Climate Change Vulnerability in Alameda County: A Look at Extreme Heat

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Introduction

Understanding which communities will be impacted by climate change is important for informing emergency response, planning, policies and mitigating the impacts of climate change. In Alameda County, we can expect more and prolonged heat waves with some areas with relatively high vulnerability. Climate change affects health in many ways and communities are not affected equally or in the same way. Evidence shows some groups that will be particularly vulnerable to these impacts include people with disabilities and mobility issues, people with pre-existing health conditions, the elderly, children and low-income communities of color.

The Alameda County Public Health Department has developed a mapping analysis of climate change vulnerability that looks closely at extreme heat vulnerability. This is modeled after a report by Contra Costa Health Services, which can be found here: https://cchealth.org/health-data/pdf/2015-climate-change.pdf

In the slides you will find various maps that show the factors that contribute to climate change vulnerability and a map showing the combined vulnerability factors across the Alameda County. The final slide is a summary table comparing the vulnerability factors across cities and communities in Alameda County. Every city and community has some kind of vulnerability to climate change and heat that needs to be considered.

Climate Change and Vulnerability in Alameda County

This set of slides are factors that highlight vulnerability to climate change. They are arranged in four groups:

- Biological factors
- Socioeconomic factors
- Social exclusion factors
- Living conditions factors

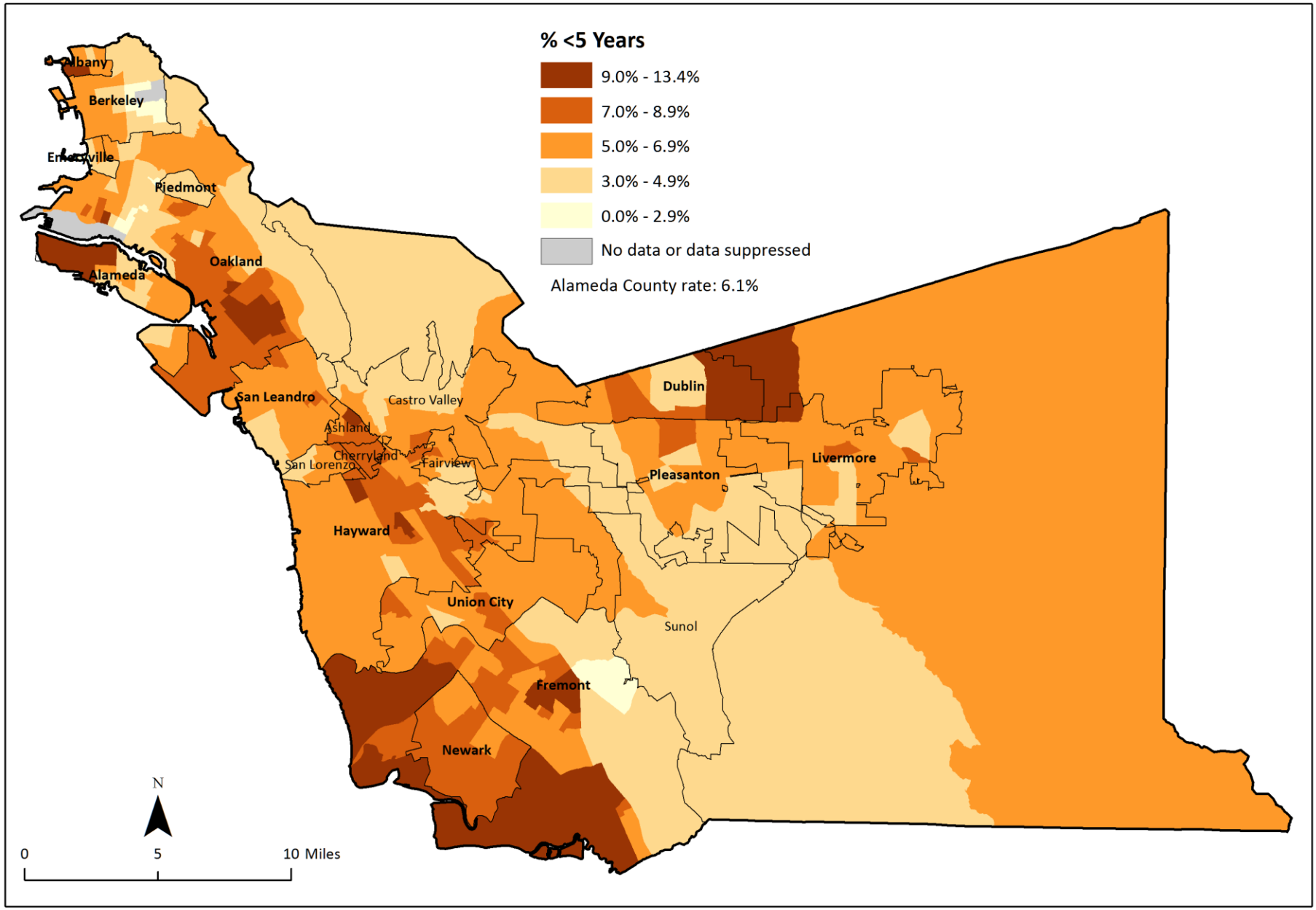
Climate change risks are numerable:

- Emergencies such as a heat wave, flooding, fire, or storms
- Increase in poor conditions, such as ground-level ozone, fine particulate matter, or allergens and asthma triggers
- Increase in vector-borne diseases due to higher temperatures
- Contaminated water bodies including municipal water sources

Questions? Contact Matt Beyers at the Alameda County Public Health Department, Community Assessment, Planning, and Evaluation (CAPE) at matt.beyers@acgov.org

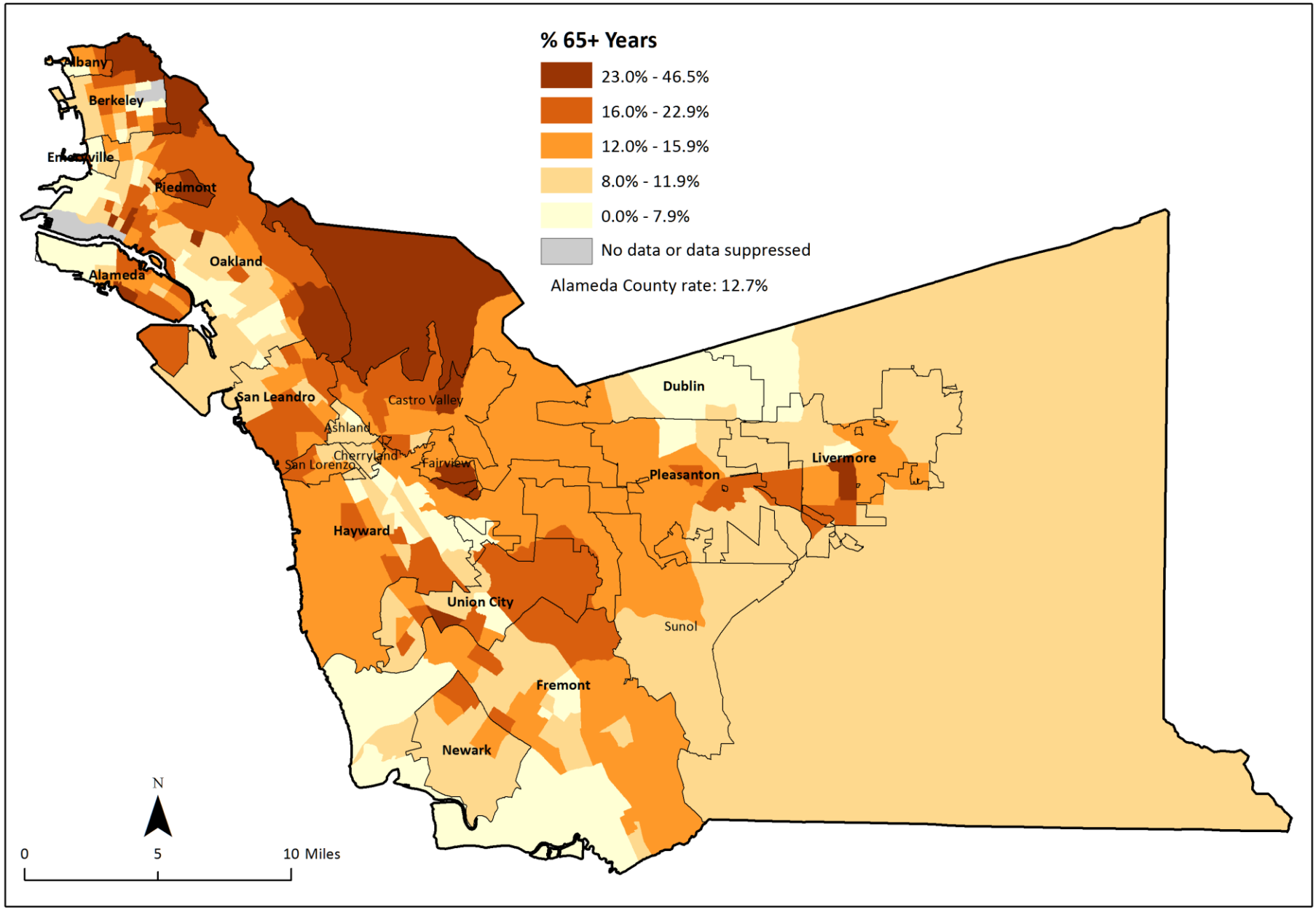
Biological Factors for Vulnerability to Climate Change

Persons <5 Years



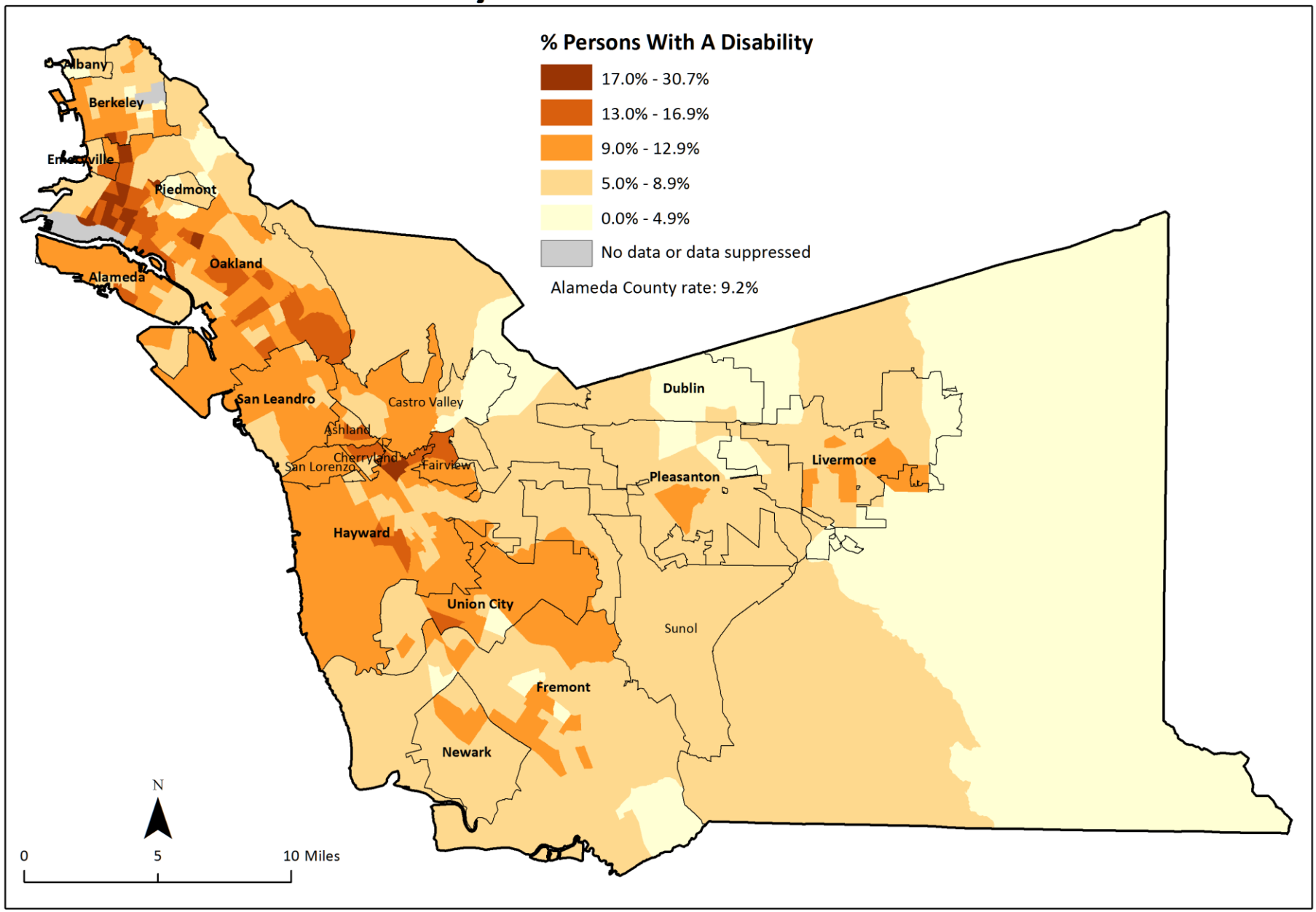
Source: CAPE, with data from Esri 2015.

Persons 65+ Years



Source: CAPE, with data from Esri 2015.

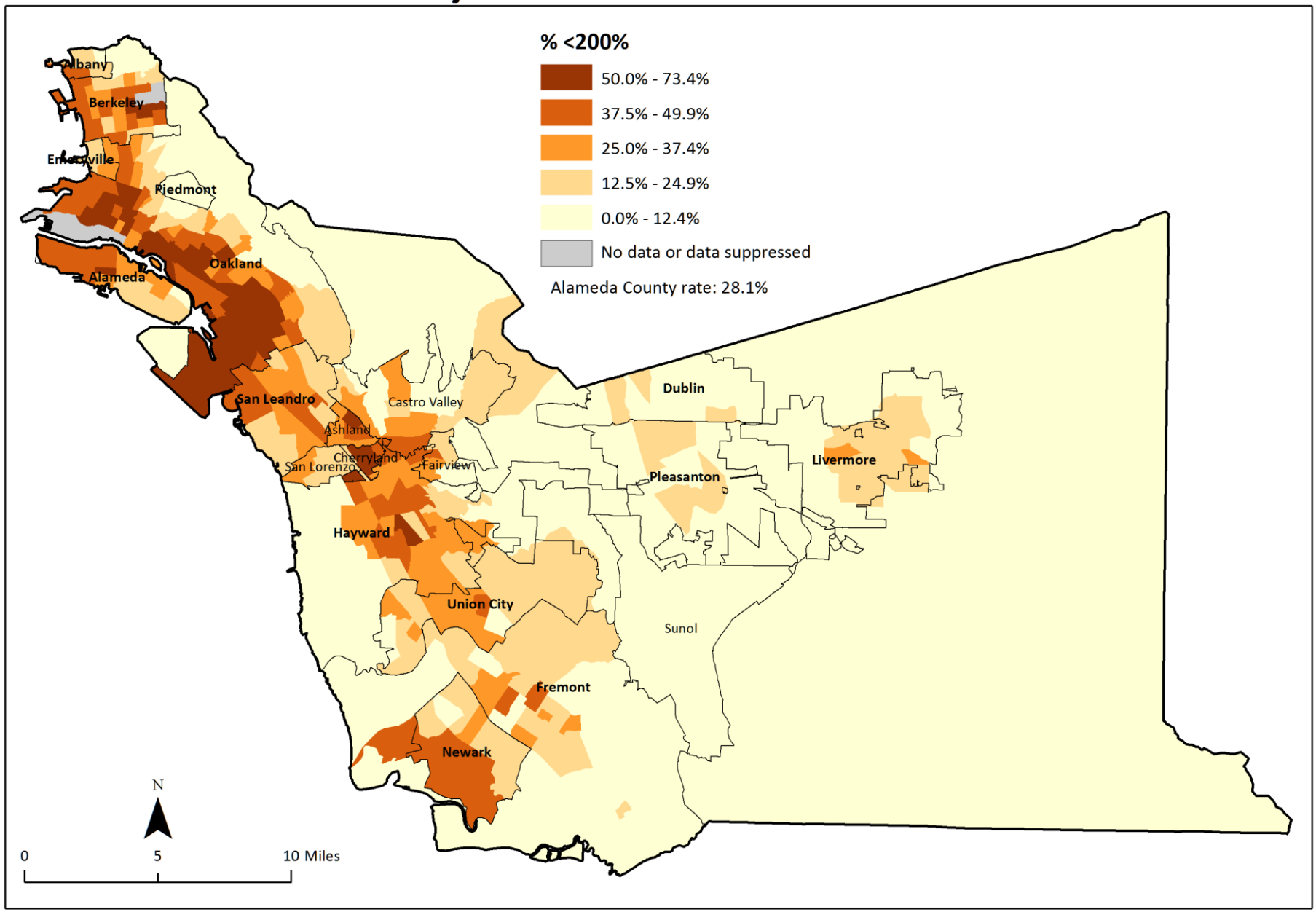
Persons with a Disability



Source: CAPE, with data from American Community Survey 2014 5-year files.

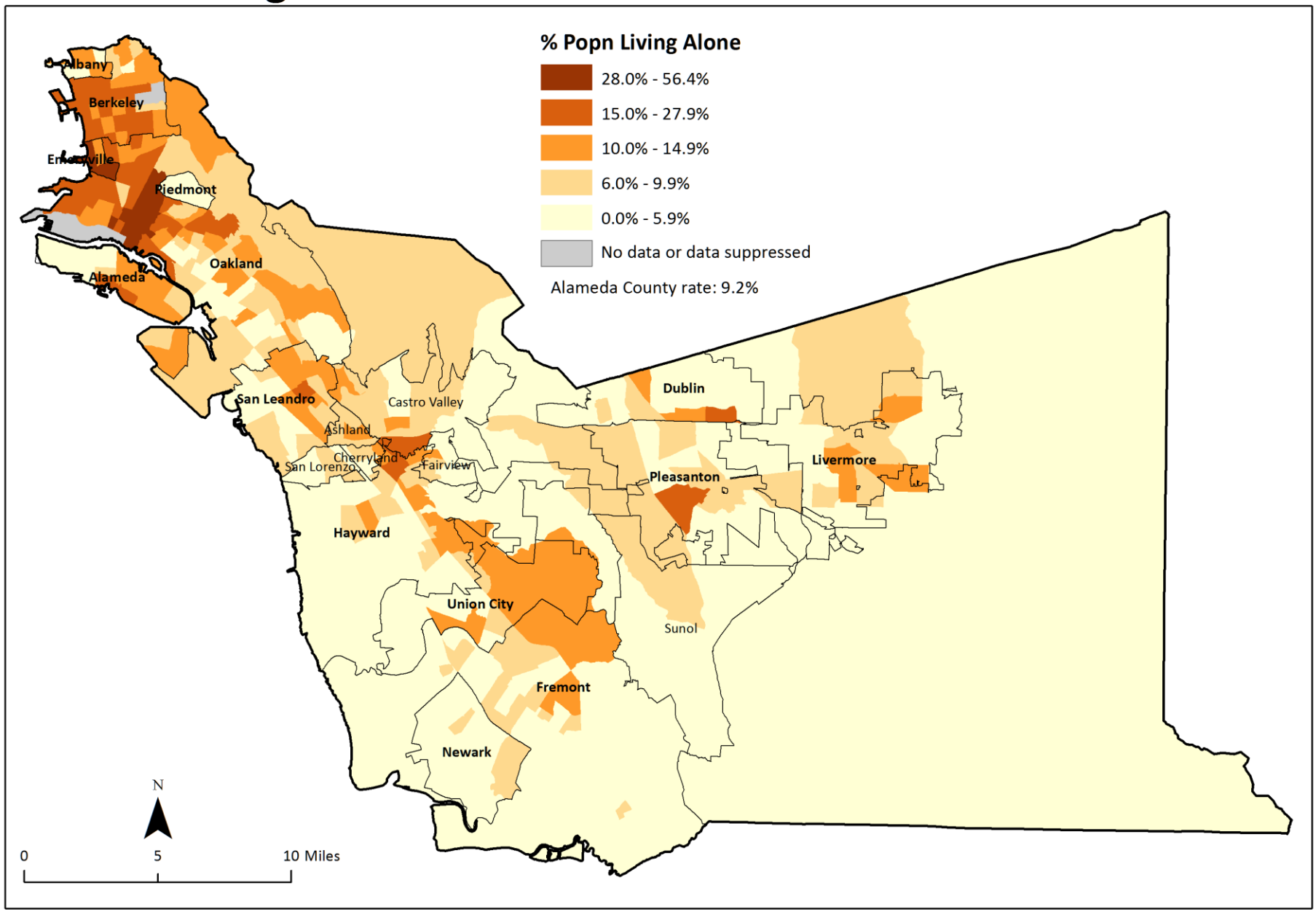
Socioeconomic Factors for Vulnerability to Climate Change

Persons <200% Poverty



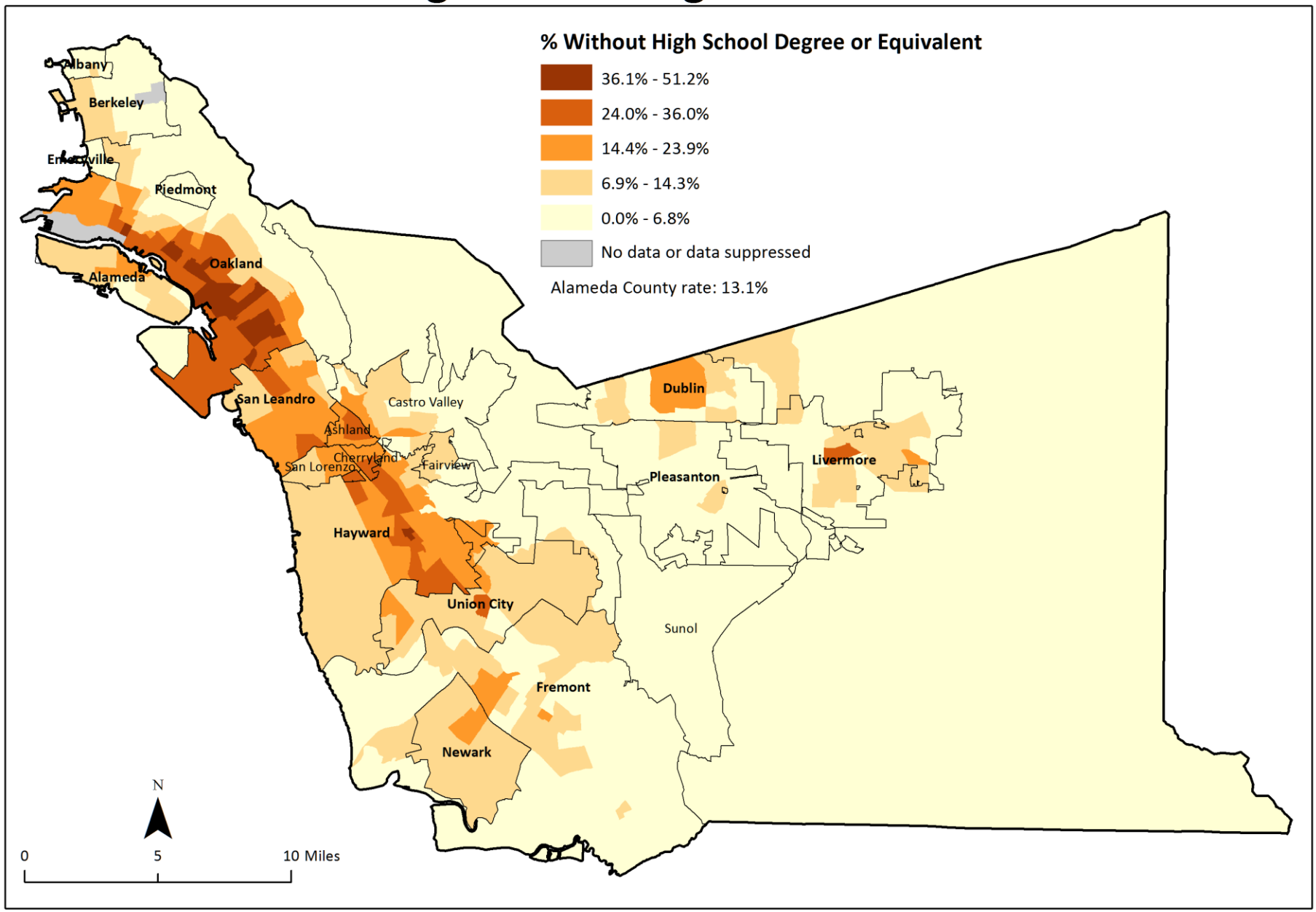
Source: CAPE, with data from American Community Survey 2014 5-year files.

Persons Living Alone



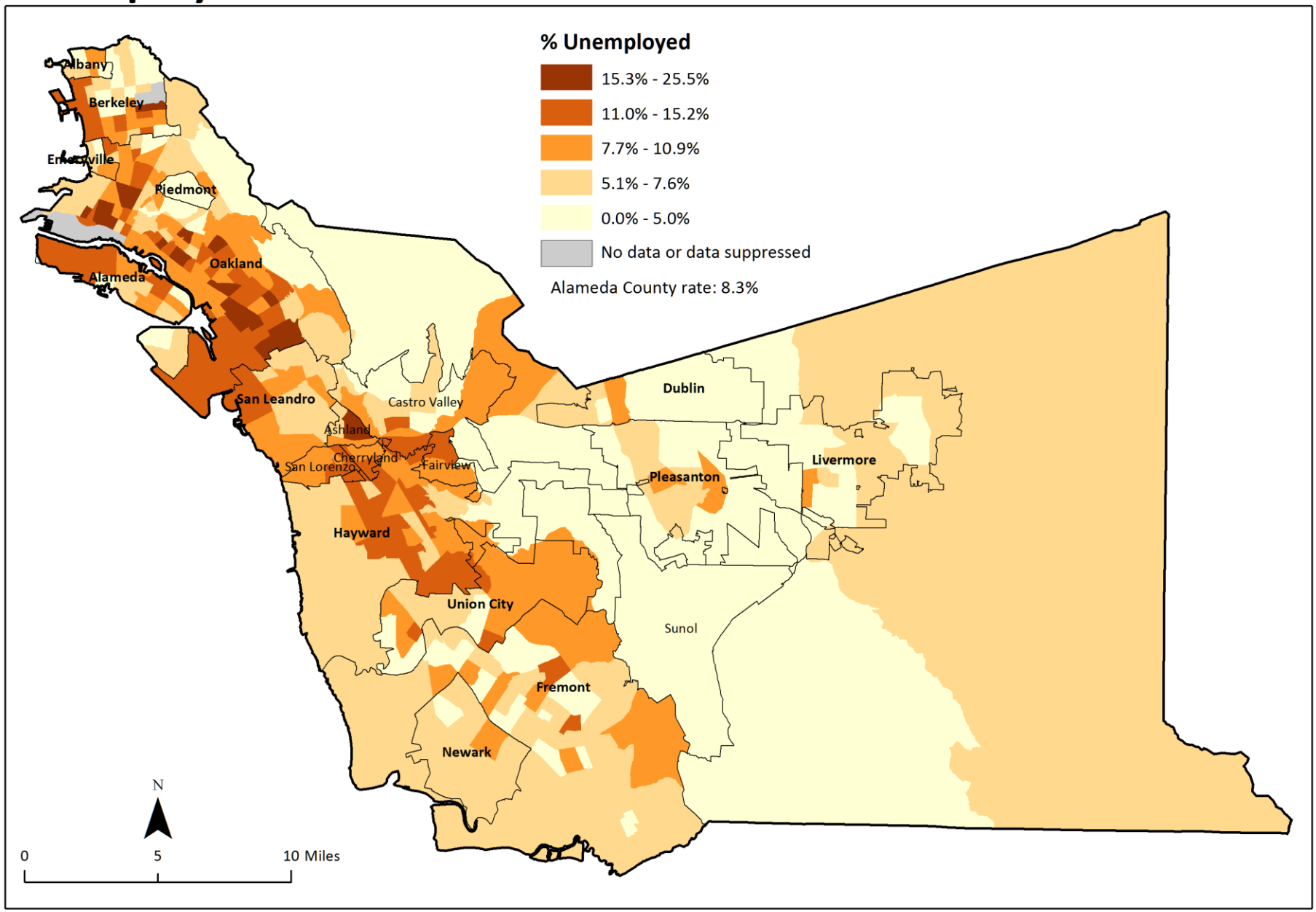
Source: CAPE, with data from American Community Survey 2014 5-year files.

Persons Without a High School Degree



Source: CAPE, with data from American Community Survey 2015 5-year files.
Note: Persons 25+ years only.

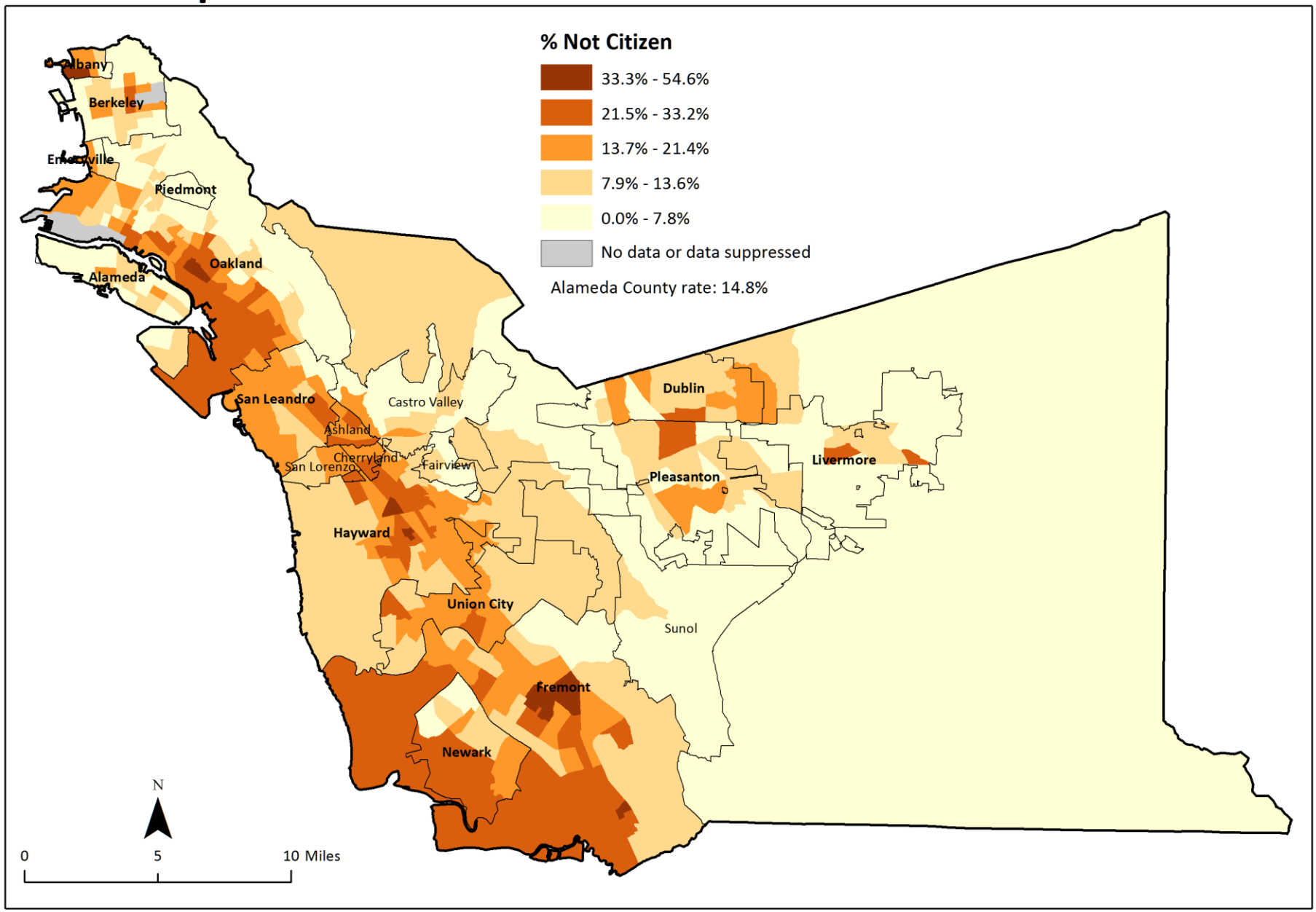
Unemployment



Source: CAPE, with data from American Community Survey 2015 5-year files.
Note: Persons in civilian labor force only.

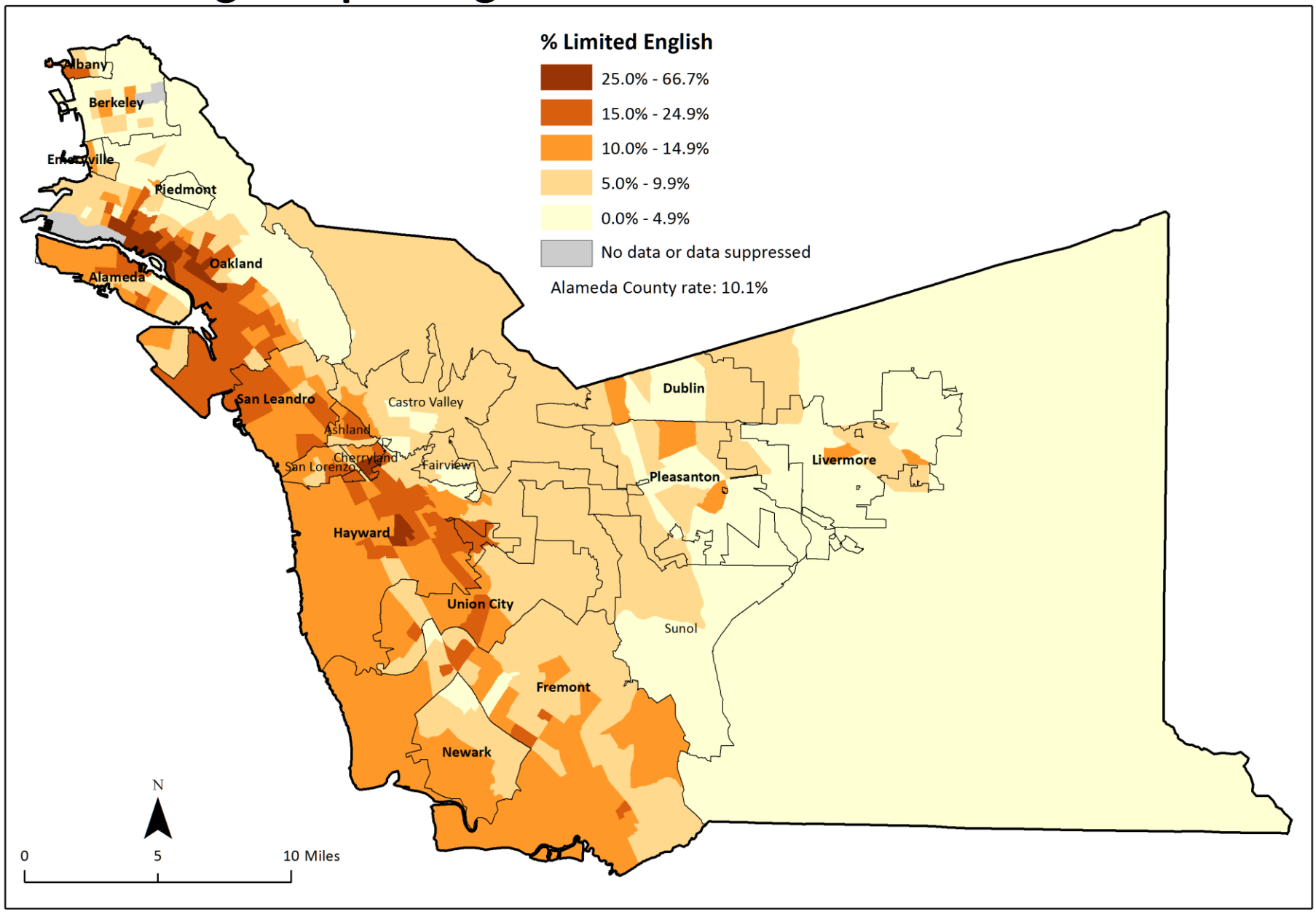
Social Exclusion Factors for Vulnerability to Climate Change

Citizenship



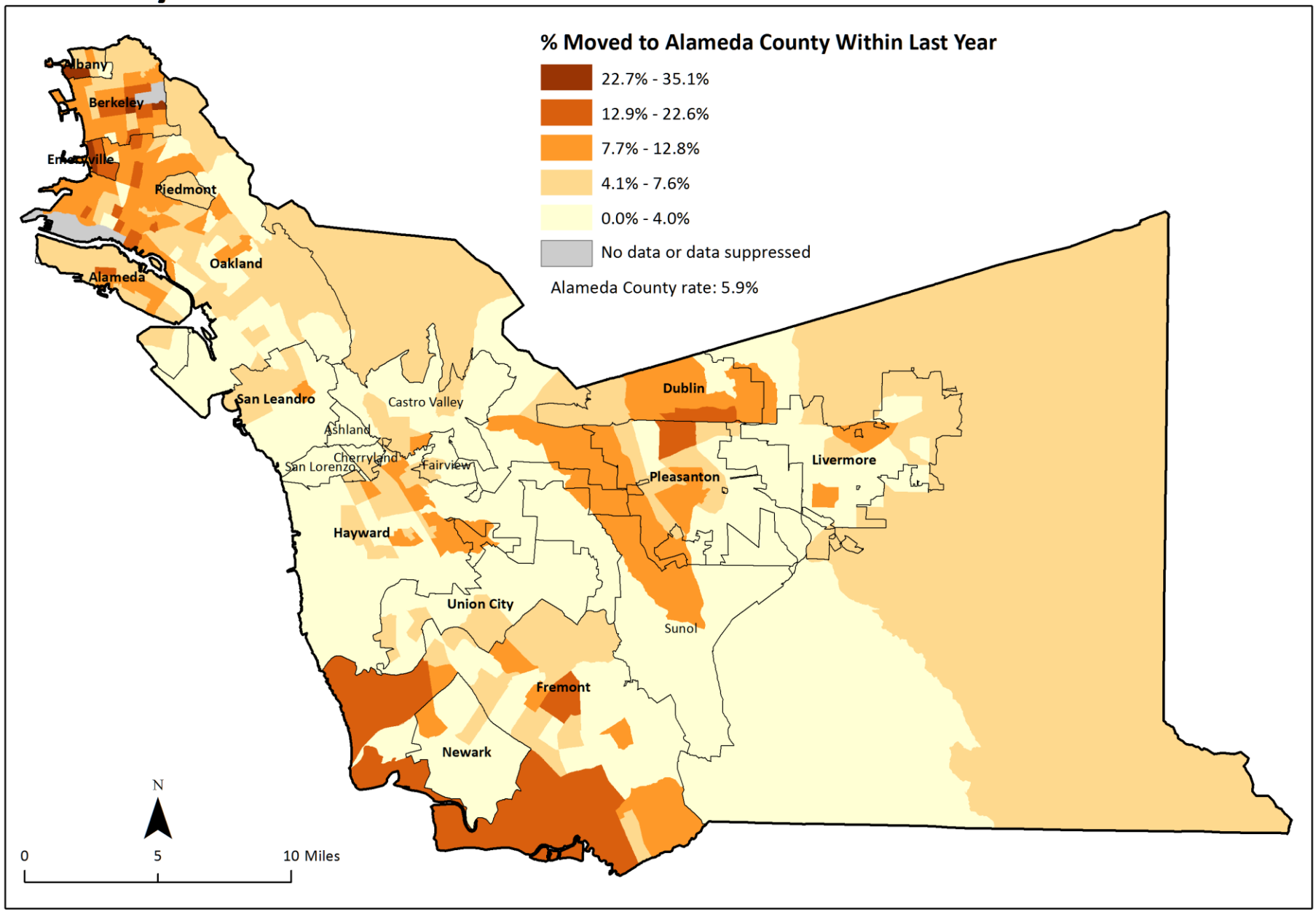
Source: CAPE, with data from American Community Survey 2015 5-year files.

Limited English Speaking Households



Source: CAPE, with data from American Community Survey 2014 5-year files.

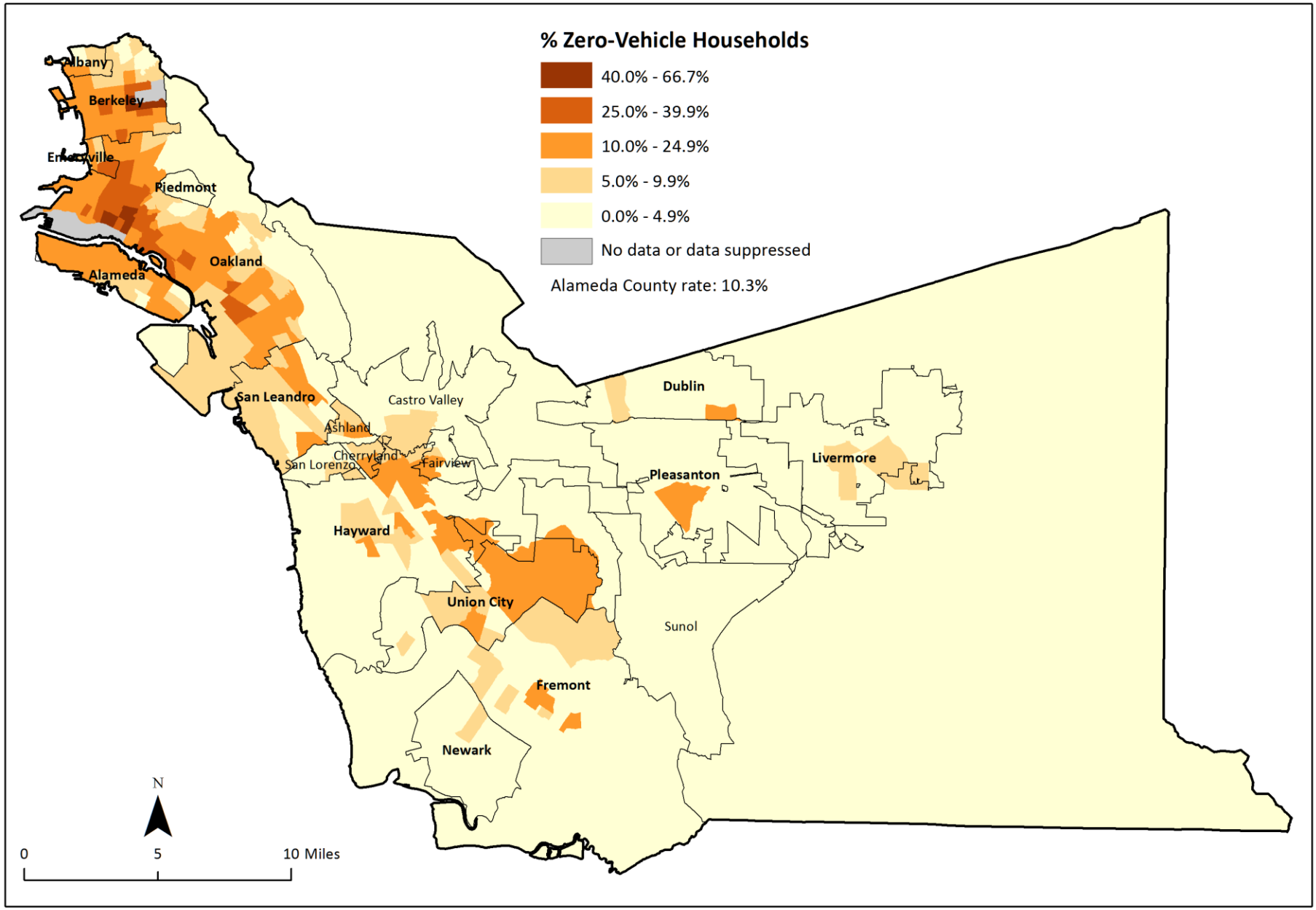
Mobility



Source: CAPE, with data from American Community Survey 2015 5-year files.

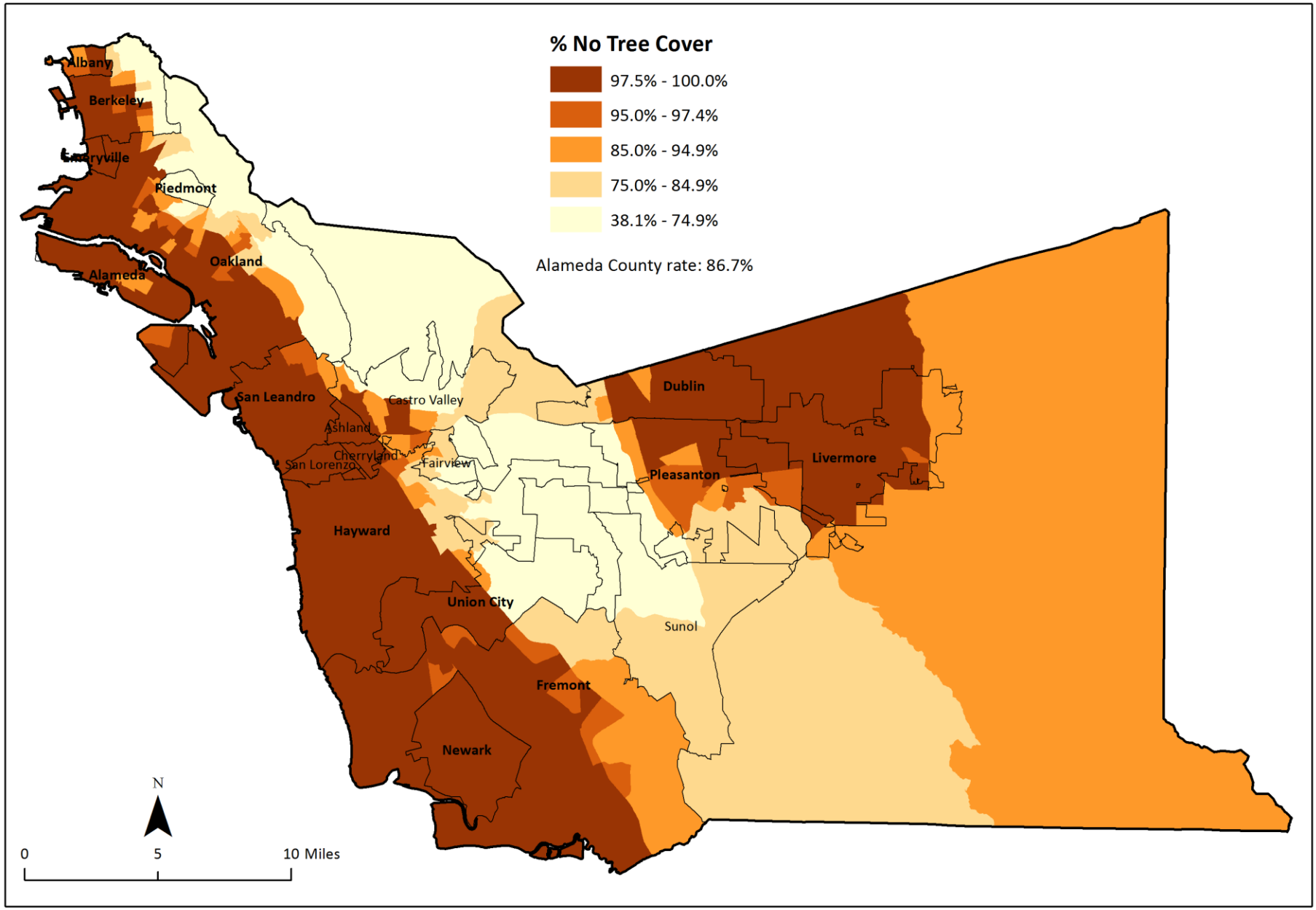
Living Conditions Factors for Vulnerability to Climate Change

Zero-Vehicle Households



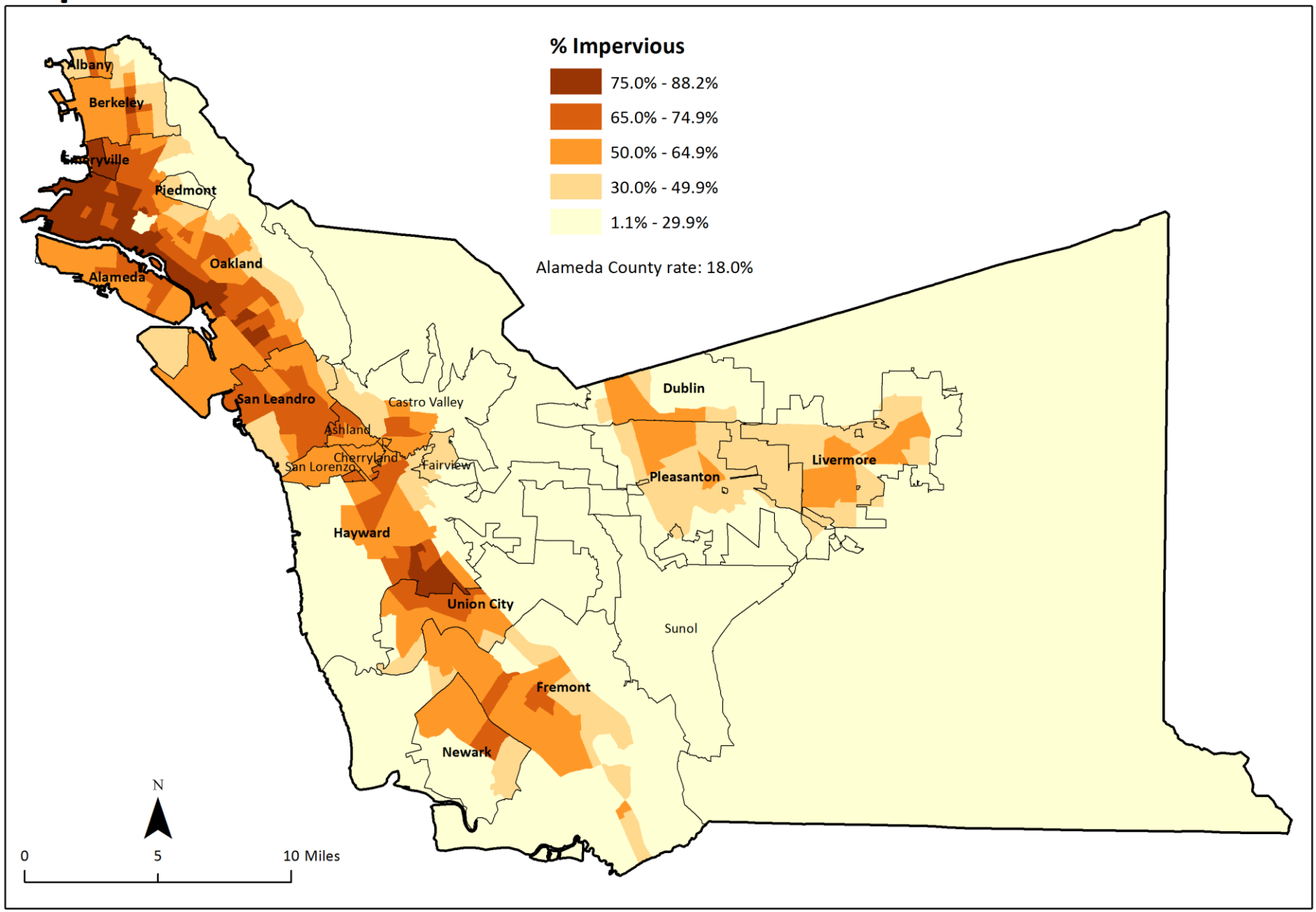
Source: CAPE, with data from American Community Survey 2014 5-year files.

No Tree Cover



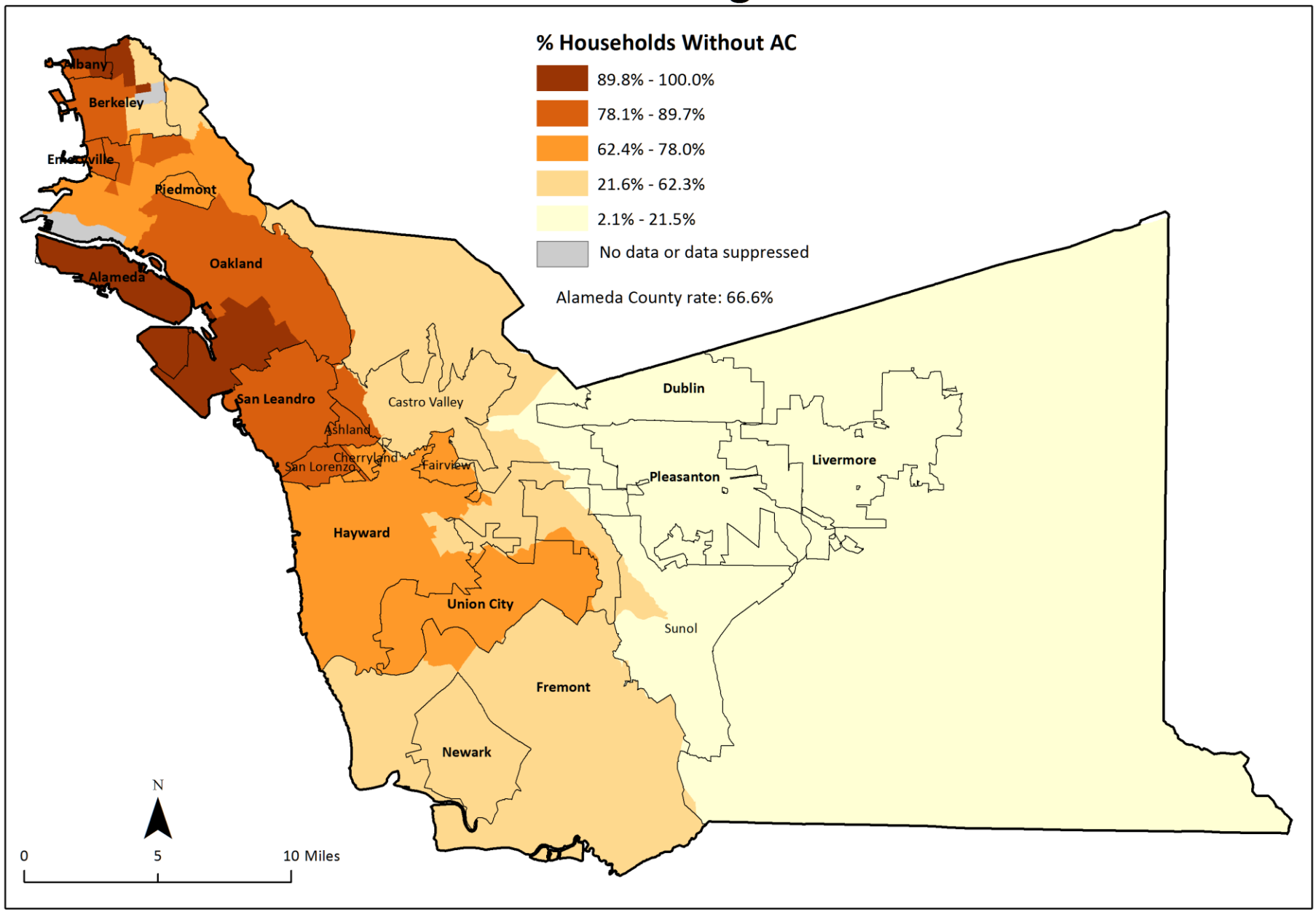
Source: CAPE, with data from USGS National Land Cover Database 2011.

Impervious Surface



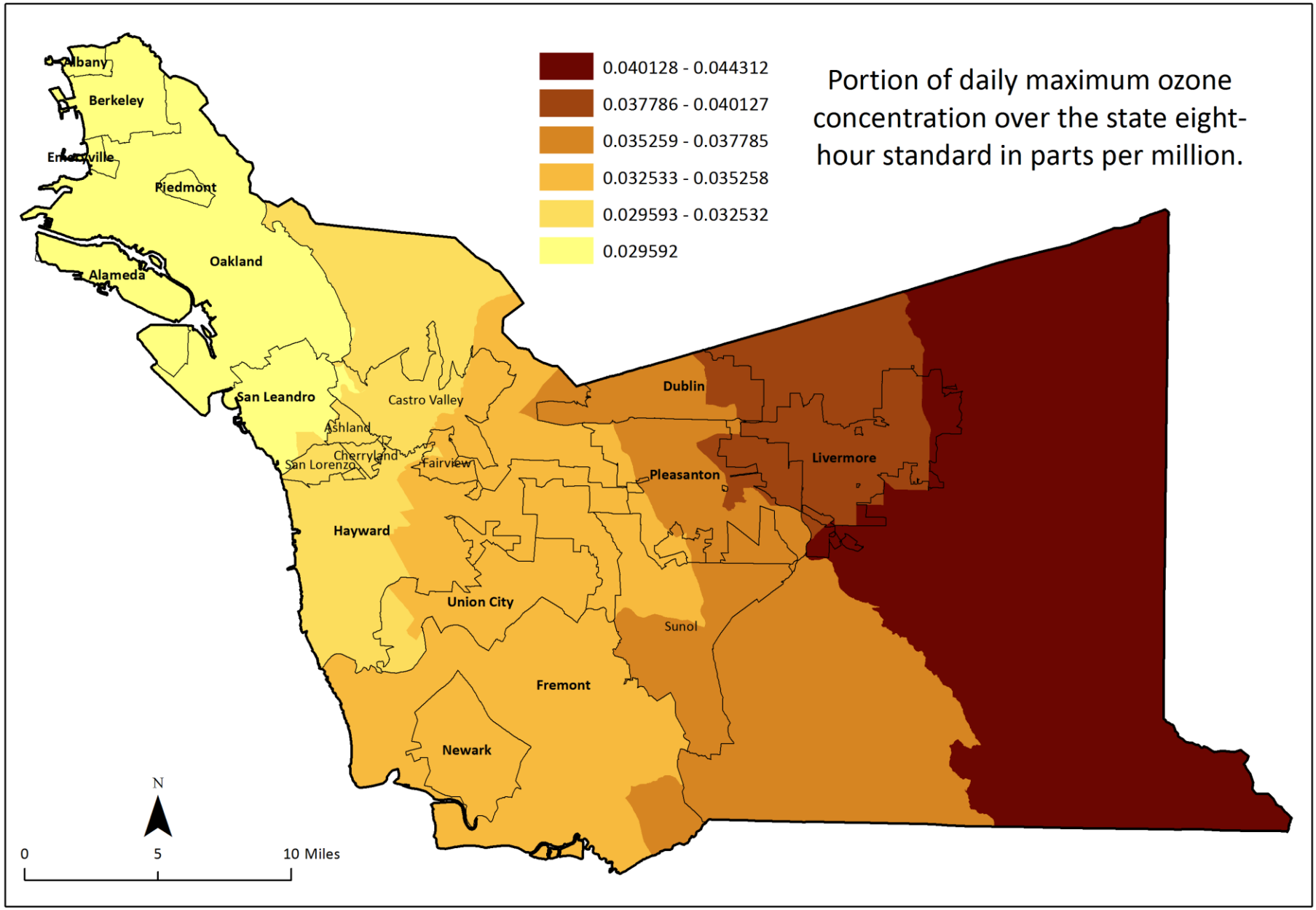
Source: CAPE, with data from USGS National Land Cover Database 2011.

Households Without Air Conditioning



Source: CAPE, with data from CDPH 2009 California Energy Survey via Pacific Institute.

Ozone



Source: CAPE, with data from CalEnviroscreen 3.0.

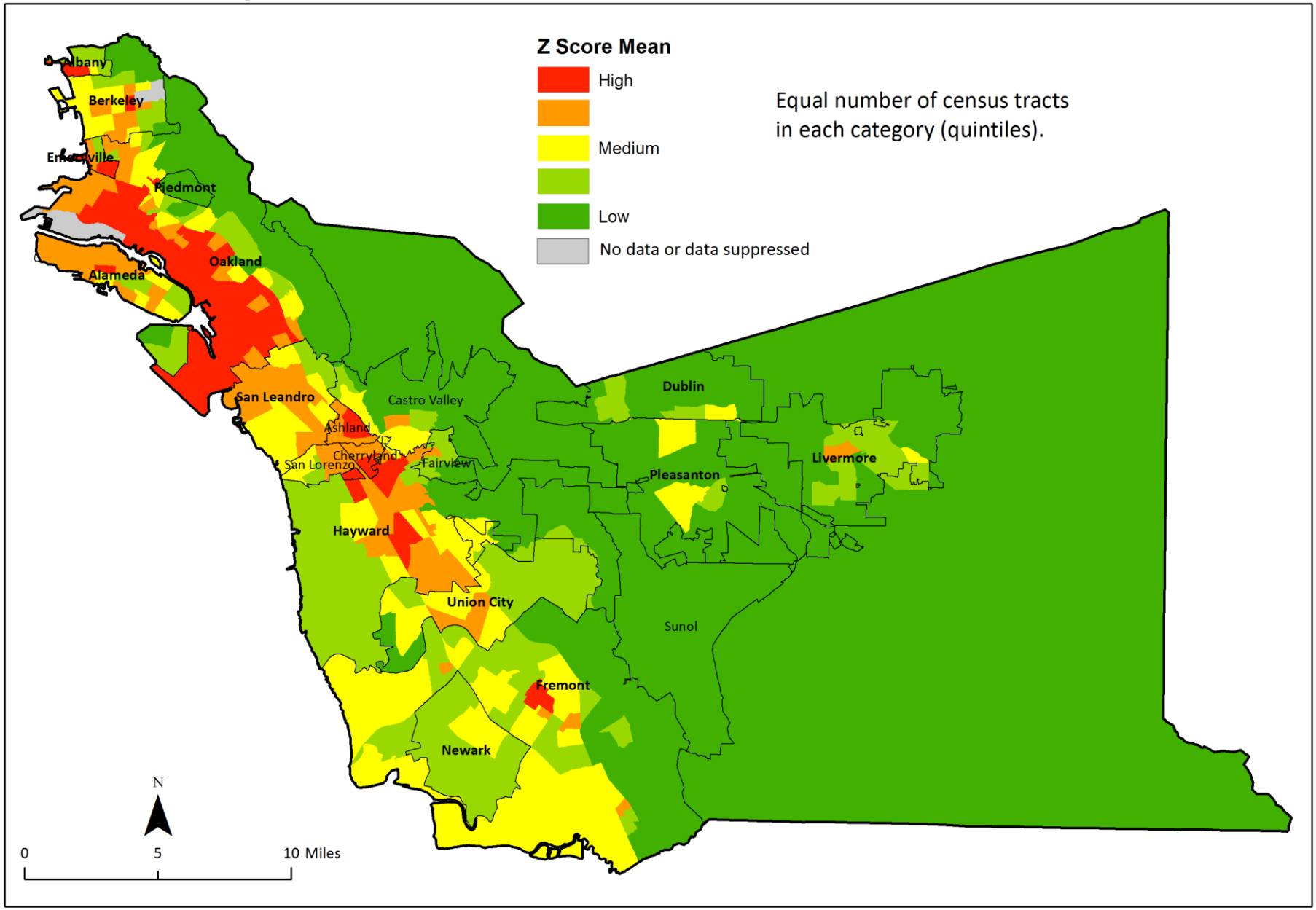
Mean Z Scores

The final figure is a map of combined vulnerability factors across the county. The factors were combined using an averaged standard score (z-score), a measurement of how far they differ from average conditions. Each factor was weighted equally, and the census tracts in red are those with the highest average. A high average score for a census tract may be driven by a high ranking for a large number of vulnerability factors, or by very high outlier values for a small number of factors.

What the colors mean:

- Green means “low vulnerability risk to climate change/extreme heat”
- Yellow means “medium vulnerability risk to climate change/extreme heat”
- Red means “high vulnerability risk to climate change/extreme heat”

Vulnerability



Source: CAPE.

City/Place Summary

	Biological Factors			Socioeconomic Factors				Social Exclusion Factors			Living Conditions Factors					
Geography	% <5 Years	% 65+ Years	% With Disability	% Persons <200% Federal Poverty Level	% Persons Living Alone	% Persons 25+ Years Without HS Degree	% Unem-ployed	% Persons Not A Citizen	% Households Limited English	% Persons Moved From Different County In Past Year	% Households Without a Vehicle	% No Tree Canopy	% Impervious Surface	% Households Without Air Conditioning	Ozone*	Average Standard Score
Alameda County	6.1%	13.0%	9.5%	27.4%	9.0%	13.1%	8.3%	14.8%	10.0%	6.5%	10.1%	NA	NA	NA	NA	
Cherryland	7.7%	9.7%	12.8%	50.9%	7.3%	25.7%	11.9%	22.9%	21.0%	2.9%	8.4%	99.5%	58.8%	76.4%	0.0325	High
Ashland	8.1%	8.7%	8.8%	43.7%	8.5%	23.4%	13.1%	20.6%	15.8%	1.8%	9.7%	99.7%	64.6%	82.7%	0.0325	
Oakland	6.4%	12.9%	12.1%	41.1%	13.2%	19.6%	10.5%	14.7%	12.0%	6.4%	17.3%	84.8%	48.4%	81.0%	0.0296	
Emeryville	4.0%	12.2%	10.7%	22.8%	30.6%	3.1%	6.5%	10.8%	6.6%	19.6%	13.5%	99.5%	77.2%	82.6%	0.0296	
Hayward	7.1%	11.7%	10.1%	32.9%	5.9%	19.9%	10.2%	20.7%	15.6%	5.2%	6.7%	91.6%	32.2%	74.7%	0.0337	
San Leandro	5.8%	15.5%	10.4%	29.9%	9.6%	17.6%	8.2%	14.9%	13.6%	3.5%	8.4%	98.8%	61.9%	86.0%	0.0298	
San Lorenzo	5.8%	14.0%	11.0%	19.9%	5.0%	17.6%	11.2%	13.8%	11.9%	2.5%	5.0%	99.9%	56.4%	81.9%	0.0325	
Berkeley	3.4%	13.8%	8.4%	32.2%	14.1%	4.3%	8.2%	12.0%	4.4%	16.8%	20.9%	84.7%	48.0%	71.5%	0.0296	
Alameda	5.2%	16.1%	9.2%	21.2%	11.6%	8.7%	7.7%	8.9%	9.1%	7.1%	7.6%	98.5%	56.0%	99.6%	0.0296	
Albany	6.9%	12.7%	6.3%	21.1%	8.9%	3.6%	6.4%	20.3%	7.8%	10.2%	7.4%	95.6%	54.8%	91.1%	0.0296	
Union City	6.5%	13.6%	8.5%	22.8%	4.0%	12.2%	7.3%	16.7%	11.7%	4.1%	6.7%	84.0%	29.1%	72.6%	0.0343	
Newark	7.0%	12.3%	8.2%	21.9%	4.6%	12.3%	6.4%	11.9%	7.2%	3.6%	3.6%	99.8%	38.0%	59.1%	0.0353	
Remainder of County	6.2%	13.4%	7.4%	28.9%	7.3%	16.9%	8.7%	14.8%	7.9%	4.0%	3.8%	83.2%	1.4%	76.4%	0.0325	
Fairview	5.4%	15.4%	11.8%	17.0%	5.8%	7.7%	8.8%	5.9%	6.7%	1.8%	1.9%	76.3%	24.4%	73.0%	0.0353	
Fremont	6.5%	12.0%	7.4%	15.5%	5.0%	7.7%	6.4%	19.7%	9.9%	6.0%	4.1%	96.0%	27.7%	58.8%	0.0353	
Livermore	6.0%	12.8%	8.2%	17.4%	6.9%	8.5%	5.1%	8.1%	4.1%	4.6%	3.8%	99.1%	41.0%	9.7%	0.0404	
Castro Valley	5.1%	15.9%	9.3%	20.0%	7.7%	7.8%	7.2%	8.6%	7.3%	3.5%	4.1%	77.6%	27.4%	54.9%	0.0329	
Dublin	7.1%	8.6%	6.1%	10.4%	6.7%	8.0%	4.5%	12.9%	6.5%	10.3%	3.7%	97.1%	29.7%	13.9%	0.0383	
Pleasanton	5.0%	13.6%	6.9%	10.5%	6.0%	4.8%	5.5%	11.2%	5.9%	6.0%	3.1%	88.3%	33.0%	6.6%	0.0379	
Piedmont	4.3%	20.6%	4.9%	7.4%	4.4%	1.5%	4.2%	3.9%	2.7%	5.1%	2.9%	62.5%	29.8%	68.5%	0.0296	
Sunol	3.2%	16.9%	7.1%	14.7%	8.9%	8.0%	5.7%	4.5%	2.2%	0.8%	0.8%	76.2%	4.5%	NA	NA	Low

* Portion of daily maximum ozone concentration over the state eight-hour standard in parts per million