

Kauai: The Garden Isle

A Statistical Analysis of Hawaii's Oldest Island



Introduction

This report provides a comprehensive analysis of Kauai, Hawaii's oldest island. We examine demographic trends, economic indicators, climate patterns, and tourism statistics, comparing Kauai to other Hawaiian islands.

About Kauai

Kauai, known as the "Garden Isle," is the oldest of the main Hawaiian Islands at approximately 5.1 million years old. Located in the northwestern part of the Hawaiian archipelago, it covers 562 square miles and is home to over 73,000 residents.

Key Facts

- **Location:** 22.0964° N, 159.5261° W
- **Area:** 562.3 square miles
- **Population:** ~73,000 (2020 Census)
- **County:** Kauai County
- **Highest Point:** Kawaikini (5,243 feet)
- **Notable Features:** Na Pali Coast, Waimea Canyon, Mount Waialeale (one of the wettest spots on Earth)

About This Project

This analysis uses data from the U.S. Census Bureau's American Community Survey (ACS) to explore:

- Population trends and demographics
- Economic indicators and housing
- Comparisons with other Hawaiian islands
- Geographic distributions across census tracts

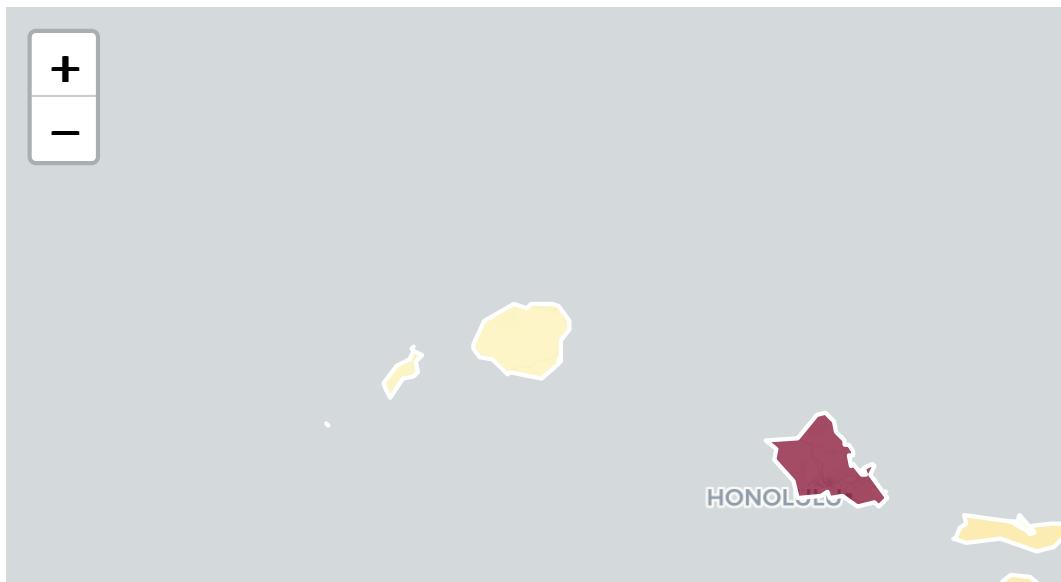
The ACS **5-year estimates** combine data collected over a 5-year period (2018–2022) to provide more reliable estimates, especially for small geographic areas. The data represents an **average** of those 5 years, released in 2022.

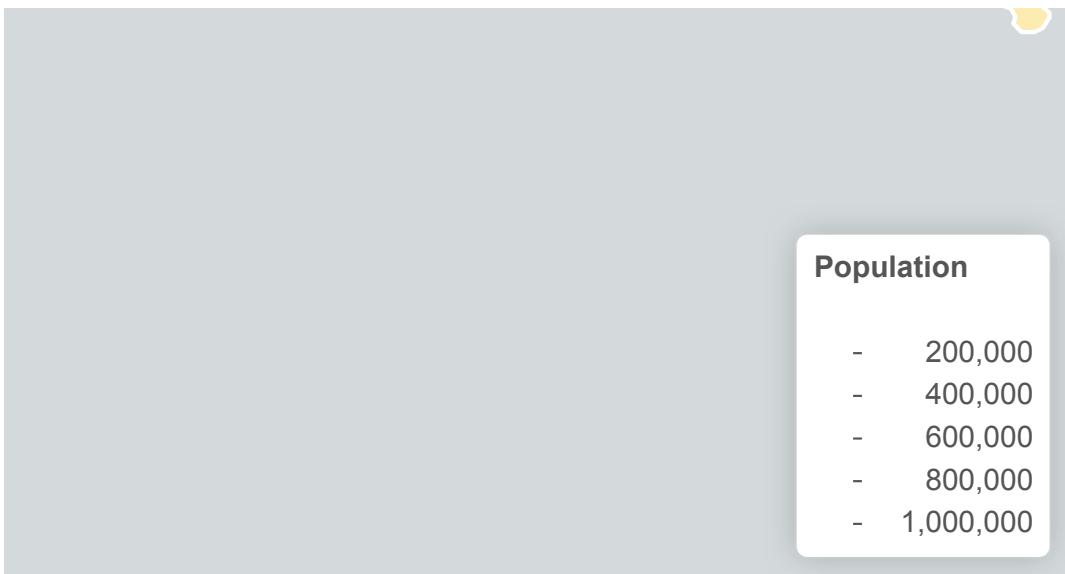
Note: that county data for Kalawao may be missing in some visuals due to the county having less than 100 individuals.

Geographic and Demographic Overview

Population Distribution

The following interactive map displays the population distribution across Hawaiian counties. Kauai County, located in the northwestern region of the Hawaiian archipelago, shows distinct population patterns compared to more urbanized counties.





Leaflet | © OpenStreetMap contributors © CARTO

Figure 1: Population Distribution Across Hawaiian Counties

Demographic Characteristics

Table 1: Demographic Characteristics by County

American Community Survey 2022 (5-year estimates)

County ¹	Population	Median Age	Bachelor's Degree or Higher (%)
Honolulu	1,010,100	38.8	23.3
Hawaii	202,163	43.3	19.2
Maui	164,765	42.2	20.0
Kauai	73,511	42.3	21.3
Kalawao	50	43.3	20.0

¹ Kauai County highlighted for reference

Source: U.S. Census Bureau, ACS 2022

The demographic profile reveals variations in age distribution and educational attainment across counties, with implications for workforce development and social services planning.

Economic Analysis

Income Patterns

Geographic distribution of median household income demonstrates economic disparities across the Hawaiian Islands. The following map visualizes these patterns, with darker shades indicating higher median incomes.

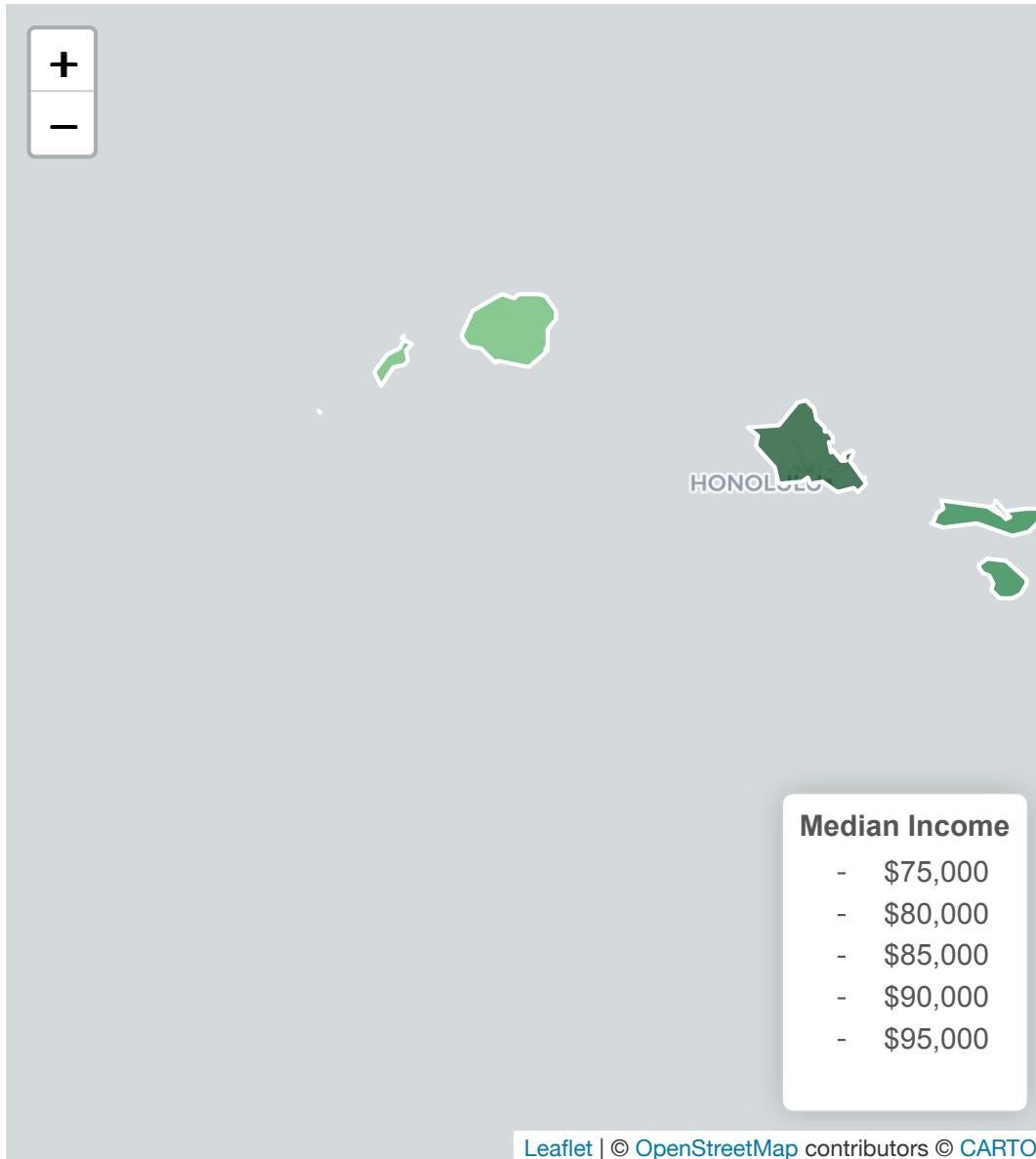


Figure 2: Median Household Income Distribution

Comparative Income and Housing

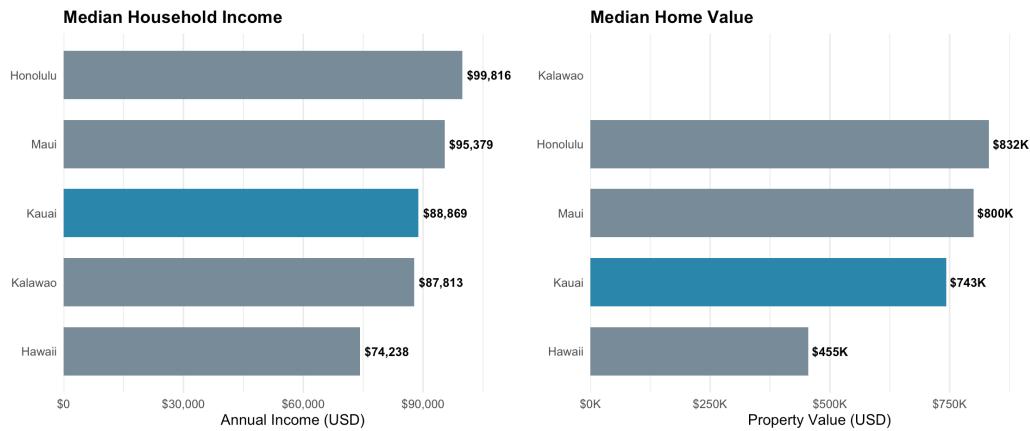


Figure 3: Economic Indicators - Income and Housing Values

The economic indicators reveal that Kauai maintains competitive income levels while experiencing housing costs reflective of island real estate market dynamics.

Housing Affordability

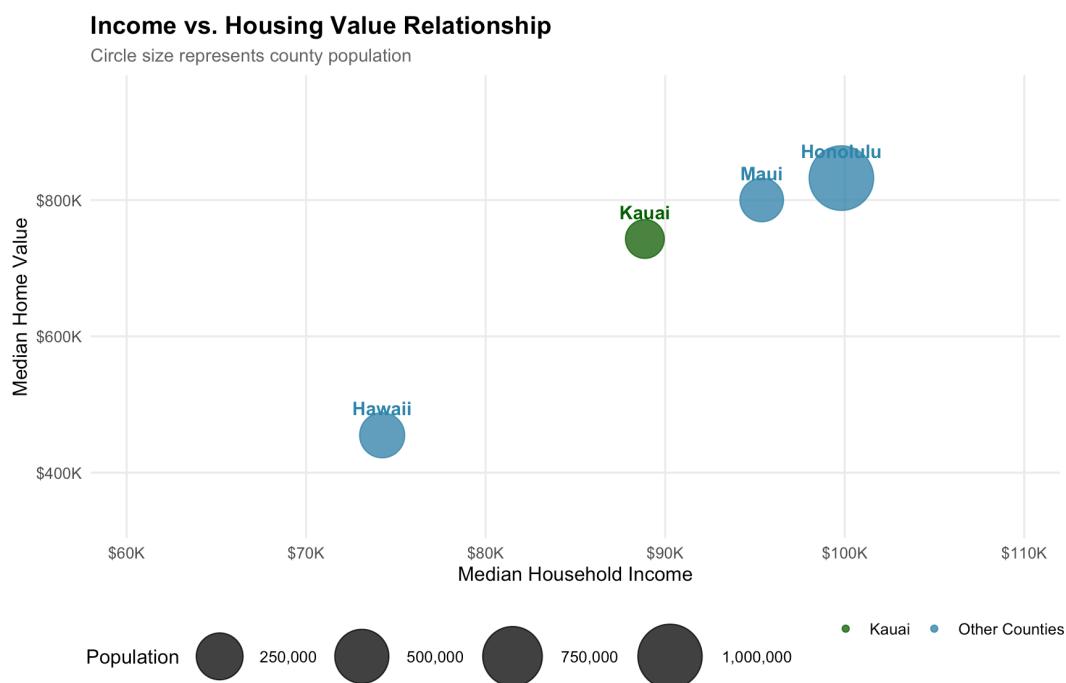


Figure 4: Relationship Between Income and Housing Costs

Education and Workforce

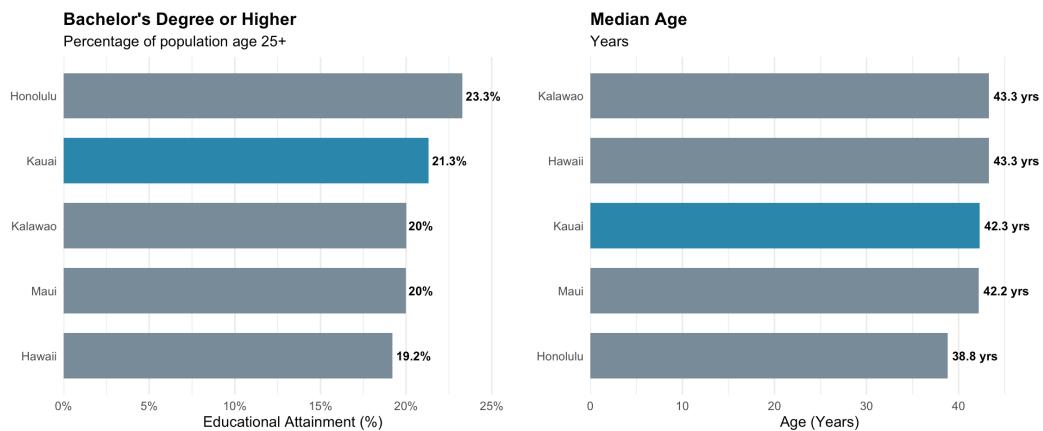


Figure 5: Education and Age Demographics

Educational attainment varies across counties, reflecting different economic structures and workforce demands. Age demographics provide context for understanding community composition and future workforce trends.

Comprehensive Statistics

Table 2: Comprehensive Socioeconomic Indicators

All Hawaiian Counties, 2022

County ¹	Population	Median Income	Median Age	Median Home Value	Median Rent	Bachelor's %	Unen
Honolulu	1,010,100	\$99,816	38.8	\$832,200	\$1,976	23.3	
Hawaii	202,163	\$74,238	43.3	\$454,900	\$1,352	19.2	
Maui	164,765	\$95,379	42.2	\$800,100	\$1,805	20.0	

Kauai	73,511	\$88,869	42.3	\$742,900	\$1,686	21.3
Kalawao	50	\$87,813	43.3	NA	\$1,297	20.0

¹ Kauai County highlighted as primary focus of analysis

Source: U.S. Census Bureau, American Community Survey 2022 (5-year estimates)

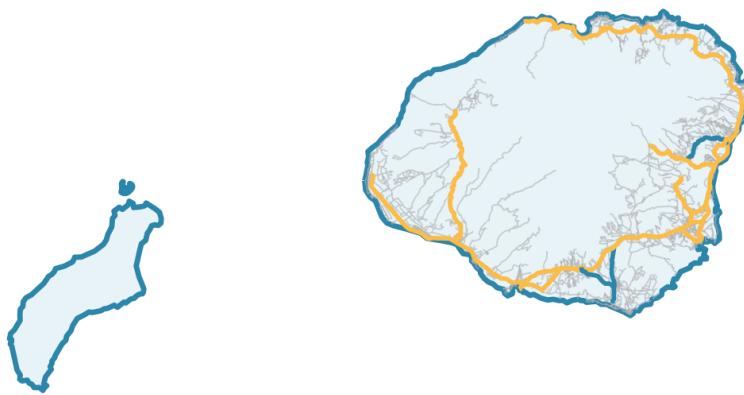
Geographic Infrastructure

Road Network Analysis

The [tigris](#) package provides access to detailed geographic features from the U.S. Census Bureau's TIGER/Line database. Below we visualize the road network in Kauai county.

Transportation Infrastructure: Kauai County

Major road networks and county boundaries



Road Type █ Interstate █ US Highway

Source: U.S. Census Bureau TIGER/Line Shapefiles 2022

Kauai's road network reflects the county's geographic constraints as an island community. The transportation infrastructure is characterized by a coastal highway system that encircles much of the island, with limited interior road development due to the mountainous terrain of the island's central region. Unlike more urbanized Hawaiian counties, Kauai lacks interstate highways, with the road network primarily consisting of state routes and county roads that serve both residential areas and the tourism

industry. The spatial distribution of roads reveals settlement patterns concentrated along the coast, particularly on the eastern and southern shores where population density is highest. The relative absence of roads in the island's interior—home to Mount Wai'ale'ale, one of the wettest spots on Earth—underscores the relationship between topography, climate, and infrastructure development.

Water Features

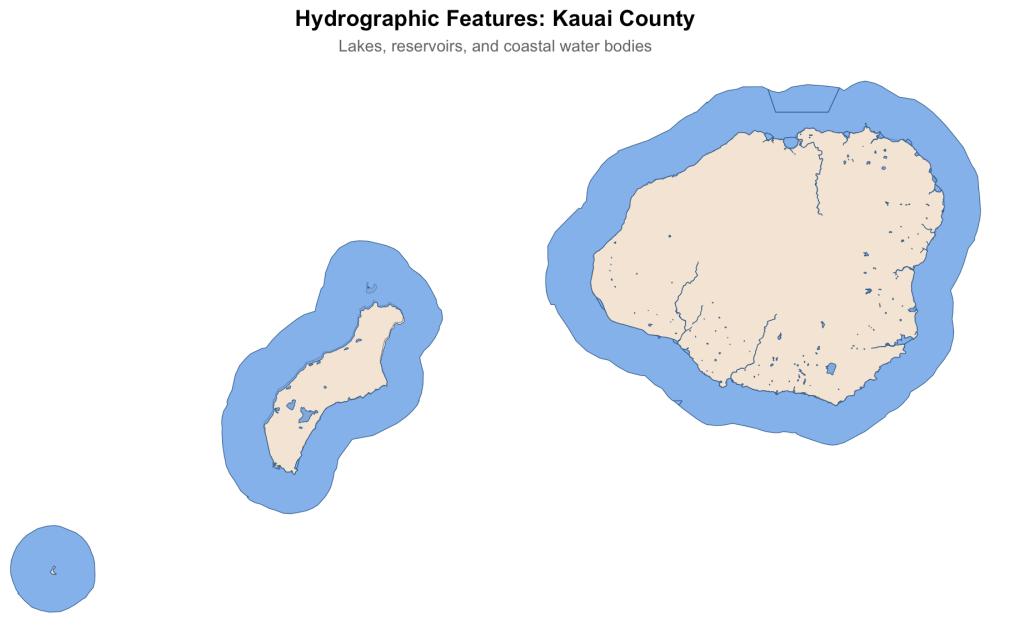


Figure 7: Hydrographic Features in Kauai County

Kauai's hydrographic features include both natural water bodies and human-engineered reservoirs that support the island's agriculture. The mapped water features highlight several key characteristics:

****Natural Features**:** Coastal estuaries and natural ponds are distributed around the island's perimeter, supporting unique ecosystems and serving as important habitat for native Hawaiian species.

****Reservoirs and Agricultural Infrastructure**:** Several large reservoirs, particularly visible in the southern and eastern portions of the island, reflect Kauai's historical role in sugar cane cultivation. These water management systems continue to serve agricultural operations and, in some cases, have been repurposed for hydroelectric power generation.

****Spatial Relationship to Settlement**:** The distribution of water features correlates with population centers, indicating the historical

importance of water access in determining settlement patterns and agricultural development. The prominence of water features in Kauai's landscape reflects both the island's abundant rainfall—particularly in the interior highlands—and the necessity of water management infrastructure to support human activity in an island environment.

Conclusions and Implications

Key Findings

Based on the comprehensive analysis of census data, several important patterns emerge:

Demographic Profile

Kauai County demonstrates a stable demographic composition with a median age of 42.3 years and a total population of 73,511. This positions Kauai as a moderately sized county within the Hawaiian archipelago.

Economic Indicators

The median household income of \$88,869 reflects a robust local economy, while the median home value of \$742,900 indicates housing market pressures common across Hawaiian counties. The relationship between income and housing costs suggests ongoing affordability challenges that warrant policy attention.

Educational Attainment

With 21.3% of residents holding bachelor's degrees or higher, Kauai shows competitive educational attainment levels. This human capital represents an asset for economic diversification and workforce development initiatives.

Policy Implications

1. **Housing Affordability:** The income-to-housing-value ratio suggests the need for continued focus on affordable housing development and preservation.
2. **Workforce Development:** Educational attainment levels support investment in knowledge-based industries while maintaining

traditional economic sectors.

3. **Demographic Planning:** Age distribution patterns inform infrastructure, healthcare, and social service planning needs.

Limitations and Future Research

This analysis is based on 5-year ACS estimates and represents data collected through 2022. Future research should examine:

- Temporal trends in demographic and economic indicators
- Intra-county geographic variations
- Impact of tourism and other industry sectors on local economies
- Climate change and resilience planning implications



Appendix

Data Sources and Methodology

Data Collection: All data were obtained from the U.S. Census Bureau's American Community Survey (ACS) 2022 5-year estimates via the [tidycensus](#) R package.

Geographic Level: County-level data for all five Hawaiian counties (Hawaii, Honolulu, Kauai, Maui, and Kalawao).

Variables Collected:

- B01003_001: Total Population
- B19013_001: Median Household Income
- B01002_001: Median Age
- B15003_022 & B15003_001: Educational Attainment
- B25077_001: Median Home Value

- B25064_001: Median Gross Rent
- B23025_005 & B23025_003: Unemployment Rate

References

Referenced claude.ai and chat.gpt for code generation