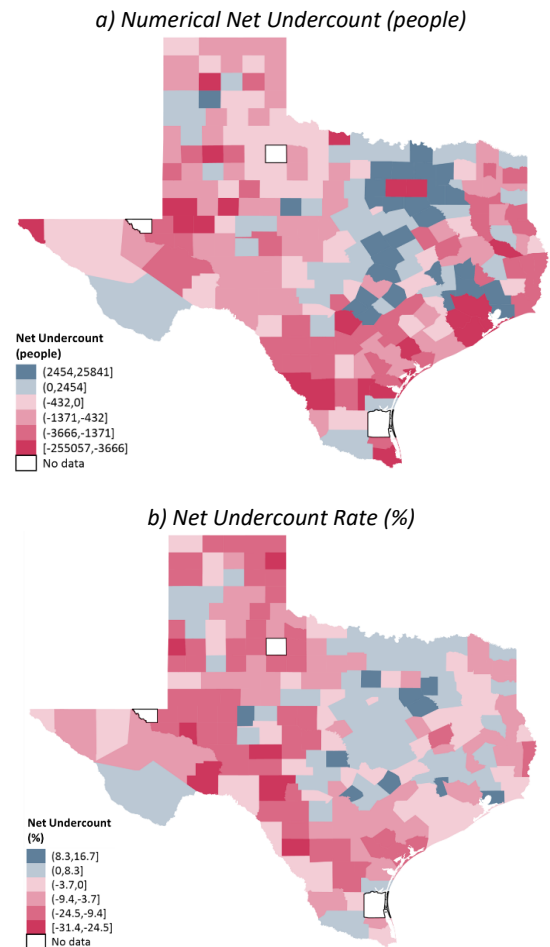
In addition to reporting the differences between the 2020 Census and the TDC Projections, the *projection benchmark* approach used here might also reflect the net coverage error and inaccuracies on the base population and births, deaths, and migrant rates used by the TDC when estimating their projections. Similarly, the differences here presented as net undercount figures might contain part of the noise injected by the 2020 census new *differential*.<sup>12</sup>

**Results**

Counties Undercount

Most Texas counties experienced a TDC projection higher than their Census count (177 out of 254, or 69.7% of counties) (see Figure 1). The other 74 Texas counties (29.1%) observed a TDC projection lower than their Census count.

**Figure 1**  
Numerical and rate net undercount in Texas counties.



**Note:** A darker red color indicates a higher negative net undercount. A darker blue color indicates a higher positive net undercount (or net overcount). Loving, Kenedy, and King are excluded from the analysis due to the *differential privacy* approach used to estimate their populations.

Interestingly, in terms of numerical net undercount, counties with a positive net undercount observed a maximum value of up to 25,841 people (in Collin County, located in the Metroplex Region, which represented

2.5% of its TDC projection). Nevertheless, counties with a negative net undercount (TDC projection higher than a Census count) observed the largest negative net undercount of -255,057 (in Harris County, located in the Gulf Coast region, representing -5.1% of its TDC projection).

In terms of rates, counties with a positive net undercount (or net overcount) observed a maximum rate of 16.6% (in Kaufman County, located in the Metroplex Region, equivalent to 20,775 people). However, counties with a negative net undercount observed the largest negative rate of -29.4% (in Edwards County, located in the South Texas region, which is equivalent to -586 people).

These initial results showed that counties with a small population could easily have a high rate and a low numerical net undercount because a number would represent a higher share than in a more populated county. Therefore, it is important to distinguish the distribution of the counties by low and high net undercount for the cases in which the net undercount is positive or negative (see Table 1).

Our analysis dissects counties into eight groups: four groups for negative net undercount and four groups for positive net undercount (or overcount).

**Table 1**  
Texas counties by the magnitude of the net undercount.

		Low Number	High Number	Total
Negative Undercount	Low Rate	30	38	68
	High Rate	28	81	109
	Total	58	119	177
Positive Undercount	Low Rate	25	30	55
	High Rate	1	18	19
	Total	26	48	74

**Note:** Shaded cells signal those counties with a High Rate, High Number, or both.

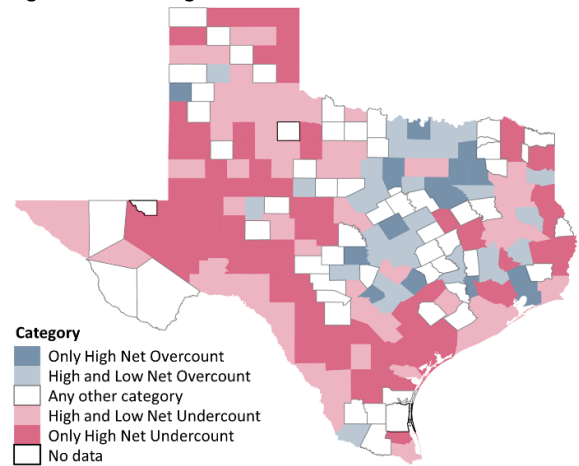
In Texas, 196 out of 254 counties (77.2%) have either a High Rate or a High Number, or both (instinctively of the sign of the net undercount). This suggests that most Texas counties have at least one type of high net undercount (colored counties in Figure 2).

Of these 196 counties, 97 have a combination of high and low numbers and rates (high rate and low number, or low number and high rate) regardless of whether the net

undercount is positive or negative (see light red and light blue counties in Figure 2). These 97 counties have a negative net undercount (after balancing out the negative and positive net undercount of counties) of -220,527 people (40.3% of the PES net undercount of -547,968 people).

**Figure 2**

High and Low categories of net undercount in Texas counties.

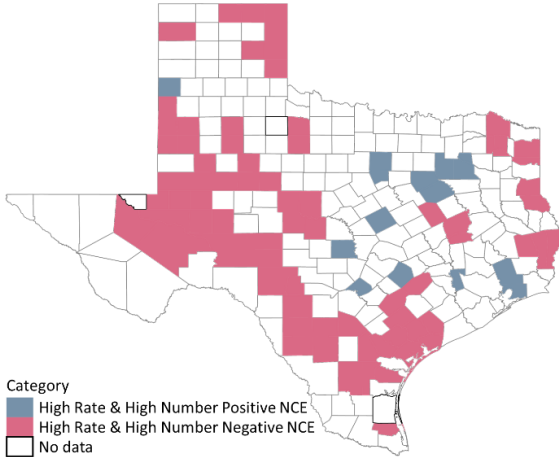


**Note:** *Only High Net Overcount* category refers to when a county has a High Rate and a High Numerical positive net undercount. *High and Low Net Overcount* category refers to when a county has either a High Rate and Low Numerical or a Low Rate and High Numerical positive net undercount. *Only High Net Undercount* refers to when a county has a High Rate and a High Numerical negative net undercount. *High and Low Net Undercount* category refers to when a county has either a High Rate and Low Numerical or a Low Rate and High Numerical negative net undercount. *Any other category* refers to when counties have both a low numerical and rate net undercount regardless of its sign. Loving, Kenedy, and King are excluded from the analysis due to the *differential privacy* approach used to estimate their populations.

Among the other 99 counties having a high net undercount (rate and numerical), independently of the sign of the net undercount (see Figure 3), 81 counties have a negative net undercount, and 18 have a net overcount. These 99 counties have a net undercount of -326,138 people (59.5% of the PES net undercount of 547,968 people).

Counties with a high net undercount (numerical and rate) predominate in the South Texas and West Texas regions. On the other side, most counties with a high numerical and rate positive net undercount (or net overcount) are close to the well-known Texas Triangle, composed of Texas' biggest metropolitan areas (Houston, Dallas, San Antonio, and Austin).

**Figure 3**  
High net undercount in Texas counties.



**Note:** Uncolored areas have any other category. Loving, Kenedy, and King are excluded from the analysis due to the *differential privacy* approach used to estimate their populations.

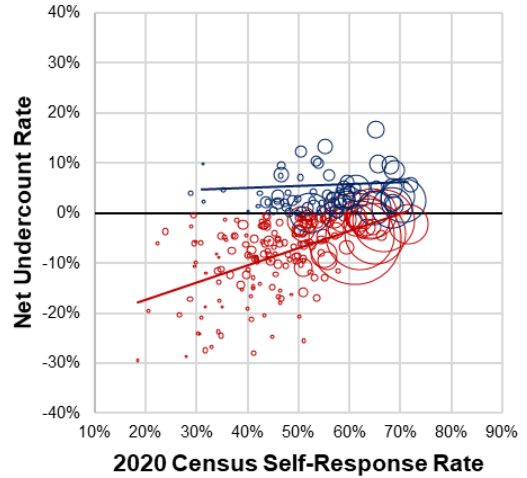
Net Undercount and Self-Response Rate

We find that negative values of net undercount are correlated to counties’ self-response rates in the 2020 census. These variables present a statistically significant correlation of 0.489 at the 1% confidence level. On the other hand, counties with a positive net undercount (or net overcount) do not have a statistical correlation. Figure 4 shows the relationship of these variables in a scatterplot.

The blue circles (or those above the horizontal axis) are counties with a positive net undercount. Counties represented by red circles (or those below the horizontal axis) have a negative net undercount. Straight lines are fitted values from a linear regression between the variables for each subsample. The almost null slope of the blue straight line suggests the net undercount is mainly steady, regardless of the self-response rate of the counties. The steeper slope of the red straight line suggests a positive correlation between the variables for counties with a negative net undercount. This result provides evidence in favor of the existing literature that suggests the quality of the Census is worse at lower self-response rates.<sup>14,15</sup> A 1% increase in the self-response rate is associated with a 0.34% higher net undercount. In other words, a 1% increase in the self-response rate is related to a 0.34% lower undercounting.

Figure 4 shows counties’ size via the size of the circles, highlighting two main facts: most Texas counties are small, and there is a concentration of highly populated counties (big circles) at the right part of the graph.

**Figure 4**  
Self-Response Rate and Net Undercount in Texas counties.



**Note:** Each circle represents a county. The size of the circle is proportional to the 2020 census population of each county. Red color indicates negative net undercount. Blue color indicates a positive net undercount (or net overcount). Loving, Kenedy, and King are excluded from the analysis due to the *differential privacy* approach used to estimate their populations.

The Texas population is scattered across its geography: 160 of its 254 counties have 30,000 or fewer people. We performed a robustness check for counties with 30K or fewer people and counties with 30K+ people and found that the magnitude of the correlation is relatively higher in the less populated counties. A 1% increase in the self-response rate is associated with a 0.30% higher net undercount in counties with 30K people or less, while it is associated with a 0.17% higher net undercount in 30K+ counties.

**Concluding Remarks**

This research brief examined disparities between the 2020 Census counts and the Texas Demographic Center’s projections as a benchmark to estimate a potential net undercount for Texas counties. The analysis underscores the vital role of accurate census data in shaping policies and equitable representation.

The findings reveal a substantial net undercount in specific Texas counties, particularly in South Texas and West Texas regions, prompting a closer examination of the regional dynamics. Notably, 77.2% of Texas counties exhibit high net undercount (numerical or rate), emphasizing the widespread impact of census discrepancies on diverse communities. Moreover, 91.8% of Texas' net undercount seems to be embedded in four regions (Gulf Coast, Alamo, South Texas, and West Texas).

As we navigate these disparities, it becomes evident that Harris County (in the Gulf Coast region) stands out with the most significant negative net undercount, necessitating focused attention on resource distribution and intervention strategies.

The regional analysis further nuances the narrative, showcasing that numerical net undercount must be contextualized with rate variations to understand the issue comprehensively.

In identifying potential drivers of the net undercount when it is positive or negative across counties, we found that a negative net undercount is correlated to counties' self-response rate in the 2020 census. In particular, a 1% increase in the Self-Response Rate is associated with a 0.34% higher net undercount. This, in practical terms, suggests that a 1% increase in the Self-Response Rate is related to a 0.34% lower undercounting. It is critical to point out that, when considering the size of the counties, this relationship is stronger in counties with 30k people or less than in those with 30K+.

In conclusion, this research underscores the urgency of addressing local differences and regional disparities, urging stakeholders, policymakers, and researchers to mitigate these challenges collaboratively. The insights gleaned from this examination contribute to the ongoing discourse on census accuracy and lay the groundwork for targeted interventions and informed decision-making at both the state and regional levels.

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