



Intensive Dairy and Cattle Production Operations: Assessing Risks to Communities in Kern County, California



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Introduction

Despite the growing literature on concentrated animal feeding operations (CAFOs) and their associated effects on community health and the environment, there is limited information and location data about CAFO operations in California's San Joaquin Valley. Our study focuses on dairy and cattle CAFOs in Kern County, California, and aims to evaluate the associated environmental and human health risks. In addition to providing updated CAFO inventory data and an online GIS mapping tool to the public, this study contributes to the literature by analyzing the risks perceived by residents in this geographic area lacking adequate representation. We identified 55 CAFOs currently operating in Kern County: 33 of these were found to be within three miles of a public school, and 20 were permitted without being subject to environmental review in compliance with the California Environmental Quality Act (CEQA). The results of our community surveys and interviews indicate that residents of Kern County are concerned with the presence of CAFOs located in close proximity to their communities and are aware of specific health and environmental risks posed by nearby CAFOs. The majority of participants (61.4%) reported experiencing negative effects from living near CAFOs. Lastly, our review of publicly available records indicated discrepancies between the perceived significance of environmental and human health impacts by community members versus the county and regulatory bodies.

In California, many of the state's dairy and beef cattle CAFO operations are concentrated in Kern County, a major agricultural and oil production hub located in the southern portion of the San Joaquin Valley. Some of the largest CAFO operations are located in Kern County, and USDA estimates that there were over 375,000 cattle and calves located in the county in 2017. While the presence of increasingly industrial methods of agriculture and livestock production have brought some economic benefits to the region, these main drivers of economic growth are strongly associated with a range of environmental and human health impacts. In addition to releasing fungi, bacteria, antibiotic-resistant bacteria and odor-emitting compounds into the surrounding air, CAFOs have been reported to affect ground and surface water quality through the release of animal wastes (Alvarado et al., 2012). Documented air pollutants associated with CAFOs include criteria pollutants that can harm the environment and human health (Ozone, CO, SO_x, PM10 and PM2.5) and toxic air pollutants that are known or suspected to cause cancer or other serious health effects (H₂S and NH₃) (EIR Vol.1, 2017). CAFO operations tend to be located in rural, low-income, minority areas that already lack the resources that promote health and well-being (UC Davis, 2017).

Research Questions & Methods

1. What are the specific locations and sizes of dairy and cattle CAFO operations in Kern County, and are there demographic disparities among communities located in close proximity to these operations?
2. How are the environmental and human health burdens associated with dairy and cattle CAFO operations perceived by the residents of communities located in close proximity to CAFO operations Kern County?

GIS and Statistical Analysis: Public records of CAFO operations in Kern County were combined with spatial data collected through GIS analysis and satellite imagery to create an updated county inventory of CAFO operations to make available to CRPE and the public. We analyzed the spatial distribution of CAFOs in light of relevant environmental justice factors such as jurisdictional status, proximity to public schools, and demographic characteristics such as income and race/ethnicity. We ran statistical regressions in R to test whether the presence of a CAFO was statistically associated with demographic composition.

Analysis of Public Records and Government Documents: We completed an analysis of publicly available information regarding CAFO operations in Kern County to compile inventory data and to conduct an integration comparison of our study findings and those of municipalities and regulatory bodies.

Community Surveys: To assess community perceptions of environmental and human health impacts of nearby CAFO operations, we conducted voluntary surveys with 44 community members over the course of two weekend trips to Kern County. The majority of survey participants were recruited with the assistance of CRPE and consisted of individuals who were affiliated and unaffiliated with CRPE's work in Kern County.

Key Informant Interviews: We conducted 13 qualitative, in-depth interviews with key informant community members in Kern County. Key informants were recruited with the assistance of CRPE and consisted of community members with first-hand knowledge about the community and issues surrounding livestock production and public health and the environment.

Acknowledgements

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Study Area-Kern County, California

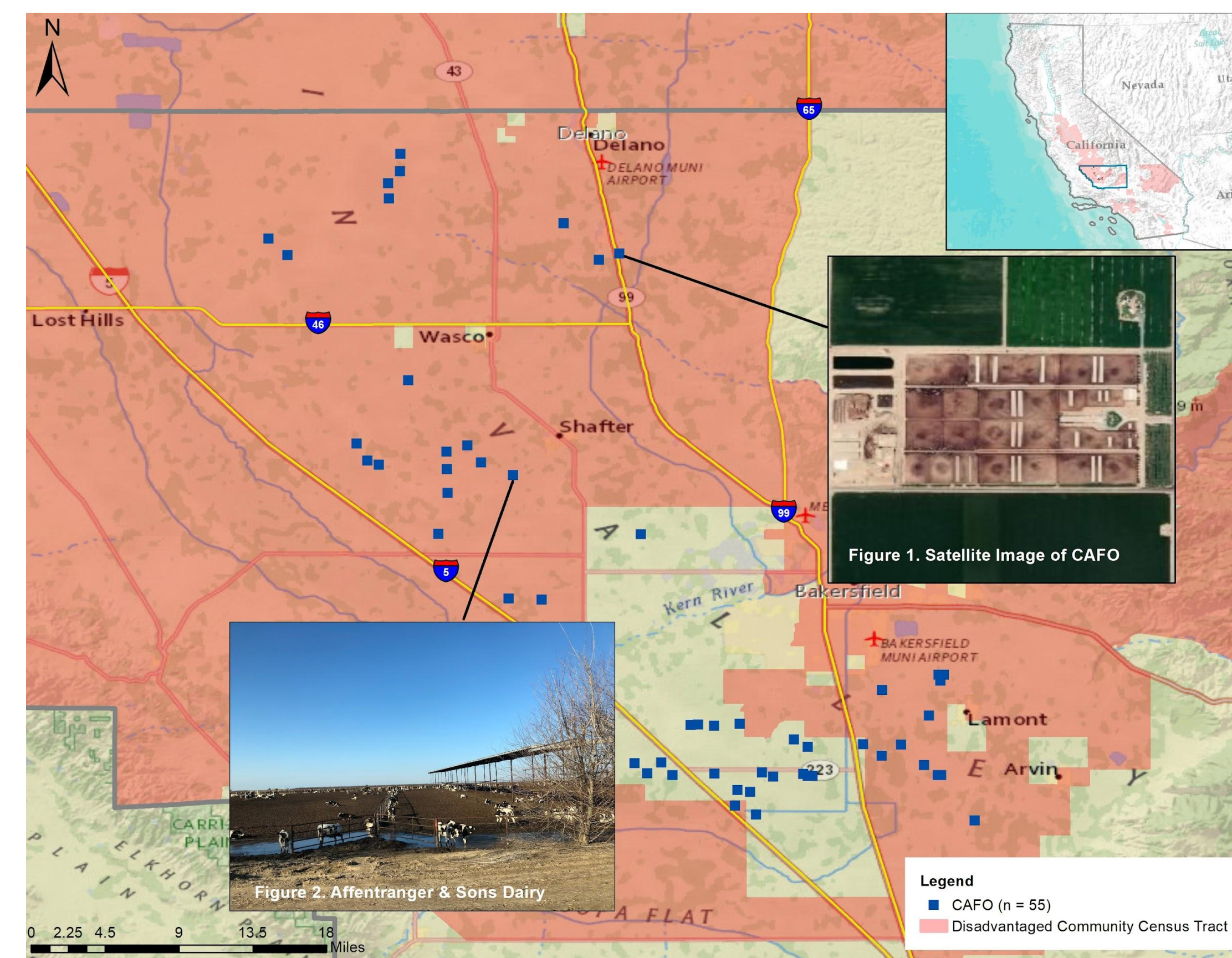


Figure 1. Study area and spatial distribution of CAFOs in Kern County, California

Findings

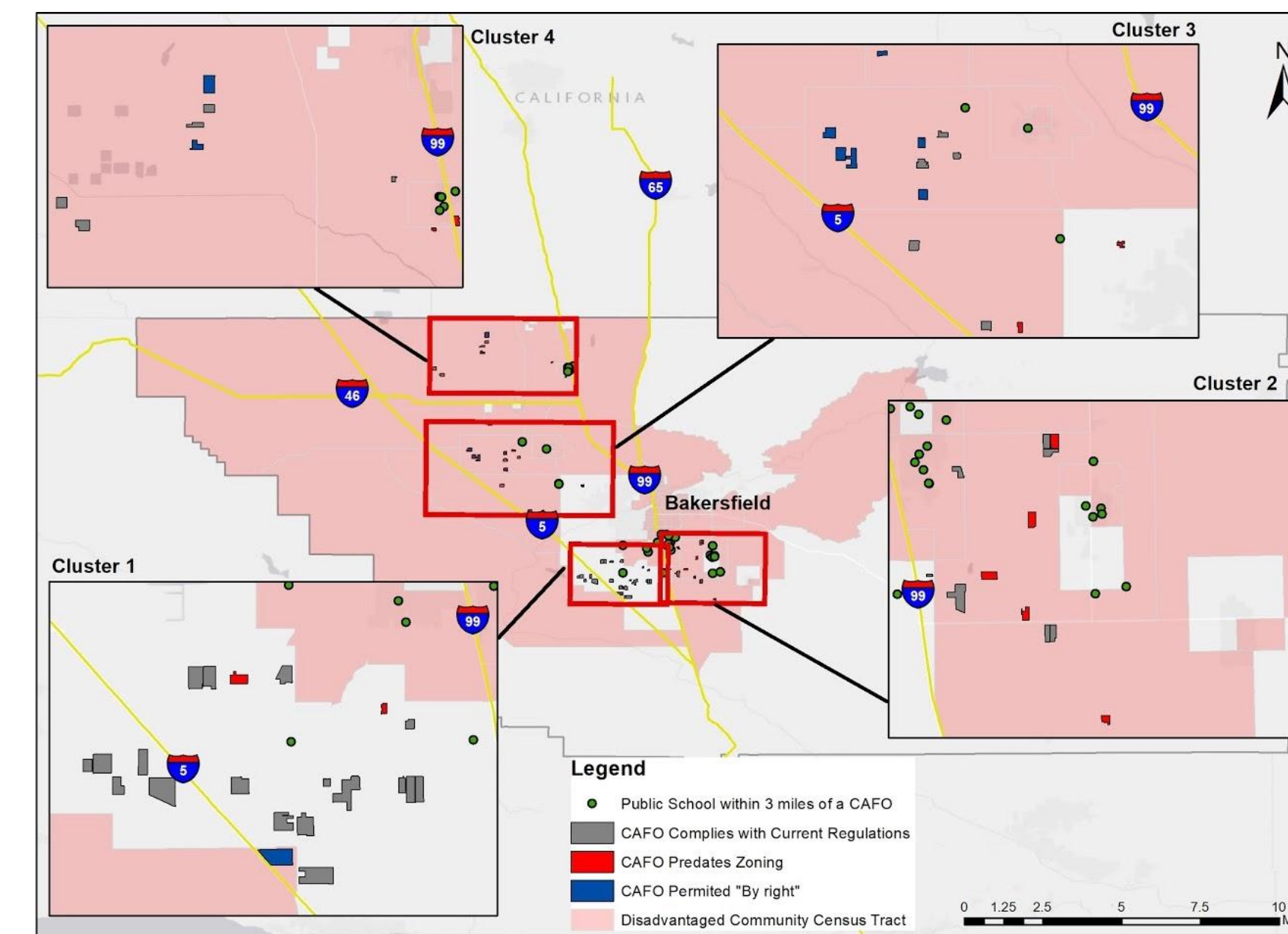


Figure 2. Map of CAFO by zoning and permitted status. We found 33 CAFOs within 3 miles of a public school.

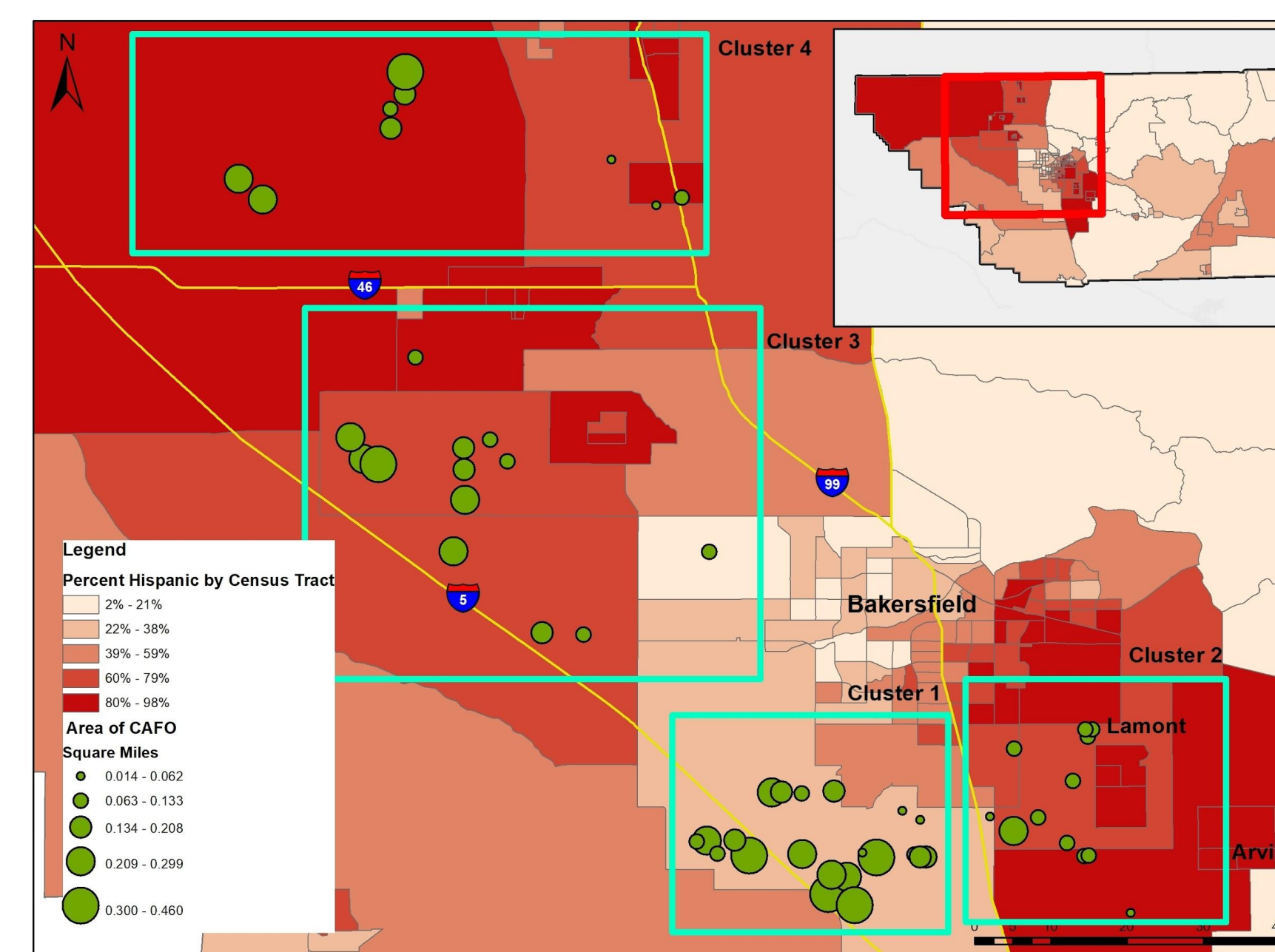


Figure 3. Percent Hispanic/Latinx by census tract with estimated surface areas of CAFOs

County Characteristics

- ❖ **Area:** 8,132 square miles (3rd largest in CA)
- ❖ **Total Population:** 896,764 (11th most populous county in CA)
- ❖ **Race/Ethnicity:** Hispanic or Latinx (53.4%), White (34.0%), Black /African American (6.2%)
- ❖ **Percent of population living in unincorporated areas:** 46%
- ❖ **Percent below poverty level:** 22.9% (CA average 15.9%)
- ❖ **Percent of population living in low-income, densely settled unincorporated areas:** 38%

Link to Interactive GIS Mapping Tool with CAFO Location Data:
https://webpages.scu.edu/ftp/eoxlajtambito/KC_Dairies.html

County CAFO Inventory

- ❖ 55 total dairy and cattle CAFOs
- ❖ 36% (n=20) approved without CEQA review
- ❖ <1% (n=1) located in incorporated areas
- ❖ 36% (n=33) located in census tracts designated as disadvantaged communities —areas with significantly higher pollution burdens and with low populations (CalEnviroScreen 3.0)
- ❖ 33 public schools located within three miles of a CAFO

Statistical Analysis

- ❖ Most CAFOs were located in census tracts with populations that are over 50% Hispanic/Latinx
- ❖ Each one unit increase in the Hispanic/Latinx population proportion increased likelihood of a census tract having a CAFO by 31% (p < 0.05)
- ❖ Each one unit increase in the White population proportion reduced the likelihood by 15% (p < 0.05)



Figure 4. Image taken in the field of CAFO operation located in Cluster #2 (West of Lamont and Arvin)

References

- ❖ Draft EIR: Kern County Dairy Animal Facility Revisions to the Kern County Zoning Ordinance-2017 C. vol. 1, Kern County Planning Department, Draft EIR: Kern County Dairy Animal Facility Revisions to the Kern County Zoning Ordinance-2017 C.
- ❖ Alvarado, Carla S, et al. "The Potential for Community Exposures to Pathogens from an Urban Dairy." *Journal of Environmental Health*, 2012.
- ❖ CalEnviroScreen 3.0. Office of Environmental Health Hazard Assessment (OEHHA), 2018, oehha.ca.gov/calenviroscreen/report/calenviroscreen-30.
- ❖ Kern County: *Geography of Inequity and Opportunities for Action*. UC Davis, 2017. *Kern County: Geography of Inequity and Opportunities for Action*.
- ❖ "U.S. Census Bureau QuickFacts: California." *Census Bureau QuickFacts*, www.census.gov/quickfacts/ca.

Findings Continued

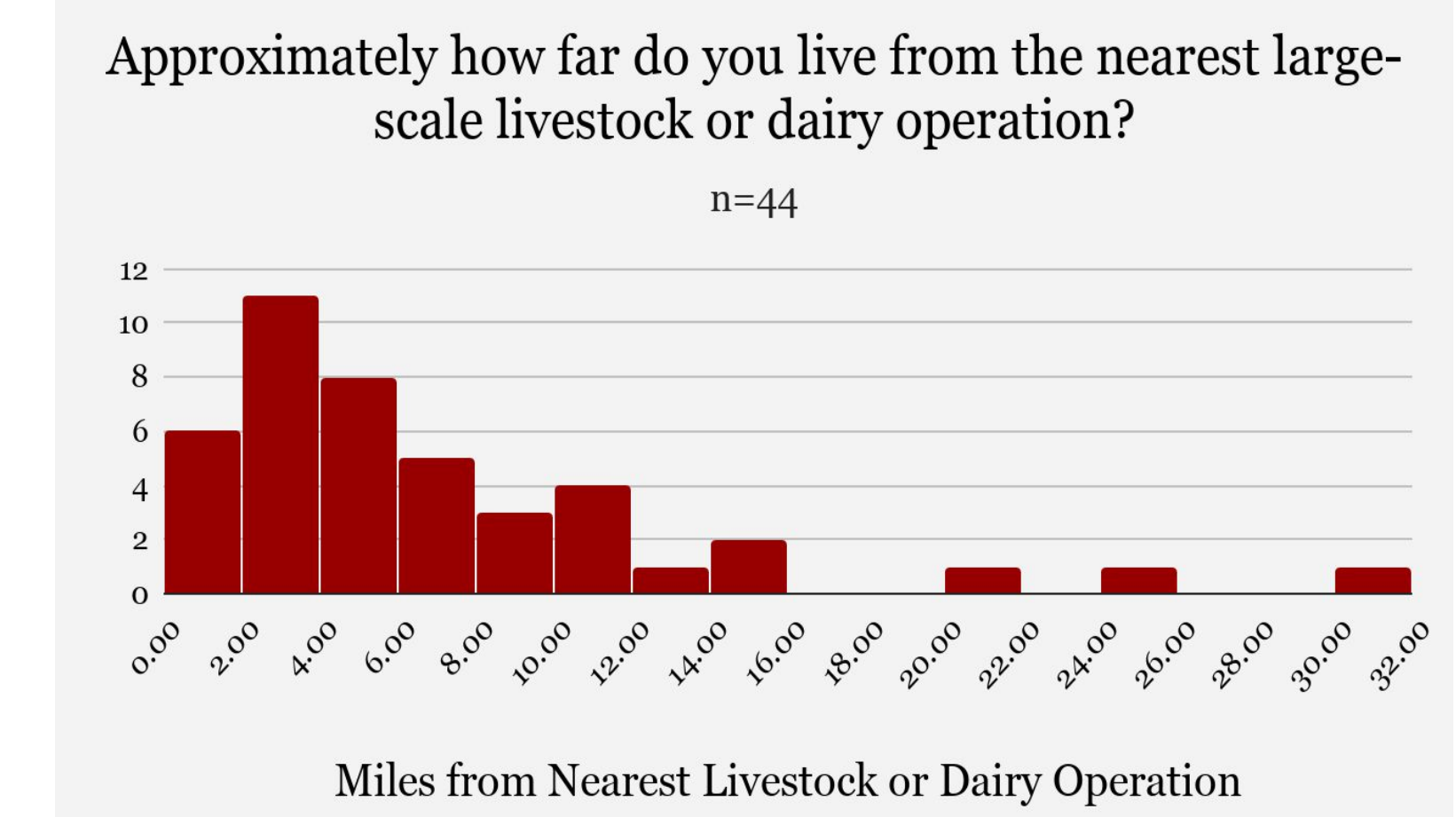


Figure 5. Survey respondents proximity to CAFO operations.

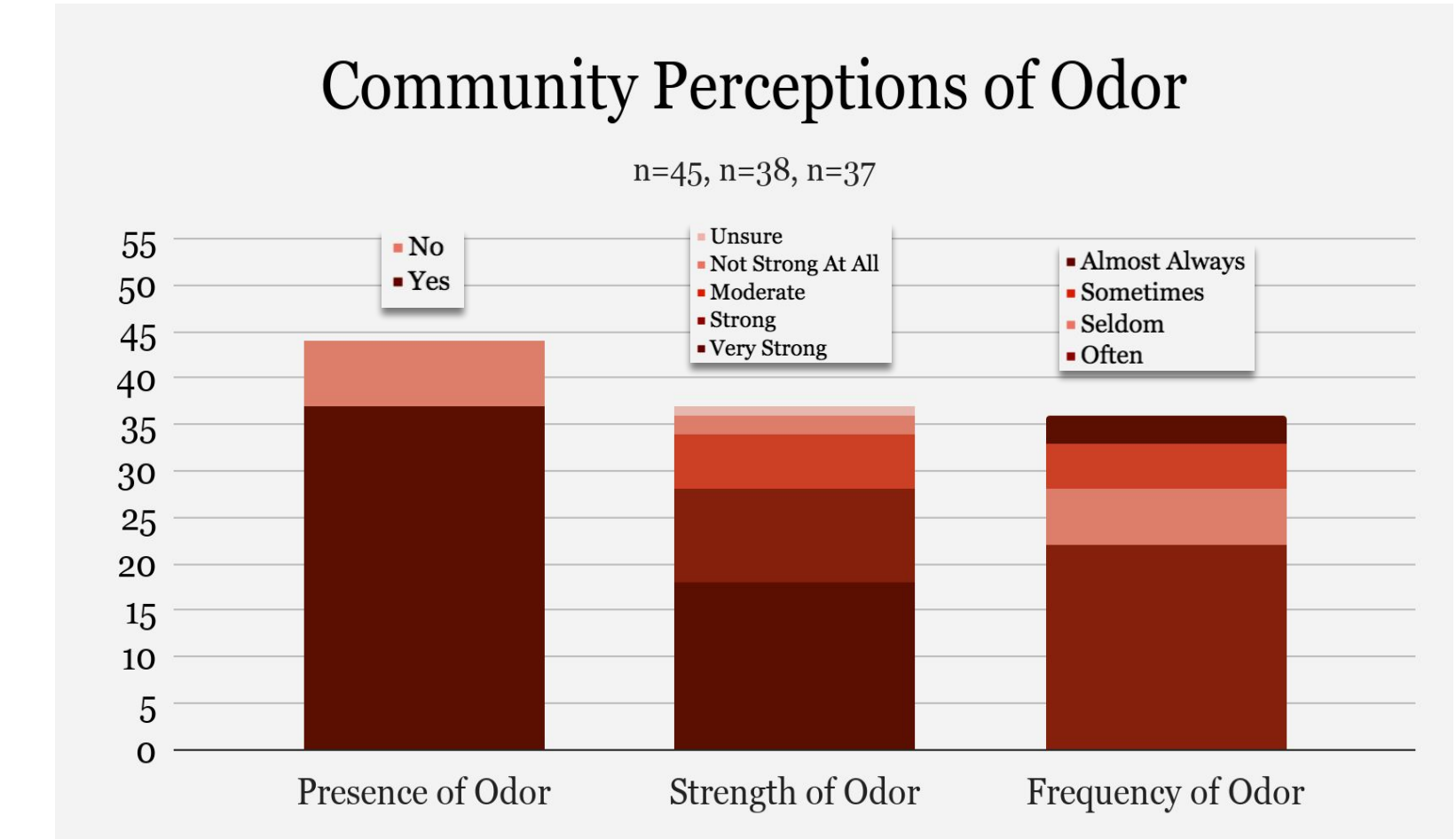


Figure 6. Presence, strength and frequency of Odors in Kern County communities

Table 1. Summary Table of Environmental and Human Health Impact Findings

Human Health Impacts	Environmental Impacts	Related interview and survey responses:
Irritation to skin, eyes, mucous membranes, and upper respiratory system, and pulmonary inflammation (<i>may be caused by exposure to ammonia</i>)	Generation of significant levels of GHG emissions	➢ "I have friends and I know people that have things like valley fever, and there are so many days that they can't go out because their sickness or condition will worsen."
Increased phlegm production (<i>may be caused by nonbiologic aerosols, such as dust particles from feed, skin cells, and dried feces</i>)	Degradation of air and water quality	➢ "The big issue is the traffic these dairies bring. Everyday the milk is shipped away in trucks, the feed also being brought in for the cows as well."
Bronchitis & Asthma (<i>may be caused by prolonged exposure to nonbiologic aerosols</i>)	Release of harmful manure discharge or hazardous materials into the environment	➢ "The odor is very strong, it annoys us a lot that we don't want to go outside."
Cough, phlegm, wheezing (<i>may be caused by exposure to bioaerosols, such as particles containing endotoxins, bacteria, and fungi</i>)	Objectionable odors that affect a substantial number people	➢ "The first visible issue when the dairy opened up was the increased amount of flies."
	Generation of vectors through creation of flies and waste	➢ "A lettuce farmer just around the corner actually had an e coli breakout due to the flies that were from a dairy farm with e coli; flying and eating the lettuce on the farm."
		➢ "It caused my son's sinusitis and allergies."

Conclusion

The 55 dairy and cattle CAFOs identified through our inventory analysis were concentrated in four clusters. The CAFO composition of these clusters varied with respect to the quantity, sizes and regulatory requirements of CAFOs, and the locations of CAFO clusters were found to have varying socioeconomic characteristics, such as minority population densities, poverty levels, and unincorporated status, which affect a community's ability to organize and promote well-being. **As a result, some communities in Kern County are disproportionately affected by the hazards posed by CAFOs, and thus face greater environmental injustices.** Survey and interview findings indicate that communities in Kern County are aware of specific environmental and human health impacts associated with CAFO operations. The majority of survey participants (86.0%) reported that they lived within 10 miles of a CAFO operation, and 61.4% reported experiencing negative effects from living near livestock operations. The presence of malodors and poor air quality were primary concerns for community members. In addition to the documented risks posed by nearby CAFO operations, our findings indicate that these communities are also exposed to hazards associated with other forms of agricultural and industrial production that dominate region, such as pesticides from almond and grape farms and contaminants from oil and gas infrastructure and hazardous waste facilities. In sum, communities located in close proximity to dairy and cattle CAFO operations in Kern County face a wide range of documented environmental and human health burdens. Identifying these CAFOs, assessing the perceived impacts of these operations, and providing a GIS mapping tool for communities to conduct their own analysis increases the awareness of potential health hazards for communities in Kern County and creates opportunity for action by contributing to the literature and attempting to fill the gaps in what information is readily available to the public.