

## *Original Paper*

# Has the Affordable Care Act Influenced Cardiology Disease Rates in the San Joaquin Valley?

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### **Abstract**

**Purpose:** *The study provides a summary of Cardio Vascular Disease (CVD) in the San Joaquin Valley (SJV) and the burden held on residents despite the increased number of insured under the Affordable Care Act (ACA).*

**Methods:** *Patient Discharge Data were collected from the Office of Statewide Planning and Development (OSHPD) from 2010-2017. With a range of Age 40 to 64. Patients all reside in the San Joaquin Valley (Fresno, Kern, Kings, Madera, Merced, San Joaquin, Stanislaus, and Tulare). The American Community Survey (ACS) was used for population estimates. Regression was used to model the effects of the ACA on severity diagnosis and length of stay.*

**Results:** *From the result, CVD patients from the age of 40-64 declined. Many individuals appeared in 2013 with county indigent or self-pay and changed in 2015 to Medi-Cal. Overall, rates of hospitalization decreased. However, regression analysis suggested an increase in severity diagnoses and an increase in the length of stay after the ACA was implemented.*

**Conclusion:** *The study provides a summary of Cardio Vascular Disease (CVD) in the San Joaquin Valley (SJV) and the burden held on residents despite the increased number of insured under the Affordable Care Act (ACA). The evaluation of discharge data demonstrates the positive impact the ACA has for those suffering from CVD in SJV.*

### **Keywords**

*Cardiovascular disease, Affordable Care Act, insurance coverage, Medi-Cal, San Joaquin Valley*

## 1. Introduction

Health care reform under the Affordable Care Act is driving healthcare workers to make swift changes. Currently, 14 million people in California are estimated to have at least one chronic condition and over half of this group have multiple chronic diseases (Affordable Care Act Impact, n.d.). Despite improvements for treatment, prevention, and access to care, cardiovascular disease is the number one condition that claims more California lives than any other. At least one out of three individuals are diagnosed with a common form of CVD, such as heart failure, stroke, and high blood pressure. The American Heart Association indicated that by the year 2035, the number of Americans with CVD is projected to rise to 131.2 million – 45 percent of the total U.S. population (AHA, 2017). Residents living in the San Joaquin Valley are not immune to this catastrophic episode either. Despite the immediate changes made to healthcare under the ACA, annual costs for CVD is estimated to cost \$37 billion annually or 16% of all health care costs in California (Economic Burden of Chronic Disease in California, 2015). More than any other chronic disease in the state of California. In 2010, CVD cost the SJV approximately \$613 million dollars.

With the decline of mortality from CVD in California, disparities still persist. Individuals with lower levels of income and education are more likely to have one form of CVD than any other persons. The SJV attributes to some of the highest poverty rates and poor socioeconomic conditions when compared to the rest of California. In all parts of the region, poverty is deeply rooted. The area is dominated by low-wage farm and service jobs and has average employment income behind the rest of the state. There are over 28 million chronic conditions in California in general, with CVDs being the most common (36.4 %) (Brown et al., 2014). The San Joaquin Valley Counties include: Fresno, Kern, Kings, Madera, Merced, San Joaquin, Stanislaus, and Tulare. United States Census Bureau issued a report entitled the American Community Survey in 2017, which found that six San Joaquin Valley counties had the highest percentage of residents living below the federal poverty line of any counties in California. The report also found that the same six counties are among the 52 with the highest poverty rate in the US. The median income for a household in the valley is \$46,713. The poverty rate for individuals below the poverty level is 23.7%. According to the United States Census Bureau, the SJV had a total population at the time of the 2011-2015 of 4,080,509. While the eight counties in the SJV differ widely in the prevalence of diseases and health status, almost all diseases and health threats have a greater prevalence in the region.

According to Wolf and Maddox (2019), the ACA has affected heart failure patients by coverage expansion, delivery health reform, and insurance regulation. However, there is a gap in the literature that fails to include regions that are challenged with multiple disparities. The high levels of poverty in the region mean fewer have access to health care. Environmental risks, low education levels, and a high number of agricultural workers all contribute to the region's considerable at-risk population. The Affordable Care Act has offered a chance to address these challenges. As more people are covered by some kind of health insurance, preventive services, in particular for vulnerable populations can be

expanded. Before the expansion of the ACA provision that took place in 2013, uninsured rates of approximately 25% existed in the SJV. That means one in four residents living in the SJV did not have access to private insurance, employer-sponsored coverage, or government health insurance like Medicare or Medi-Cal. After the implementation, the entire valley saw at least an additional 432,000 residents enroll in Medi-Cal. This was largely because of the expansion of Medi-Cal law, which currently pays 95% of the bill by the federal government. In addition to Medi-Cal expansion, Covered California stated that another 67,000 people enrolled in subsidized private insurance. The study results showed that the rate of hospitalization with individuals who had private pay and other insurance had no change. In addition, those that were covered utilizing Medicaid, demonstrated a slight increase which is an improvement for people with multiple disparities.

## **2. Method**

### *2.1 Data Collection*

We collected patient Discharge Data including gender, age, race/ethnicity, insurance coverage, data of hospital admission, and length of stay, from the Office of Statewide Planning and Development (OSHPD) from 2010-2017. The American Community Survey (ACS) was used for population estimates. ACS is a publicly available data source that provides details about population status within the United States.

### *2.2 Population*

The study focused on those with a primary diagnosis of a cardiovascular-related event including hypertension, heart failure, and stroke. The study population was limited to individuals who were 40 to 64 years of age at the time of the event and residing in one of the eight San Joaquin Valley Counties (Fresno, Kern, Kings, Madera, Merced, San Joaquin, Stanislaus, and Tulare). Hospital admissions were included if the event occurred after the year 2009. Patient records who presented with Medicare, Medi-Cal (Medicaid in California), Private, worker's compensation, county indigent programs, or other public insurance as their primary source of payment were included in the analysis. Patient records were excluded if they were missing data on gender, age, race/ethnicity, payer, and county of residence.

### *2.3 Statistical Analysis*

SPSS 26 statistical software was used to conduct the analysis. Descriptive statistics including frequency, percentage, mean, and standard deviation for the study population are presented in Table 1. In Table 2, we display the frequency of hospitalizations, the estimated populations in the San Joaquin Valley, and the rate of hospitalizations per 10,000 in the population by year. In Figure 1, we illustrate the percentage of cardiovascular-related hospitalizations by insurance coverage and year. We used Chi-squared tests to examine and compare the distribution of patient diagnosis severity by insurance coverage prior to and after ACA implementation and can be found in Table 3. Logistic and ordinary least squares regression were used to examine the outcomes of patient severity and length of stay, respectively. Regression results are displayed in Table 4.

### 3. Result

Table 1 illustrates frequencies, percentages, means, and standard deviations across demographic characteristics and outcomes of interest across patients hospitalized for cardiovascular-related conditions. There were 51,969 (39%) women and 81,129 (61%) men hospitalized. Among the sample group of 40 to 64 years of age, the mean age was 54.8 with a standard deviation of 6.4. The racial/ethnic groups were predominantly Caucasian (51.6%), Hispanic/Latinx (29.7%), and African American (10.7%). Caucasians were the group that utilized the most hospital services. Insurance Coverage varied amongst the individuals where Medi-Cal was 33.3%; Private 32.0%; Medicare 24.1%; County Indigent, Other Government, and Other Indigent 5.3%; and Self-Pay and Other Payer 5.3%. In terms of the distribution of events pre and post ACA implementation, 53.9% were between the years of 2010-2013 and 46.1% were between the years of 2014 and the third quarter of 2017. Patients had a mean length of stay of 2.9 days with a standard deviation of 2.4.

**Table 1. Demographic Characteristics of Population Hospitalized for Cardiovascular-related Conditions, San Joaquin Valley, 2010-2017**

Variable	Frequency/mean	% (SD)
Gender		
Female	51,969	39.0%
Male	81,129	61.0%
Age in years	54.8	(6.4)
Race/ethnicity		
White	68,696	51.6%
Black/African-American	14,178	10.7%
Hispanic/Latinx	39,550	29.7%
Asian/Pacific Islander	5,899	4.4%
Native American/Eskimo/Aleut	470	0.4%
Other Race/Ethnicity	4,305	3.2%
Payer		
Medicare	32,099	24.1%
Medi-Cal	44,335	33.3%
Private and Workers' Compensation	42,533	32.0%
County Indigent, Other Gov't, Other Indigent	7,047	5.3%
Self-Pay and Other Payer	7,084	5.3%
Affordable Care Act		
Pre-ACA	71,780	53.9%
Post-ACA	61,318	46.1%
Length of Stay in Days	2.9	(2.4)

### 3.1 Rates of Cardiovascular-related Hospitalizations

Table 2 displays the rate of cardiovascular-related hospital admissions per 10,000 in the population for adults aged 40-64 by year. The rate of hospitalizations tends to decrease yearly. The year of 2010 had the highest rate at 183 per 10,000 in the population and 2015 and 2017 had the lowest rate of 137 per 10,000 in the population.

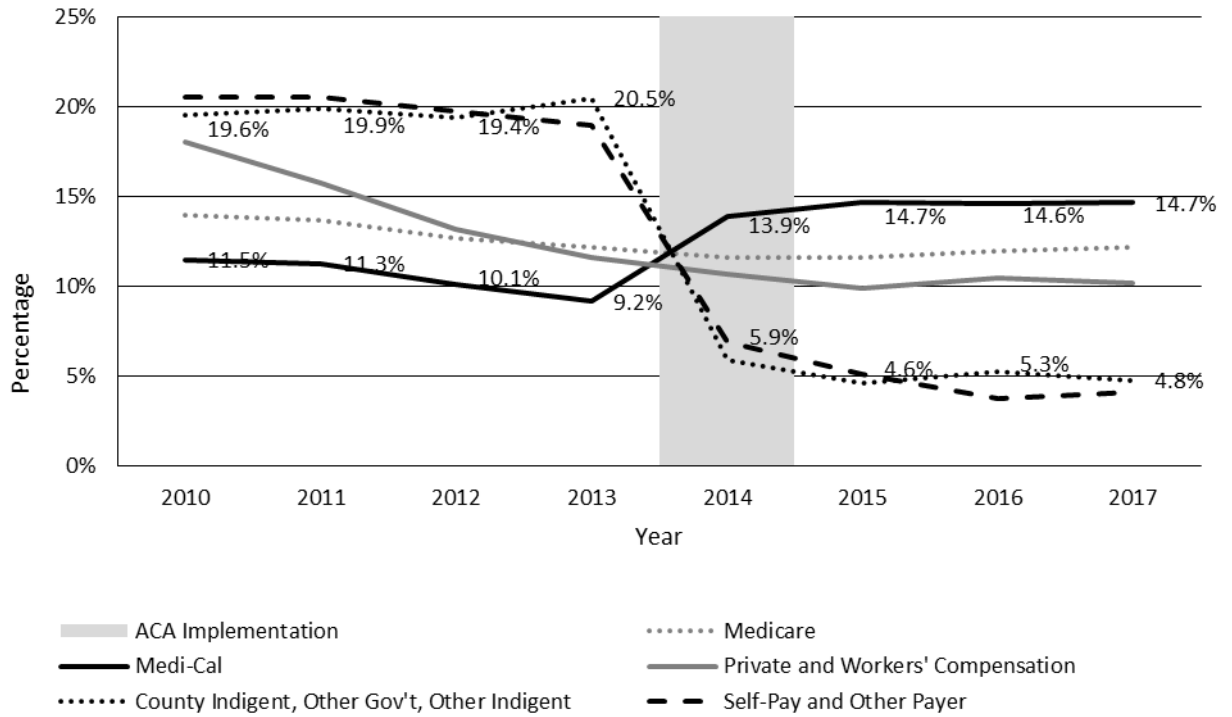
**Table 2. Rate of Cardiovascular-related Hospitalizations for Adults 40 - 64 by Year of Admission, San Joaquin Valley, 2010-2017**

Year	Frequency	Population 40 to 64	Rate of Hospitalization per 10,000
2010	20,150	1,100,721	183
2011	19,009	1,111,225	171
2012	16,910	1,121,830	151
2013	15,711	1,132,536	139
2014	15,363	1,143,344	134
2015	15,112	1,154,255	131
2016	15,422	1,165,270	132
2017	15,421	1,176,391	131

\*we adjusted the total population for a 1% increase per year

### 3.2 Trends in Utilization of Hospital Services by Insurance Coverage

In Figure 1, we illustrated the percentage of hospital admissions by insurance coverage and year. We observed the largest changes in coverage when the ACA was mandated to be implemented in the year of 2014. As hypothesized, we found that County indigent, Other Government, and Other Indigent as well as Self-Pay and Other Payer insurance coverage fluctuated with a drastic decrease from 2013-2015. Conversely, in the same period, we observed an increase in Medi-Cal utilization. In 2013, 20.5% of cardiovascular-related hospitalizations were covered by County Indigent, Other Government, or Other Indigent programming. In 2015, this value decreased to 4.6%. In 2013, 9.2% of cardiovascular-related hospitalizations were covered by Medi-Cal and in 2015, this value increased to 14.7%. These data suggest that there was a shift in insurance coverage from 2013 to 2015 where with county indigent or self-pay and changed to Medi-Cal coverage.



**Figure 1. Percentage of Cardiovascular-related Hospitalizations by Year and Payer, San Joaquin Valley, 2010-2017**

*3.3 ACA Implementation, Insurance Coverage, and Severity of Diagnosis*

In Table 3, we show the percentage of patients pre- and post-ACA implementation by insurance coverage and severity of diagnosis. We found a significant effect of ACA implementation on the relationship between insurance coverage and severity of diagnosis. Among individuals on Medi-Cal, Pre-ACA implementation, 40% of patients were admitted with a comorbidity or a major comorbidity. Post-ACA implementation, we found that this percentage increased to 53% among individuals on Medi-Cal. Across all insurance coverage groups, after the ACA was implemented we observed an increase in the percentage of patients with a comorbidity or major comorbidity in comparison to years before the ACA was implemented.

**Table 3. Percentage of Patients with Cardiovascular-related Hospitalization Pre- and Post-ACA Implementation by Insurance Coverage and Severity of Diagnosis, San Joaquin Valley, 2010-2017**

ACA Implementation	Insurance Coverage	Severity	
		No Comorbidity	Comorbidity or Major Comorbidity
Pre-ACA	Medicare	46%	54%
	Medi-Cal	60%	40%
	Private and Workers' Compensation	72%	28%
	County Indigent, Other Gov't, Other Indigent	70%	30%
	Self-Pay and Other Payer	68%	32%
	Pre-ACA Total	63%	37%
Post-ACA	Medicare	31%	69%
	Medi-Cal	47%	53%
	Private and Workers' Compensation	57%	43%
	County Indigent, Other Gov't, Other Indigent	58%	42%
	Self-Pay and Other Payer	54%	46%
	Post-ACA Total	46%	54%

$\chi^2$  test significant at  $p < .05$ .

In Table 4, we show results of a two multivariate analyses. We show exponentiated log odds from a logistic regression on severity and we show beta weights from an ordinary least squares regression on the length of stay in day.

#### *3.4 ACA Implementation and Severity of Diagnosis*

Adjusting for all other covariates in the model, we found that implementation of the ACA increased the odds of a comorbidity or major comorbidity diagnosis by 82%. In Table 4, we show the OR 1.824 ( $p < .001$ ) for ACA implementation. Pre-ACA implementation is considered from 2010-2013 and post-ACA implementation is from 2014-2017.

#### *3.5 Insurance Coverage and Severity of Diagnosis*

Adjusting for all other variables in the model, the odds of having a hospitalization with a severe diagnosis were 43% less for patients on Medi-Cal, 67% for patients on private insurance, 64% for patients on county indigent, other government, or other indigent, and 59% for patients on self-pay or other payer coverage. The ACA implementation demonstrated the largest effect in the model. The odds of a severe diagnosis was 82% greater post-ACA implementation in comparison to pre-ACA implementation. We found an interaction between the implementation of the ACA and Medi-Cal coverage on the odds of a severity diagnosis.

### 3.6 Interaction Effects of Insurance Coverage and ACA Implementation on Severity of Diagnosis

We found an interaction where ACA implementation moderated the effect of Medi-Cal coverage on the odds of a severity diagnosis, OR 0.939 ( $p < .05$ ). The main effect of ACA increased the odds ratio of a severity diagnosis, OR 1.824 ( $p < .05$ ), but this effect was not as large among those on Medi-Cal, OR 0.939 ( $p < .05$ ) compared to all others.

**Table 4. Multivariate Analysis of Severity and Length of Stay for Cardiovascular-related Hospitalizations, San Joaquin Valley, 2010-2017**

Variable	Severity Exp(B)	Length of Stay beta
Female (Ref)	1.00	-
Male	1.128***	0.118***
Age in Years	1.012***	0.020***
White (Ref)	1.00	-
Black/African-American	1.274***	-0.006
Hispanic/Latinx	1.046***	0.028
Asian/Pacific Islander	1.328**	0.129***
Native American/Eskimo/Aleut	1.191	0.307**
Other Race/Ethnicity	0.735***	-0.034
Medicare (Ref)	1.00	-
Medi-Cal	0.570***	-0.230***
Private and Workers' Compensation	0.332***	-0.745***
County Indigent, Other Gov't, Other Indigent	0.358***	-0.404***
Self-Pay and Other Payer	0.411***	-0.566***
Pre-ACA (Ref)	1.00	-
Post-ACA	1.824***	0.105***
Interaction Terms		
ACA x Medi-Cal	0.939*	-0.020
ACA x Private and Workers' Compensation	1.051	0.215***
ACA x County Indigent, Other Gov't, Other Indigent	0.894	-0.271**
ACA x Self-Pay and Other Payer	0.972	0.061
Constant	0.527***	2.005***

\*\*\*  $p < .001$ . \*\*  $p < .01$ . \* $p < .05$ . Logistic regression was used to estimate log odds of a severity diagnosis. Ordinary least squares linear regression was used to estimate length of stay on selected variables.  $R^2 = .017$ .



### 3.7 Length of Stay

In Table 4, we show the results of a multivariate ordinary least squares model on the length of stay in the hospital. We found that patients on types of insurance coverage had significantly shorter stays in the hospital compared to those on Medicare, adjusting for all covariates. We found that a significant and positive effect of the ACA implementation on length of stay, *beta* 0.105 ( $p < .001$ ). The implementation of the ACA had significant interaction effects with Private and Workers' Compensation, *beta* 0.215 ( $p < .001$ ) as well as with County Indigent, Other Government, and Other Indigent insurance coverage, *beta* -0.271 ( $p < .001$ ).

## 4. Discussion

This study found that people who were hospitalized after the implementation of the ACA tended to have more major comorbidities and longer lengths of stay in comparison to people hospitalized prior to the implementation of the ACA. To the best of our knowledge, this is the first study to illustrate this effect.

The survey results suggested that payer mix distribution in hospitals has been impacted by the ACA and that utilization of other public coverage programs has decreased with an increase of Medi-Cal coverage. Additionally, adults of low-income have benefited as well as Latino and African-American populations in the SJV. The rate of hospitalizations for individuals with CVD were highest in 2010 and reduced in the year 2013 demonstrating a consistent rate till 2017. Finally, this study demonstrated those insured by Medi-Cal, below the age of 55 with CVD, had an increase trend of admissions of 1% to 3% while older adult group above 55 reduced by 1 to 5% in years 2013-2015. The evidence produced in this study indicates the positive impact the ACA has on the SJV for those suffering from CVD. The rates of hospitalizations demonstrated a steady decline. Because of this, healthcare organizations can dedicate more time to those suffering with comorbidity and other server illness. The evidence also demonstrated that the ACA is essential when trying to conquer cardiovascular disease in the San Joaquin Valley. This analysis shows that any form of change to the Affordable Care Act could harm existing participants. Thus, creating more of a burden to the San Joaquin Valley for those who suffer from CVD. Cardiovascular Disease places a large economic burden on the U.S. alone. It is estimated that the indirect and direct cost of CVD in 2011-2012 was \$316.6 billion dollars. The American Heart Association predicts that by the year 2030, the total direct cost of CVD will jump to \$918 billion. In the state for California, CVD is a reflection of the nations. CVD accounts for one in three of all deaths in the state. Additionally, in the SJV there is growing evidence that the rate of death caused by cardiac illnesses is greatly affected by income inequality, access to economic opportunities and education. The Medicaid Expansion and ACA has given SJV substantial economic relief. The healthcare expansion of the ACA has allowed many SJV providers and hospitals to provide care to those who are newly covered. According to a recent study by UC Berkeley's Center for Labor Research and Education, abolishing the ACA would result in a loss to the economy of \$ 359 million dollars. Such a loss would deprive federal

funding and job opportunities for the SJV. The UC Berkeley study, shows 106,500 SJV residents would lose subsidies. SJV has received substantial economic relief from the Medicaid Expansion and the ACA. Statewide, more than 1.2 million people would lose the help to pay for plans purchased through Covered California, the state's insurance exchange established for the Affordable Care Act. The rates of hospitalization have stayed the same in the 3 years after the passing of the ACA, so there needs to be further investigation into utilization of preventive primary care services. Future research using the variables in this study, along with the inclusion of additional variables, such as emergency room visits and preventative primary care rates, is needed to determine the potential impact of the ACA to CVD. Expansion of medical coverage is just one factor that can improve cardiovascular health and reduce the likelihood of developing CVD. The American Heart Association has identified seven key components of cardiovascular health that all Americans should strive to achieve: normal blood pressure, normal cholesterol, normal blood sugar levels, not smoking, maintaining a normal weight, eating a healthy diet, and meeting recommendations for physical activity. Additionally, it is essential to train and educate individuals who are knowledgeable about health disparities in the socioeconomic and cultural contexts of the region and to develop the future generation of researchers who will begin to find solutions to these disparities that contribute to CVD.

## **5. Study Limitations**

These data sets do not show how many individuals acquired Medi-Cal or private insurance through the exchange. With today's healthcare industry, Primary care is a key component. Unfortunately, within this report, Primary care utilization data is not available. Migration effects can also be a limitation due to the distribution on population of place can be irregular. Beerli (2004) states, the indirect population parameters depend on the degree of the migration rate from the unknown populations. Hence, the more immigrants from unknown population, the population size can fluctuate.

## **6. Conclusion**

The evidence produced in this study indicates the positive impact the ACA has on the SJV for those suffering from CVD. The evidence also demonstrated that the ACA is essential when trying to conquer cardiovascular disease in the San Joaquin Valley. Any changes made to the ACA could be detrimental to the existing state of CVD in the SJV. Thus, causing more economic burden to the state of California. Many challenges remain ahead for healthcare policy. If this research could be reproduced in other states that serve individuals with poor socioeconomic conditions and disparities, it would be beneficial to health care policy makers. Proving that there is a need to keep access to health care for all, despite the inability to pay or access coverage is essential. For instance, health care policy leaders need to be risk takers and exhibit better concepts that are unconventional. Along these same lines, health care leaders', hospitals, and clinics need to form organizational procedures and customs that exhibit a new value system to include access to all for healthcare coverage. This is to say, by setting the expectation that

relate to their value systems, shape peoples' attitudes and beliefs. This study showed that the ACA does have an effect on CVD with in the SJV. Those that have access to care are able to improve health conditions. With the swift changing healthcare environment, placing more demands on police makers to increase access to care while cutting costs, is important. Individuals who have healthcare coverage and those that need access to healthcare, want to know that healthcare policymakers are maximizing their effectiveness to make the proper changes to impact all.

## References

- Affordable Care Act Impact. (n.d.). *San Joaquin County*.
- American Heart Association. (2017). *Cardiovascular Disease: A Costly Burden For America Projections through 2035*.
- Anderson G., & Wilson K. (2006). *California Healthcare Foundation*. Chronic Disease in California: Facts and Figures.
- Andrea S. Christopher, Danny McCormick, Steffie Woolhandler, David U. Himmelstein, David H. Bor, & Andrew P. Wilper (2016). Access to Care and Chronic Disease Outcomes Among Medicaid-Insured Persons Versus the Uninsured American. *Journal of Public Health, 106*, 63-69. <https://doi.org/10.2105/AJPH.2015.302925>
- Beerli, P. (2004). Effect of unsampled populations on the estimation of population sizes and migration rates between sampled populations. *Molecular Ecology, 13*, 827-836. <https://doi.org/10.1111/j.1365-294X.2004.02101.x>
- Brown, P., Gonzalez, M., & Dhaul, R. S. (2015). Cost of Chronic Disease in California. *Journal of Public Health Management and Practice, 21*(1), E10-E19. <https://doi.org/10.1097/PHH.0000000000000168>
- California Health Care Foundation. (n.d). Retrieved from <https://www.chcf.org/project/coverage-access-affordability-california-key-data-2013-2016/>
- Conroy, S. M., Darsie, B., Ilango, S., & Bates, J. H. (2016). *Burden of Cardiovascular Disease in California*. Sacramento, California: Chronic Disease Control Branch, California Department of Public Health.
- Economic Burden of Chronic Disease in California. (2015). Retrieved from <https://www.hsri.ucmerced.edu/research/health-disparities/about-san-joaquin-valley>
- Torres, H. et al. (2017). Coverage and Access for Americans With Chronic Disease Under the Affordable Care Act: A Quasi-Experimental Study. *Ann Intern Med., 166*, 472-479. <https://doi.org/10.7326/M16-1256>
- U.S. Census Bureau. (2017). *American Community Survey*. Retrieved from <https://www.factfinder.census.gov/faces/nav/jsf/pages/index.xhtml>
- Wolfe, J. D., & Joynt Maddox, K. E. (2019). Heart Failure and the Affordable Care Act: Past, Present, and Future. *JACC: Heart Failure, 7*(9), 737-745. <https://doi.org/10.1016/j.jchf.2019.04.021>