

The Impact of Infectious Diseases on Minority Populations in California

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INTRODUCTION

- Historically, infectious diseases are known to burden minority and vulnerable populations.
- Coccidioidomycosis (CM), caused by fungal species *Coccidioides* is endemic to central CA and heavily impacts migrant farmers, agricultural workers, and African American/Black communities.
- Campylobacteriosis (CB) is known to impact White and non-Hispanic populations, rural areas, and those who travel to South America and/or Asia.
- Shigellosis (SH) commonly affects African American/Black and Hispanic communities, as well as crowded areas with high poverty rates.
- Salmonellosis (SM) is high in African American communities, as well as urban communities with high rates of crime and poverty.
- Giardiasis (GI) incidence has been discovered to be high in indigenous populations, however more research needs to be done to determine detailed trends of disease burden

PURPOSE

The purpose of this project is to identify which diseases disproportionately burden minority populations of California in order to suggest improvements in disease prevention strategies.

MATERIALS & METHODS

- The *Infectious Diseases by Disease, County, Year and Sex* dataset was obtained from the CA Open Data Portal, which contained data for 48 reportable diseases measured in California throughout 2001-2017.
- The database contained county-level data for diseases by sex (male, female, and total) and year (2001-2017).
- Statewide disease incidence data by race and ethnicity were manually coded using Microsoft Excel from the CA Dept. of Public Health (CDPH) Infectious Disease Branch (IDB) Yearly Summaries of Selected Communicable Diseases in California.
- The data was analyzed by sorting data into California's three regions (Northern, Central, and Southern) as determined by the California Continuing Education Association (CCEA), and by pathogen type (bacterial, viral, parasitic, or fungal and other infections).
- R was used to analyze correlations between disease incidence and sex, race and ethnicity, and socioeconomic status (SES). SES was only measured for the years 2013-2017, using county-level median income data collected from the U.S. Census Bureau's 2013-2017 5-Year Data Release.

RESULTS

Results of the data analysis are summarized below for Southern CA (Fig. 1a-b), Central CA (Fig. 2a-b), and Northern CA (Fig. 3a-b). State-wide data analysis for race and ethnicity is shown in Fig. 4a-b.

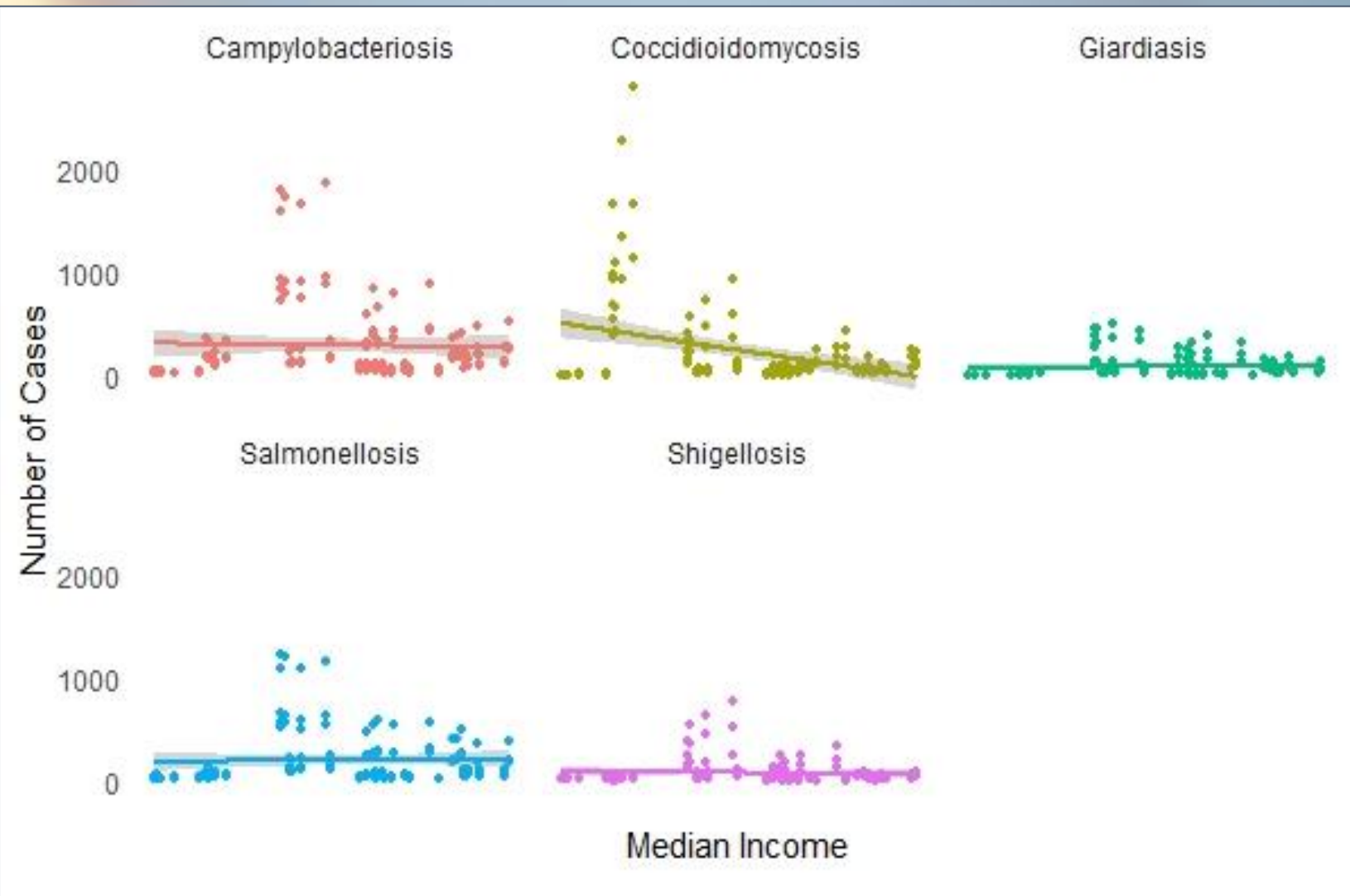


Fig. 1a Linear regression models of median income and infectious disease incidence in Southern CA (2013-2017).

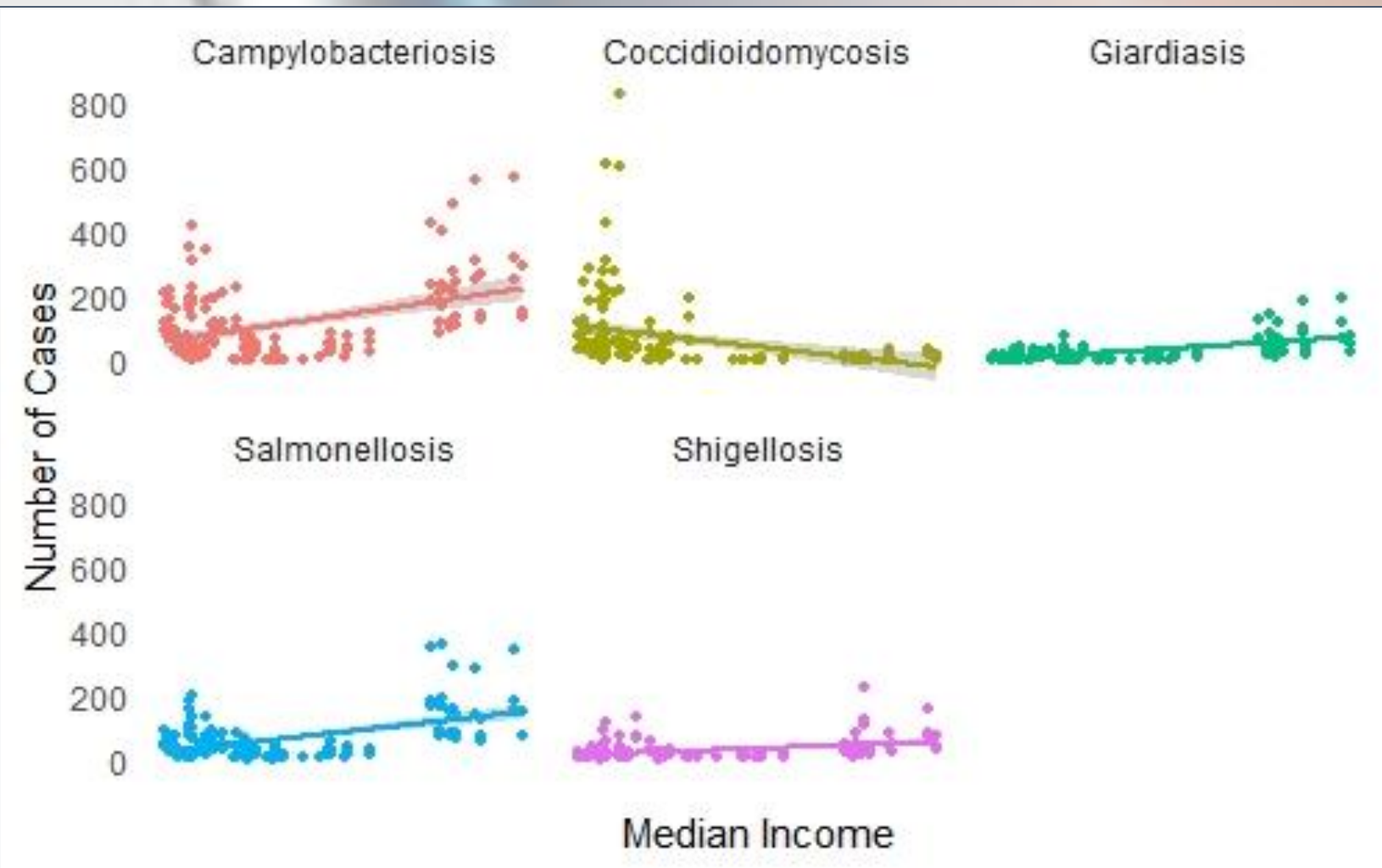


Fig. 2a Linear regression models of median income and infectious disease incidence in Central CA (2013-2017).

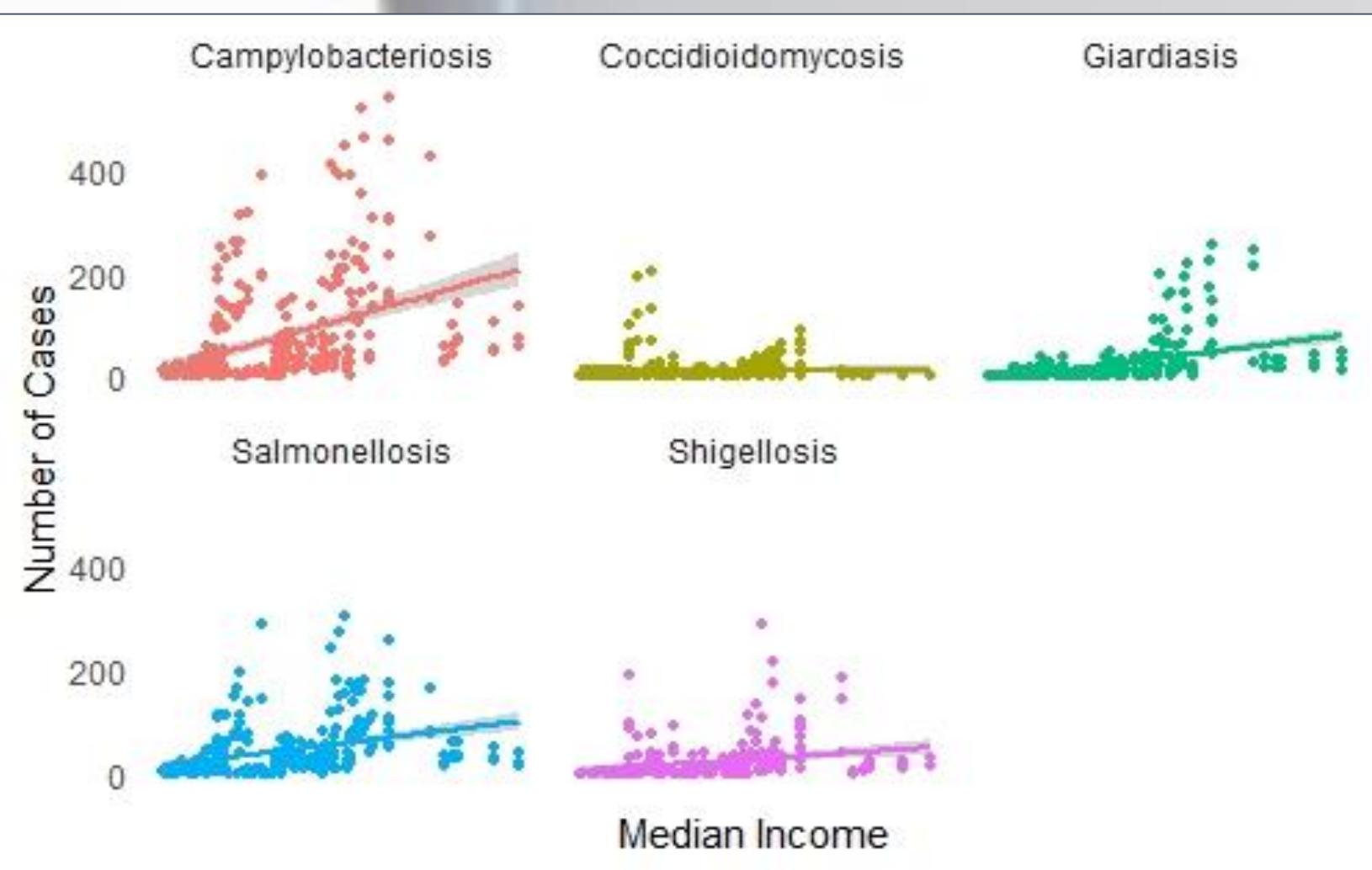


Fig. 3a Linear regression models of median income and infectious disease incidence in Northern CA (2013-2017).

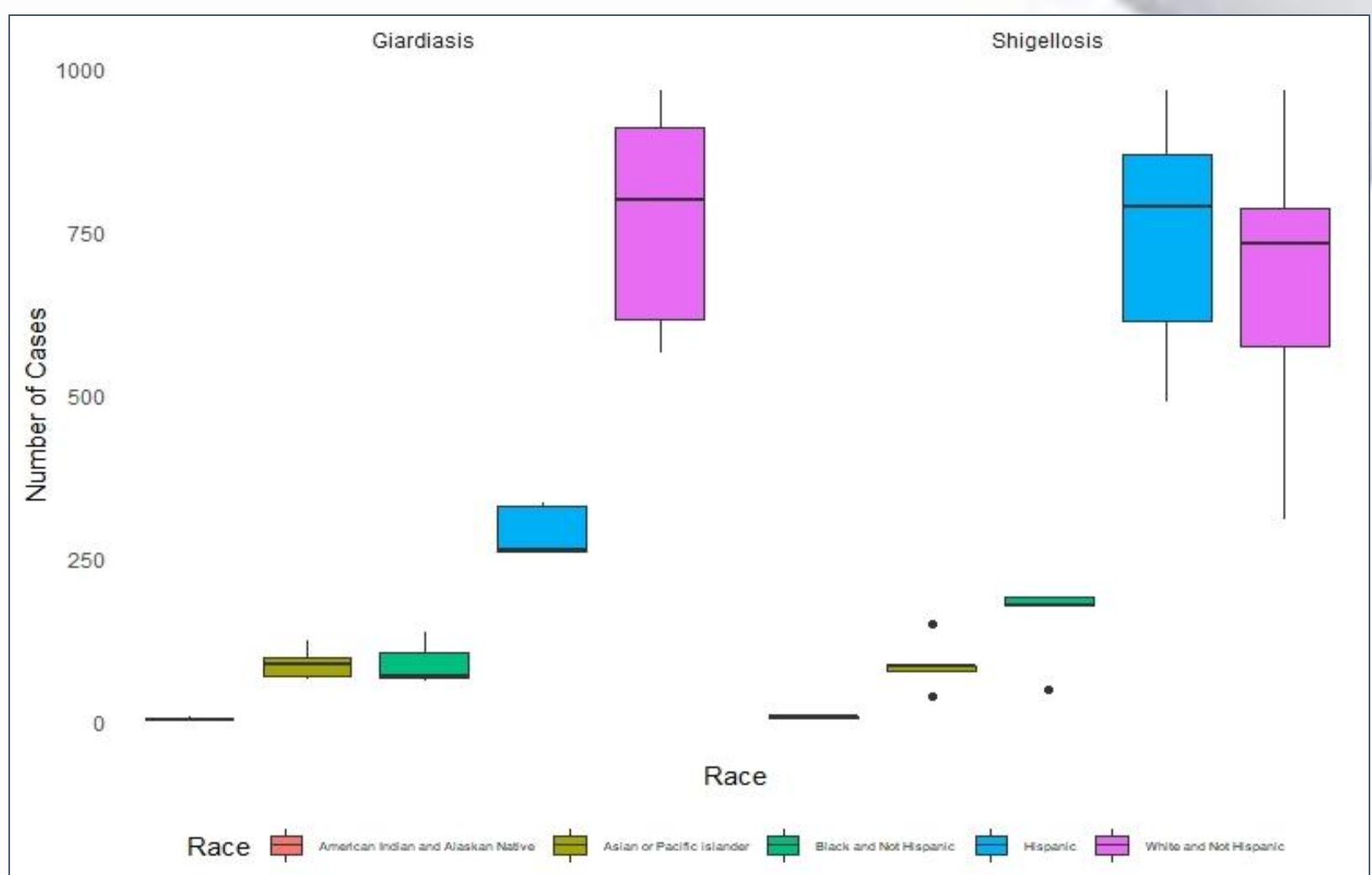


Fig. 4a Disease incidence by race and ethnicity in CA (2013-2017).

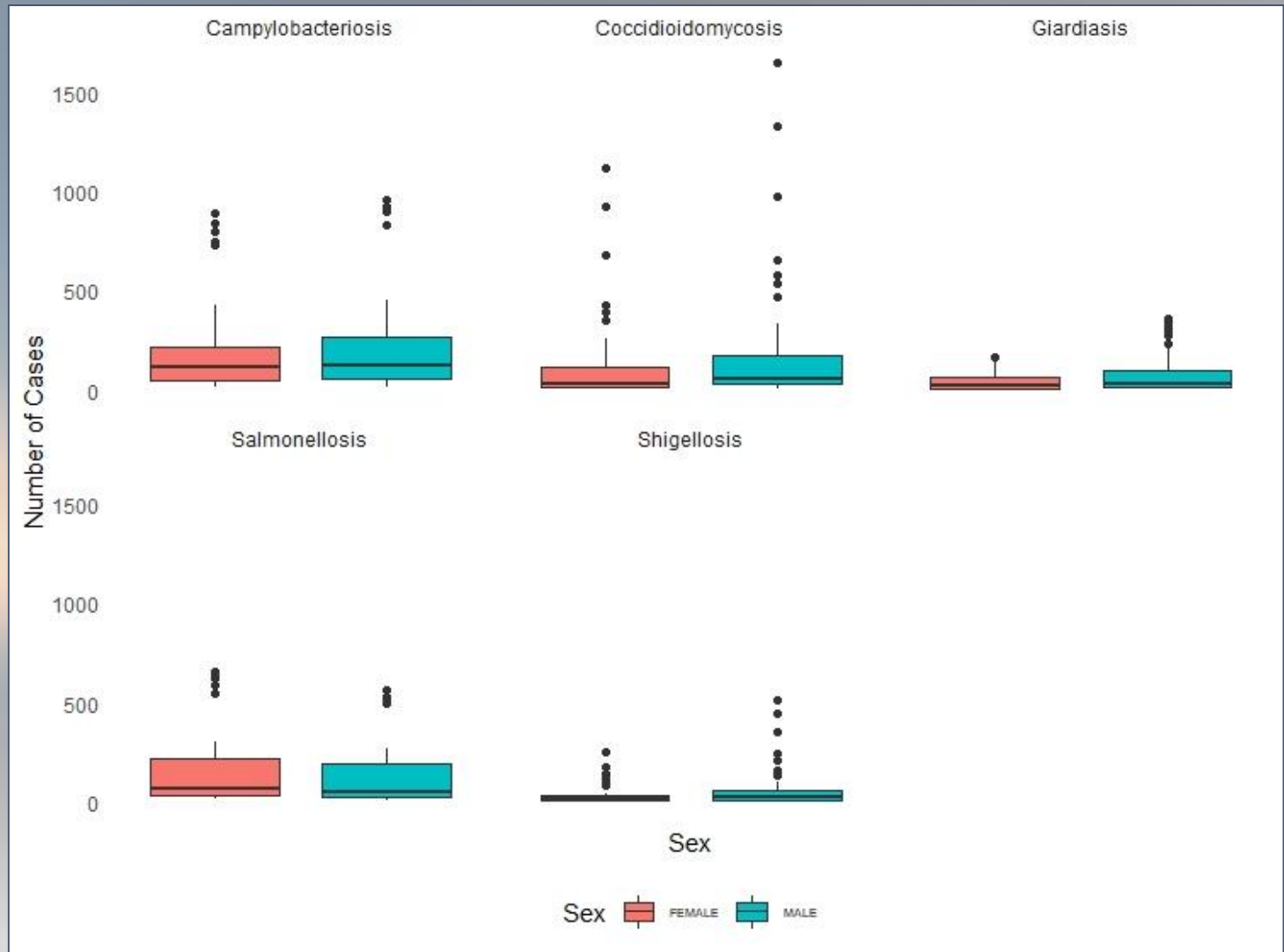


Fig. 1b Disease incidence by sex in Southern CA (2013-2017).

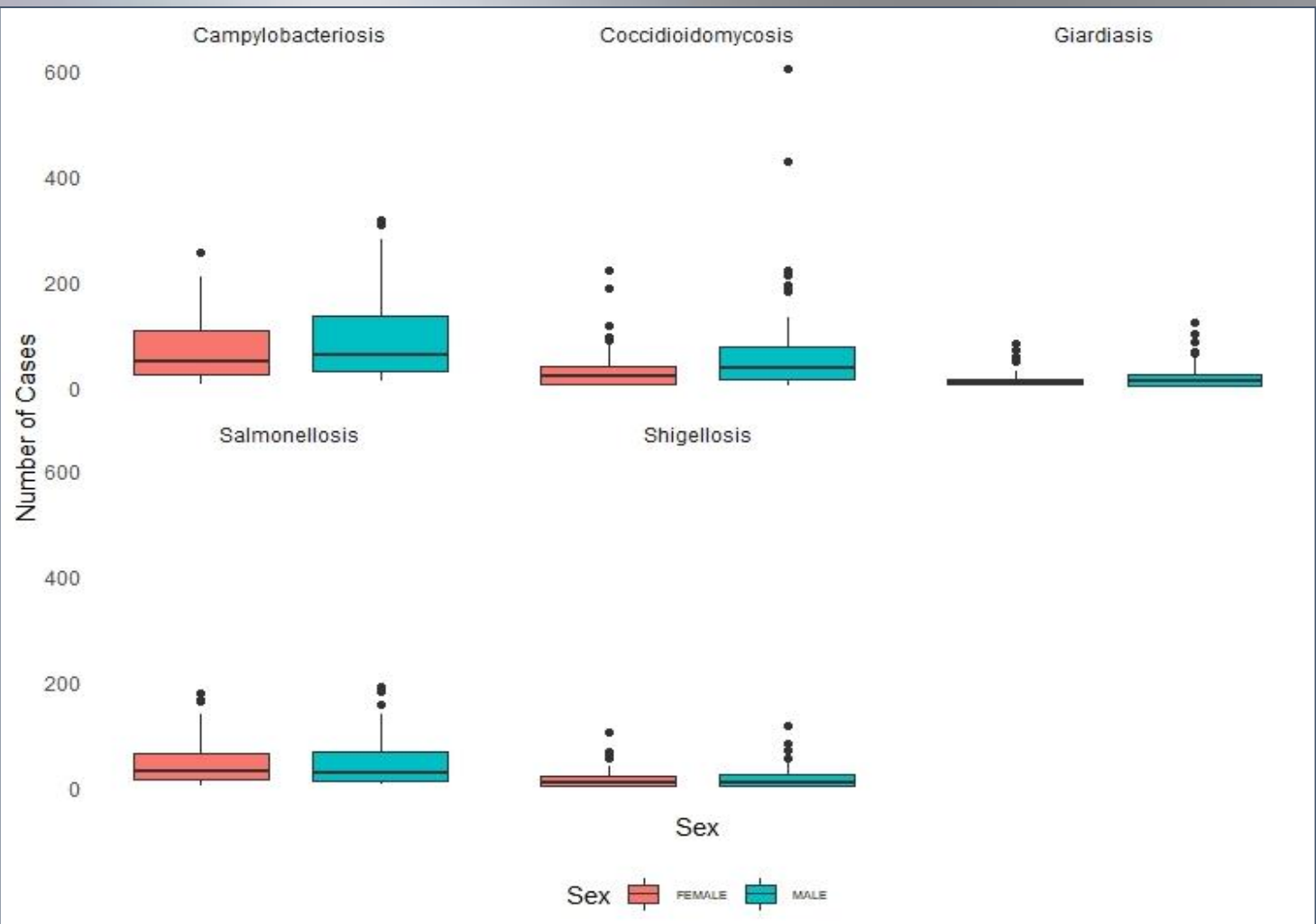


Fig. 2b Disease incidence by sex in Central CA (2013-2017).

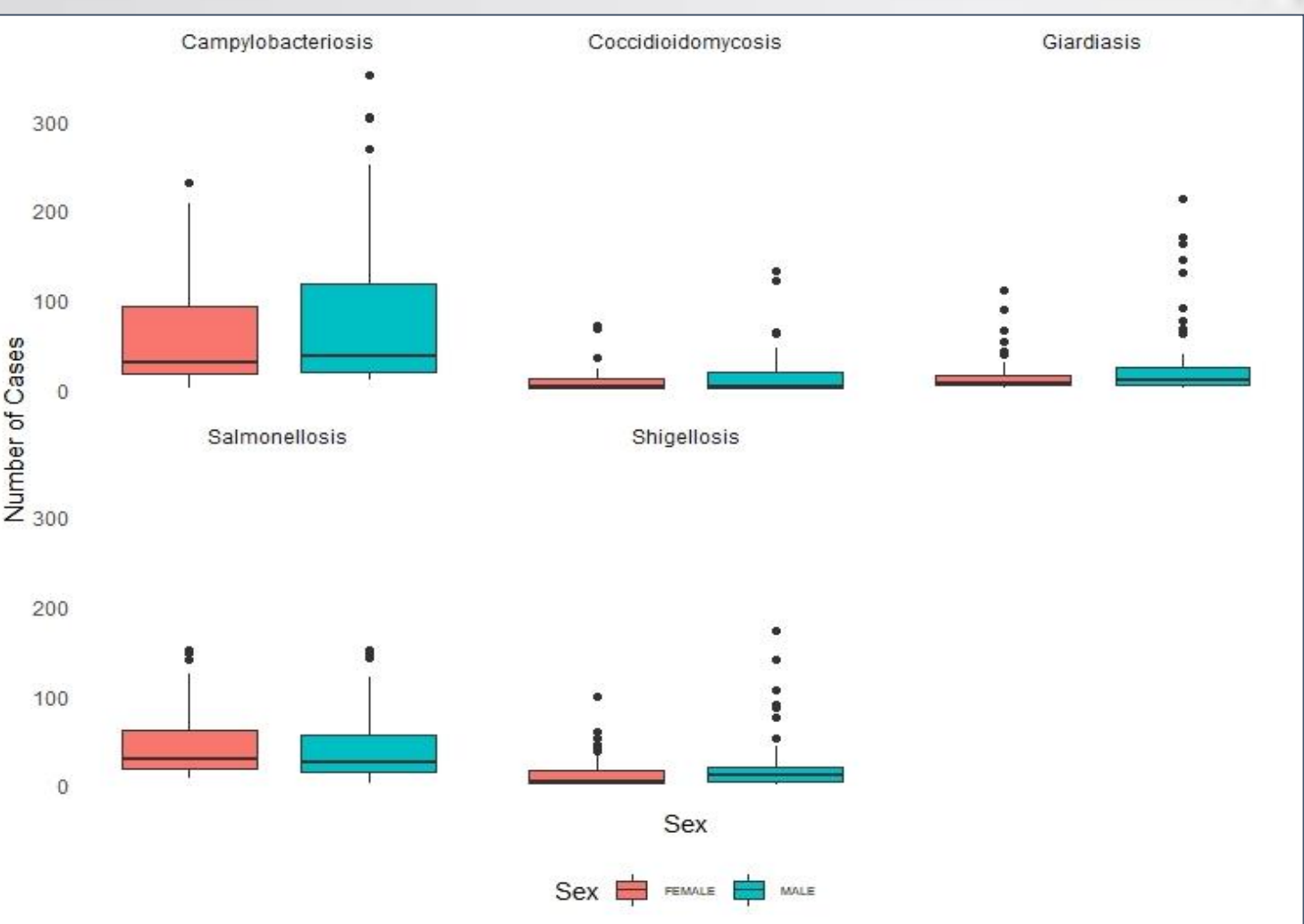


Fig. 3b Disease incidence by sex in Northern CA (2013-2017).

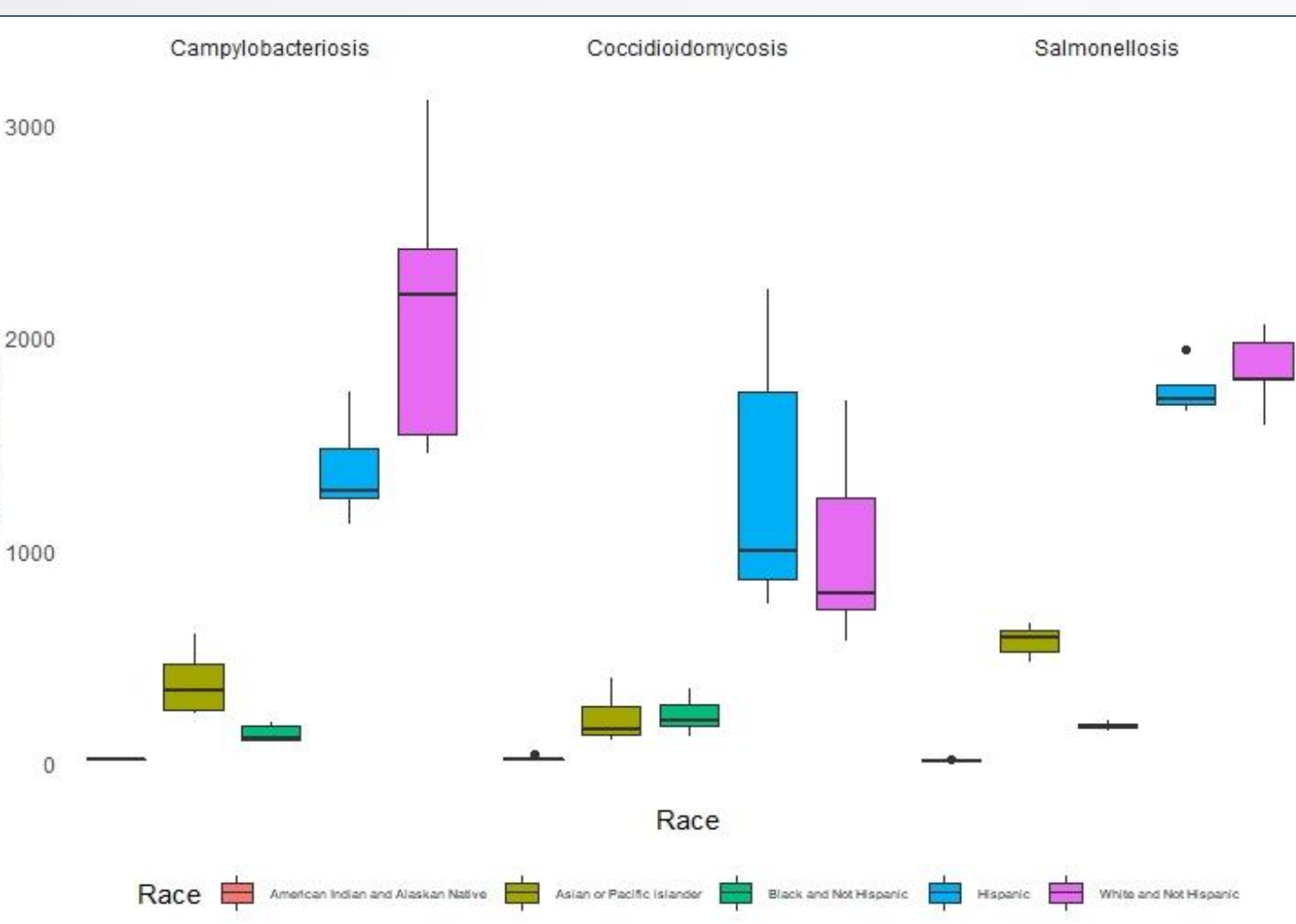


Fig. 4b Disease incidence by race and ethnicity in CA (2013-2017).

RESULTS (CONT.)

- Southern California:** CM was significantly correlated to income ($p=0.01318$). Men had higher GI incidence rates ($p=0.0244$).
- Central California:** All diseases were significantly correlated to income ($p<0.01$). Men had higher CM incidence rates ($p=0.0154$).
- Northern California:** All diseases except CM ($p=0.5569$) were significantly correlated to income ($p<0.01$). Men had higher incidence rates for both SH and GI ($p<0.05$).
- Race and Ethnicity**
 - Both White and Hispanic populations were equally likely to contract SM, followed by Asians. Hispanic populations were most likely to contract SH, followed by White populations, then Black populations.
 - CM incidence was equally high in Hispanic and White populations, followed by Asians, then Black populations.
 - GI was highest in White communities, followed by Hispanic populations. Asians were more likely to contract GI than Black populations.
 - CB was highest in White communities, followed by Hispanic communities.

DISCUSSION

Majority of CM cases are related to agricultural workers, due to soil tilling practices in the warm, dry weather. Soil tilling practices must be revisited at the county and state levels to decrease CM rates.

SM, CB, and SH are diseases derived primarily from contaminated meat and poultry. Antibiotic resistance may contribute to high disease rates. Poultry farms must reduce overtreatment of animals with antibiotics to reduce disease rates in humans.

GI can be contracted from contaminated surfaces and polluted water sources, such as sewage water that is not separated from public drinking water sources. Water sources should be monitored at the city and county levels to ensure the safest drinking water for residents.

The results of this study are limited to the cases reported by healthcare facilities to CDPH, and the lower populations of racial/ethnic minorities compared to White populations in CA. Future work includes creating more robust models by population of racial/ethnic groups and analysis by age groups.

ACKNOWLEDGEMENTS

- Paloma Vargas, Ph.D & Christopher Brown, Ph.D
- Cal Lutheran Department of Biology