

# Housing Unit Inventory

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## Project Overview: Summary of Project Details

**Project Title:** Detailed Household and Housing Unit Characteristics: Data and Replication Code Version 3

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### **Required Citations:**

Rosenheim, Nathanael, Roberto Guidotti, Paolo Gardoni & Walter Gillis Peacock. (2021). Integration of detailed household and housing unit characteristic data with critical infrastructure for post-hazard resilience modeling. *Sustainable and Resilient Infrastructure*. <https://doi.org/10.1080/23789689.2019.1681821>

Rosenheim, Nathanael. (2022). "Detailed Household and Housing Unit Characteristics: Data and Replication Code." [Version 2] *DesignSafe-CI*. <https://doi.org/10.17603/ds2-jwf6-s535>

**Project Description :** People are the most important part of community resilience planning. However, models for community resilience planning tend to focus on buildings and infrastructure. This project provides a solution that connects people to buildings for community resilience models. The housing unit inventory method transforms aggregated population data into disaggregated housing unit data that includes occupied and vacant housing unit characteristics. Detailed household characteristics include size, race, ethnicity, income, group quarters type, vacancy type and census block. Applications use the housing unit allocation method to assign the housing unit inventory to structures within each census block through a reproducible and randomized process. The benefits of the housing unit inventory include community resilience statistics that intersect detailed population characteristics with hazard impacts on infrastructure; uncertainty propagation; and a means to identify gaps in infrastructure data such as limited building data. This project archives example data and python code files. Python is an open source programming language and the code files provide future users with the tools to generate a 2010 and 2020 housing unit inventory for any county in the United States. This project's method is reproducible, generalizable, and that the characteristics included provide a valid representation of the social and economic characteristics of a community's population in 2010 and 2020.

### **Funding Source: Award name and number:**

Center for Risk-Based Community Resilience Planning : NIST-70NANB20H008, NIST-70NANB15H044 (<http://resilience.colostate.edu/>)

Southeast Texas Urban Integrated Field Lab: DE-SC0023216 (<https://setx-uifl.org/>)

### **Related Works:**

Interdependent Networked Community Resilience Modeling Environment (IN-CORE) : <https://incore.ncsa.illinois.edu/>

Hazard Reduction and Recovery Center (HRRC): <https://www.arch.tamu.edu/impact/centers-institutes-outreach/hazard-reduction-recovery-center/>

**Keywords:** Social and Economic Population Data, Housing Unit, US Census, Synthetic Population

**License:** Open Data Commons Attribution License (<https://opendatacommons.org/licenses/by/summary/>)

**DesignSafe-CI project identification number:** Project-2961 - Available at: <https://www.designsafe-ci.org/data/browser/public/designsafe.storage.published/PRJ-2961>

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## Data Dictionary: Summary of Variables

| Variable Name | Data Type | Length | Categorical | Variable Label           |
|---------------|-----------|--------|-------------|--------------------------|
| huid          | String    |        |             | Housing Unit ID          |
| blockid       | String    | 15     |             | Block ID                 |
| numprec       | Int       |        |             | Number of Person Records |
| ownership     | Int       |        | True        | Tenure Status            |

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## Variable Details and Notes

The following pages provide details on each variable. Where applicable notes provide links to verify data. Categorical variables include details on category codes.

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huid: Housing Unit ID

| Variable characteristic | Variable details     |
|-------------------------|----------------------|
| variable type           | string               |
| total cases             | 49                   |
| valid cases             | 49                   |
| missing cases           | 0                    |
| unit of measure         | Housing units        |
| unit of analysis        | Housing unit         |
| unique values           | 49                   |
| minimum length          | 20                   |
| maximum length          | 20                   |
| example 1               | B371559601011027H001 |
| example 2               | B371559601011013H001 |
| example 3               | B371559601011031H005 |
| example 4               | B371559601011031H051 |

Variable Notes: huid

1. Primary Key for sample data.

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blockid: Block ID

| Variable characteristic | Variable details             |
|-------------------------|------------------------------|
| variable type           | string                       |
| total cases             | 49                           |
| valid cases             | 49                           |
| missing cases           | 0                            |
| unit of measure         | Housing unit in census block |
| unit of analysis        | Geographic unit              |
| unique values           | 1                            |
| minimum length          | 17                           |
| maximum length          | 17                           |
| example 1               | 371560000000000.0            |
| example 2               | 371560000000000.0            |
| example 3               | 371560000000000.0            |
| example 4               | 371560000000000.0            |

Variable Notes: blockid

1. 2010 Census Block ID

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numprec: Number of Person Records

| Variable characteristic | Variable details                           |
|-------------------------|--------------------------------------------|
| variable type           | numeric (Int)                              |
| total cases             | 49                                         |
| valid cases             | 49                                         |
| missing cases           | 0                                          |
| unit of measure         | Persons                                    |
| unit of analysis        | Housing unit                               |
| range                   | minimum value: 1.00 to maximum value: 1.00 |
| mean                    | 1.00                                       |
| median                  | 1.00                                       |
| standard deviation      | 0.00                                       |
| 10th percentile         | 1.00                                       |
| 25th percentile         | 1.00                                       |
| 50th percentile         | 1.00                                       |
| 75th percentile         | 1.00                                       |
| 90th percentile         | 1.00                                       |



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## ownership: Tenure Status

| Variable characteristic | Variable details                     |
|-------------------------|--------------------------------------|
| variable type           | categorical (Int)                    |
| total cases             | 49                                   |
| valid cases             | 49                                   |
| missing cases           | 0                                    |
| unit of measure         | Housing unit                         |
| unit of analysis        | Household                            |
| range                   | minimum value: 1 to maximum value: 2 |

## ownership: Tenure Status - Categorical codes, labels and frequencies

| Code | Label                           | Count of<br>Housing units | Percent<br>Housing units | Sum of<br>Persons | Percent<br>Persons |
|------|---------------------------------|---------------------------|--------------------------|-------------------|--------------------|
| 1    | 1. Owned or being bought (loan) | 33                        | 67.35%                   | 33                | 67.35%             |
| 2    | 2. Rented                       | 16                        | 32.65%                   | 16                | 32.65%             |

### Variable Notes: ownership

1. Based on 2010 Census SF1 Table H16.
2. Tenure status is not applicable for vacant not occupied housing units.
3. Tenure status is not applicable for group quarters.
4. To verify results compare table to:  
[https://data.census.gov/cedsci/table?g=05000000US{state\\_county}&tid=DECENNIALSF12010.H16](https://data.census.gov/cedsci/table?g=05000000US{state_county}&tid=DECENNIALSF12010.H16).

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## Key Terms and Definitions

**American Community Survey (ACS):** "The American Community Survey (ACS) is a nationwide survey designed to provide communities a fresh look at how they are changing. The ACS replaced the decennial census long form in 2010 and thereafter by collecting long form type information throughout the decade rather than only once every 10 years." (U.S. Census Bureau Glossary: [https://www.census.gov/glossary/#term\\_AmericanCommunitySurveyACS](https://www.census.gov/glossary/#term_AmericanCommunitySurveyACS)).

**Census block:** "A statistical area bounded by visible features, such as streets, roads, streams, and railroad tracks, and by nonvisible boundaries, such as selected property lines and city, township, school districts, and county boundaries. A block is the smallest geographic unit for which the Census Bureau tabulates decennial census data... Over 11 million blocks were identified for the 2010 Census." (U.S. Census Bureau Glossary: [https://www.census.gov/glossary/#term\\_Censusblock](https://www.census.gov/glossary/#term_Censusblock)).

**Decennial census:** "The census of population and housing, taken by the Census Bureau in years ending in 0 (zero)." (U.S. Census Bureau Glossary: [https://www.census.gov/glossary/#term\\_Decennialcensus](https://www.census.gov/glossary/#term_Decennialcensus)).

**Household:** "A household includes all the people who occupy a housing unit (such as a house or apartment) as their usual place of residence. A household includes the related family members and all the unrelated people, if any, such as lodgers, foster children, wards, or employees who share the housing unit. A person living alone in a housing unit, or a group of unrelated people sharing a housing unit such as partners or roomers, is also counted as a household. The count of households excludes group quarters." (U.S. Census Bureau Glossary: [https://www.census.gov/glossary/#term\\_Household](https://www.census.gov/glossary/#term_Household)).

**Housing Unit:** "A house, an apartment, a mobile home or trailer, a group of rooms, or a single room occupied as separate living quarters, or if vacant, intended for occupancy as separate living quarters. Separate living quarters are those in which the occupants live separately from any other individuals in the building and which have direct access from outside the building or through a common hall." (U.S. Census Bureau Glossary: [https://www.census.gov/glossary/#term\\_Housingunit](https://www.census.gov/glossary/#term_Housingunit)).

**Group Quarters:** "The Census Bureau classifies all people not living in housing units as living in group quarters. A group quarters is a place where people live or stay, in a group living arrangement, that is owned or managed by an entity or organization providing housing and/or services for the residents... Group quarters include such places as college residence halls, residential treatment centers, skilled nursing facilities, group homes, military barracks, correctional facilities, and workers' dormitories." (U.S. Census Bureau Glossary: [https://www.census.gov/glossary/#term\\_GroupQuartersGQ](https://www.census.gov/glossary/#term_GroupQuartersGQ)).

**Tenure:** "Refers to the distinction between owner-occupied and renter-occupied housing units." (U.S. Census Bureau Glossary: [https://www.census.gov/glossary/#term\\_Tenure](https://www.census.gov/glossary/#term_Tenure)).

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