

Healthcare Assessment of Asian Elderly in San Francisco

Lead: Janet Yu

Members: Millie Huang, Queenie Wu, Ethan Rauchwerk, Allison Chen, Kaera Mishenkov
Mitchen

1 - Introduction

Healthcare inequities exist all around the US. With the US healthcare system being constantly compared to others around the world, it's insightful to see how the US healthcare system affects a specific diaspora of people. For our DataBlog project this quarter, our team focused on analyzing how Asian elderly in San Francisco were affected by health disparities e.g. communication barriers, healthcare inaccessibility, etc. With limited data access due to HIPAA regulations, our team sourced as much freely-open data on the web alongside research journals to accompany our findings to produce a blog that supported published journal findings of how Asian elderly are currently being treated by the healthcare system and what factors might be influencing their treatment.

2 - Background, The SF Asian Demographic

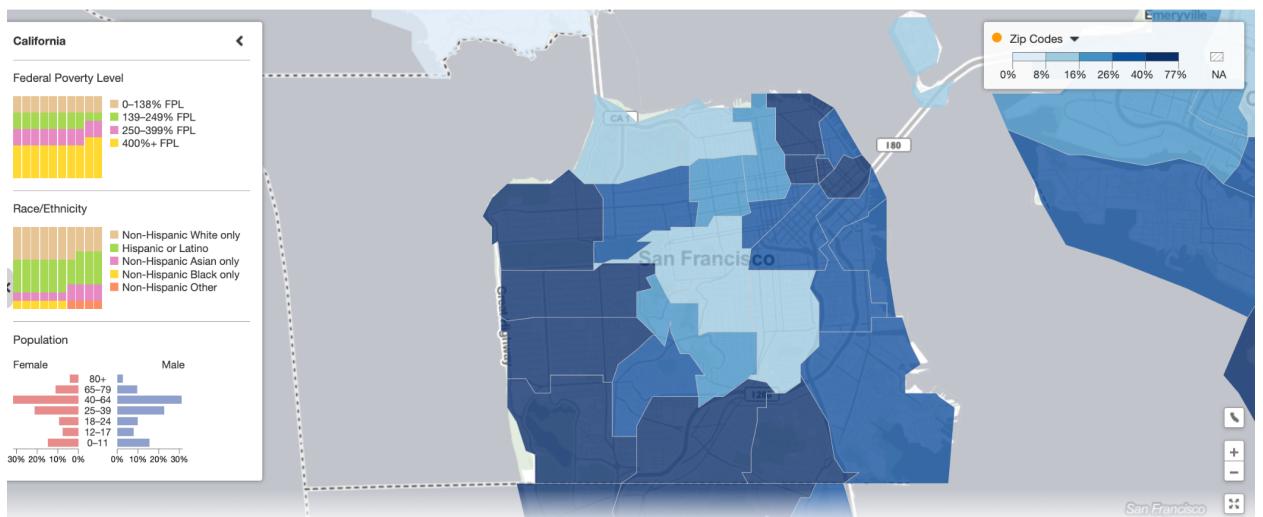
The [AskCHIS Neighborhood Edition](#) is an “online data dissemination and visualization platform that provides health estimates at sub-county geographic regions”. Using this interactive tool, our team was able to create visualizations separated by zip code in San Francisco under specific filters from data collected between 2019-2020. Below are a few interesting graphics and findings we saw.

We first broke down San Francisco by three specific factors:

1. Asian Only (18+)

Asian only (18+)

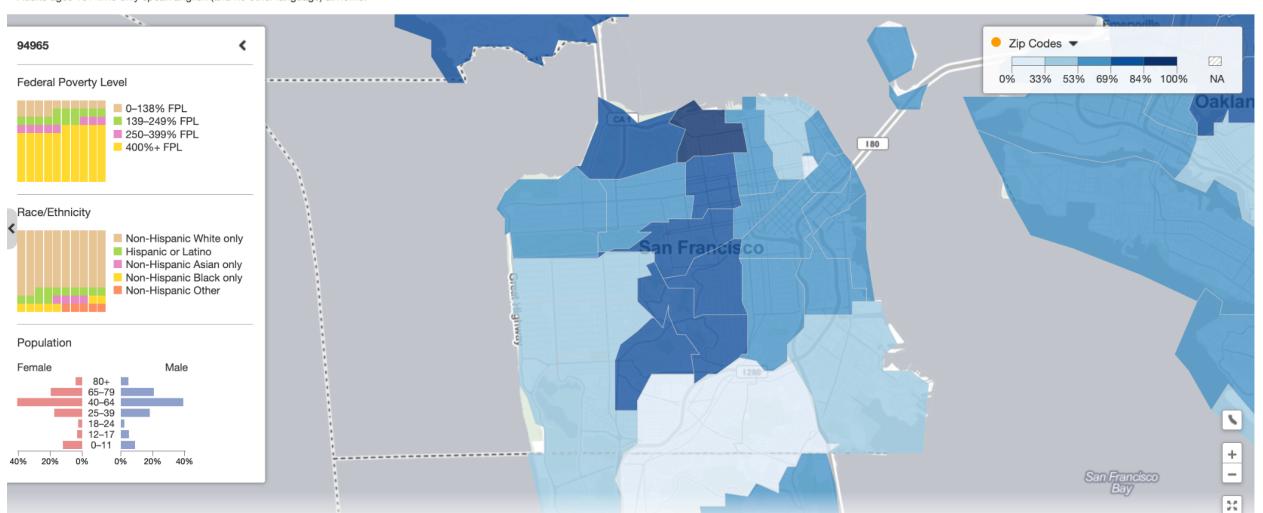
Adults ages 18+ who are Asian alone, having origins in any of the original peoples of the Far East, Southeast Asia, or the Indian subcontinent.



2. English Speaking Only (18+)

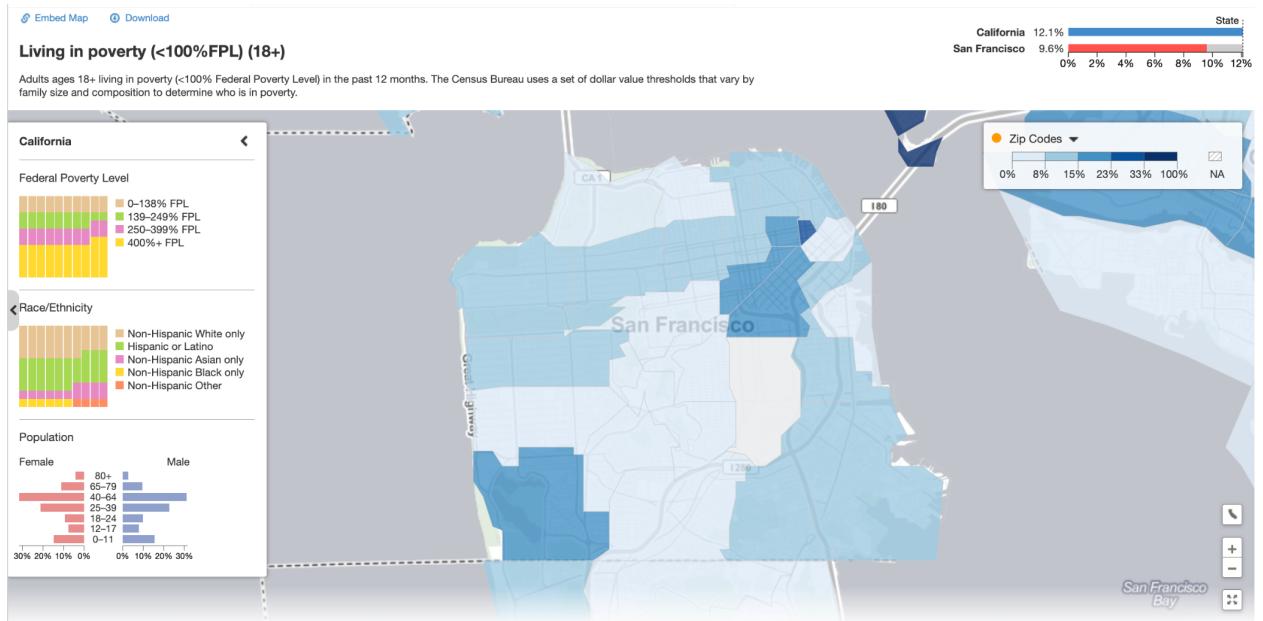
English only (18+)

Adults ages 18+ who only speak English (and no other language) at home.



and

3. Living in Poverty (18+)

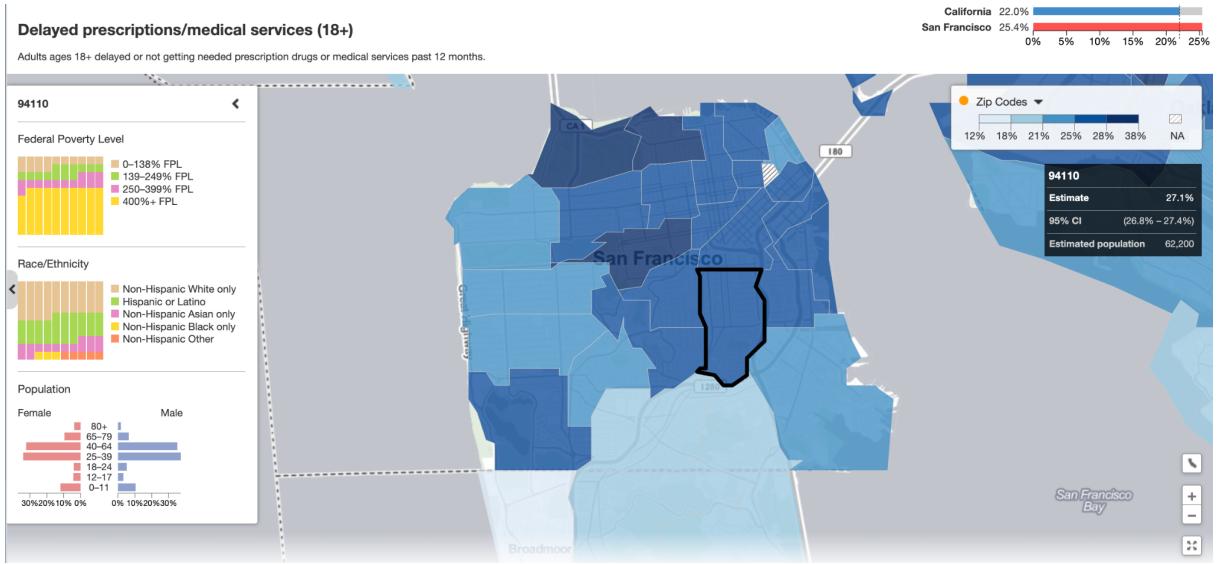


We see from these three maps analyzing the demographic of San Francisco's population that Asian adults live in a majority on the outskirts of San Francisco, focusing in areas like Daly City, Chinatown, and the lower Portola/San Bruno Area. Map (2) showing English Only adults adds onto Map (1), showing that English Only adults were not as concentrated in Asian dwelling areas, and vice versa. We also see a concentration on adults living in poverty in areas that Asian adults dwell in: Daly City and Chinatown/Downtown SF area.

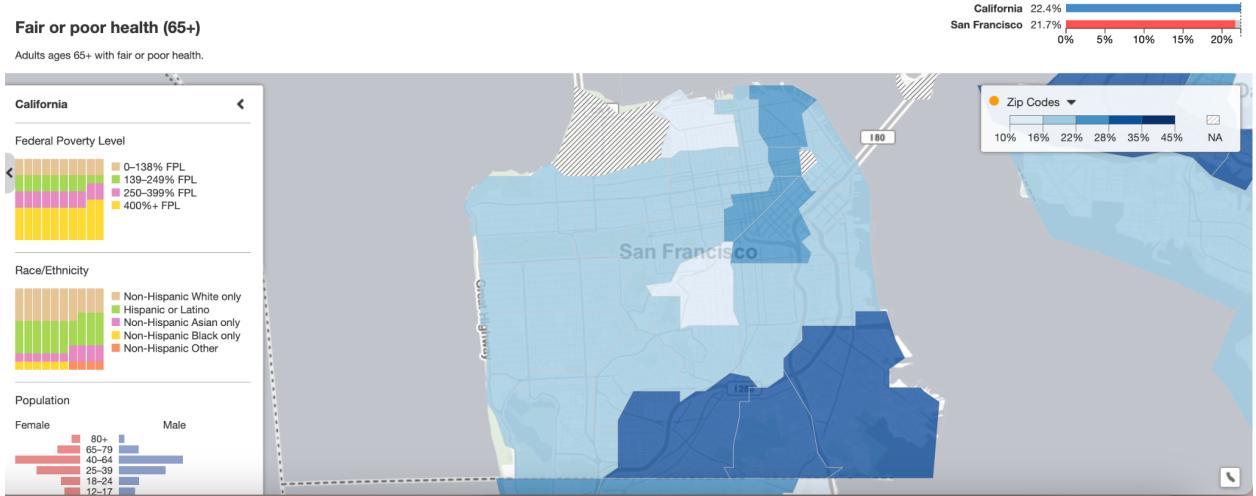
These three maps give insight into the living demographics of Asian adults in San Francisco: Asian adults live in areas of non-English speaking communities and communities living in poverty.

We'll then use these factors to analyze two health-related factors:

1. Delayed prescriptions/medical services (18+)



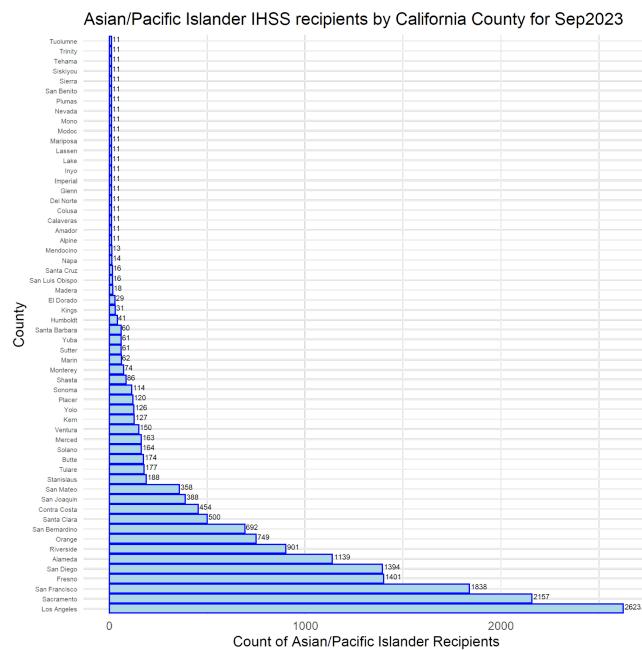
2. Fair/Poor Health (18+)



From these two maps, we see high levels of delayed prescription and/or medical services for adults in the Northeast and Southwest areas of San Francisco. We also see concentrations of adults living in fair/poor health in the Downtown SF/Chinatown area alongside the lower San Francisco Area (Portola, San Bruno...). From our previous Maps (1-3), we know that Asian adults and elderly dwell in those areas.

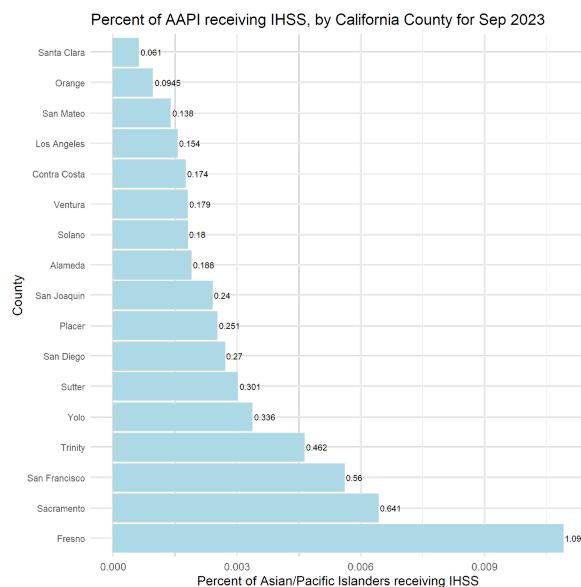
We've now supported the idea that Asian adults, from this one dataset from the AskCHIS, suffer from lower healthcare quality and access which leads to fair/poor health while also living in areas and diasporas of non-English speaking and poverty-stricken communities.

We can then look further into the Asian elderly population by looking at recipient data from the IHSS, an in-home assistance program for eligible aged, disabled, or blind individuals. It's key to note that the information we're analyzing generalizes to all recipients, but the general trend can be assumed for elderly populations receiving such in-home care.



This graph depicts the counts of Asian and Pacific Islander recipients of In-Home Supportive Services (IHSS) by county. We can see that a majority of counties have less than 500 recipients.

The county with the largest number of AAPI recipients is Los Angeles (2623), followed by Sacramento (2157) and San Francisco (1838).



In order to better understand the amount of Asian people receiving In-Home Supportive Services (IHSS), we found the proportion of AAPI receiving IHSS out of the total Asian population in each county. The top 17 counties with the highest percentages of Asian populations are shown. Asian populations were gathered from the United States Census Bureau.

We can see that Fresno has the largest proportion of Asian and Pacific Islander recipients of IHSS (1.09%), followed by Sacramento (0.64%) and San Francisco (0.56%).

Both graphs provide evidence that San Francisco is one of the top counties for counts and proportion of Asians and Pacific Islanders receiving In-Home Supportive Services.

By identifying these factors that affect the care received by Asian elderly in San Francisco, we're now stuck with questions on why this is happening, what factors are contributing to these findings, and how we could potentially help these communities.

3 - Analyzing Healthcare Quality for Asian Elderly

County: SAN FRANCISCO

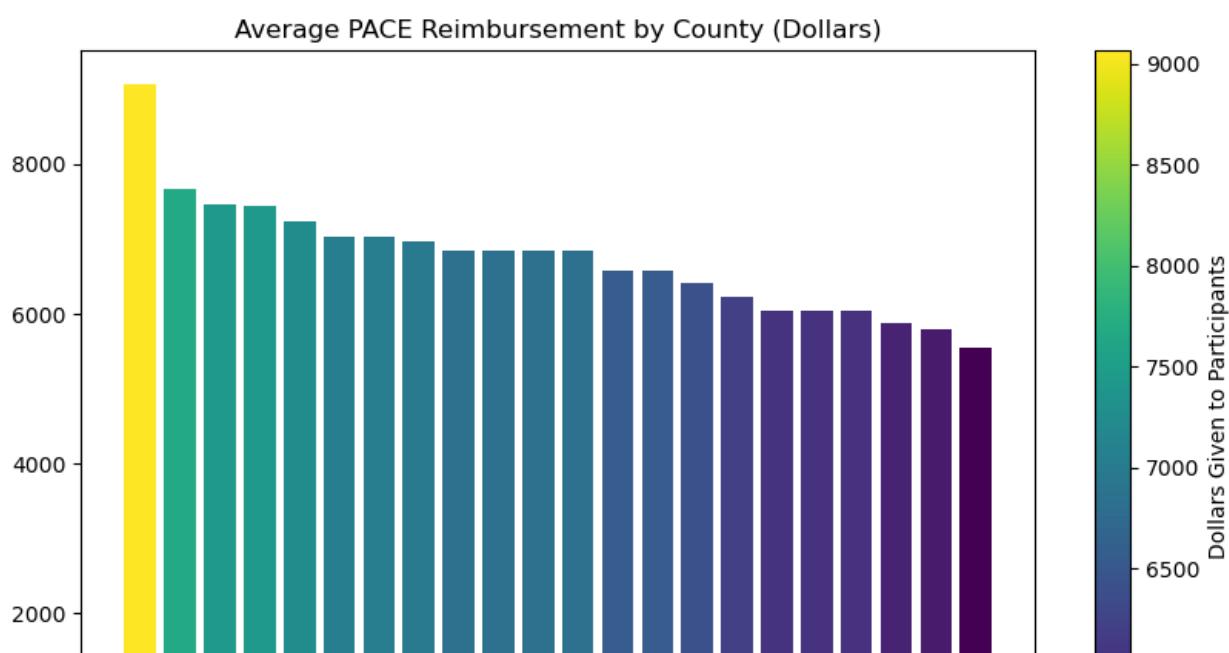
Number of important services in county (0 - 7): 7

		Number of Services/Providers	Population Aged 65+ Per 1 Provider
Information and Assistance	Aging & Disability Resource Connection Services	1	141,770
	Caregiver Resource Centers	1	141,770
Adult Day Health Care	Community Based Adult Services Providers	9	15,752
Integrated Health and LTSS for Dual Eligibles	Programs for All-Inclusive Care for the Elderly (PACE) Centers	4	35,443
Assisted Living/Residential Care	Residential Care Facilities for the Elderly (RCFEs)	61	2,324
Skilled Nursing Facilities	Skilled Nursing Facilities	13	10,905
Home Health Care	Total Home Health Facilities	11	12,888
Hospice Care	Total Hospice Facilities	8	17,721

To get a better sense of what healthcare-related services are available to the people, we found the most available types of care and facilities. This table showcases the different types of top important medical services provided to the SF public. (AI)

The Program of All-Inclusive Care for the Elderly (PACE) is a comprehensive healthcare model designed to meet the unique needs of elderly individuals in California. PACE provides a range of medical and social services, such as medical care, rehabilitation, adult day services, and support for caregivers, with the goal of enhancing seniors' quality of life while allowing them to remain in their homes.

One crucial aspect of PACE is the reimbursement structure for participating organizations. PACE operates under a capitated payment system, where organizations receive a fixed monthly payment for each enrolled participant. The reimbursement rate for PACE organizations varies among California counties, with some contributing much more to elderly care than others. The following chart compares California counties in how much money they provide to PACE.



As we can see, San Francisco leads the pack in money provided for elderly care via PACE organizations, with other bay area/northern California areas among the top counties. Southern California seems to be lacking, and it's clear that elderly individuals in these areas are receiving inadequate support compared to other areas of California.

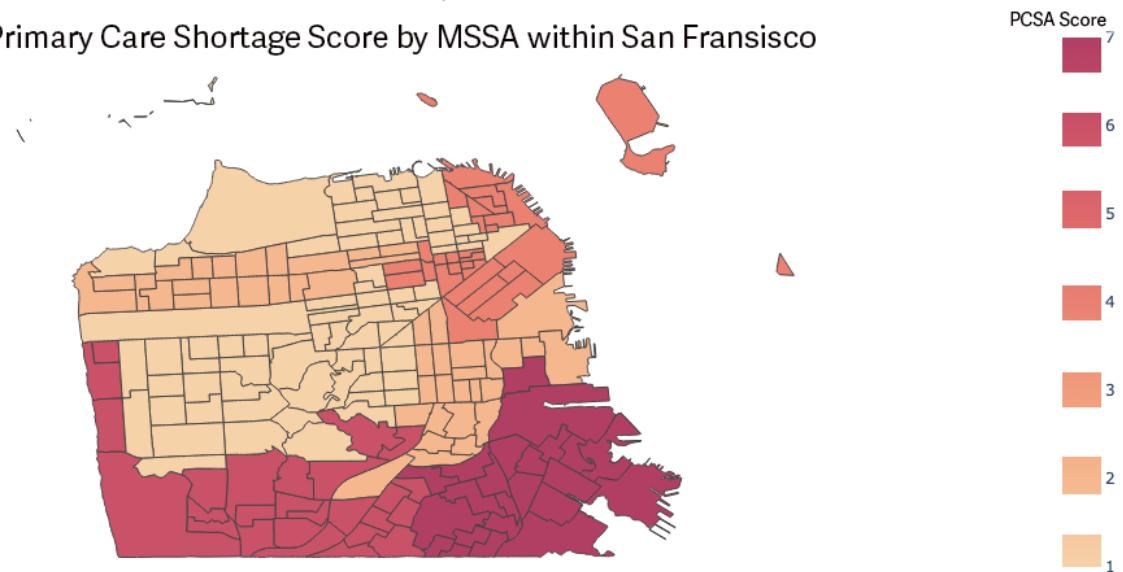
By breaking San Fransisco down into the smaller geographic designation of **MSSAs (Medical Service Study Areas)**, we gain a further picture of the areas that are medically underserved for the Bay Area and how it relates to our target demographic.

The California Healthcare Workforce Commission uses **PCSA Scores (Primary Care Shortage Scores)** as a measure that helps determine funding for primary care residency and NP/PA training to areas most in need. A score ≥ 5 identifies an MSSA as a Primary Care Shortage Area. Scores are calculated according to the percent of the population below the federal poverty level and the provider to population ratio within each MSSA; in relation to our question, this measure uses a geographic population's ability to pay and available physician resources as an indicator of healthcare accessibility.

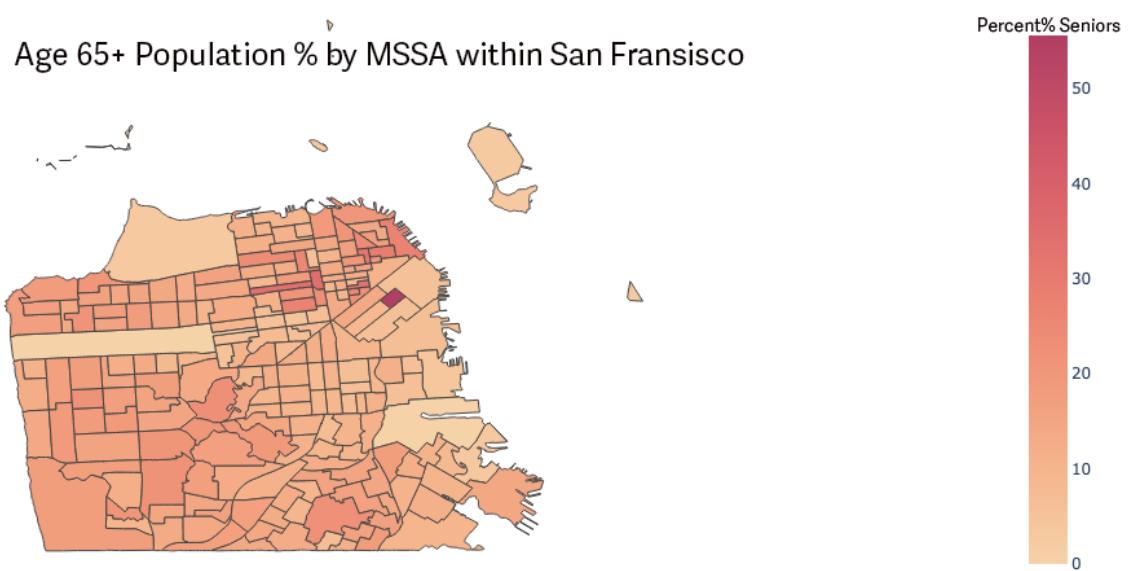
Using data from the California Department of Health Care Access and Information, we visualized and cross examined the elderly and Asian population breakdowns (respectively) with PCSA Scores by MSSA:

1. PCSA Score:

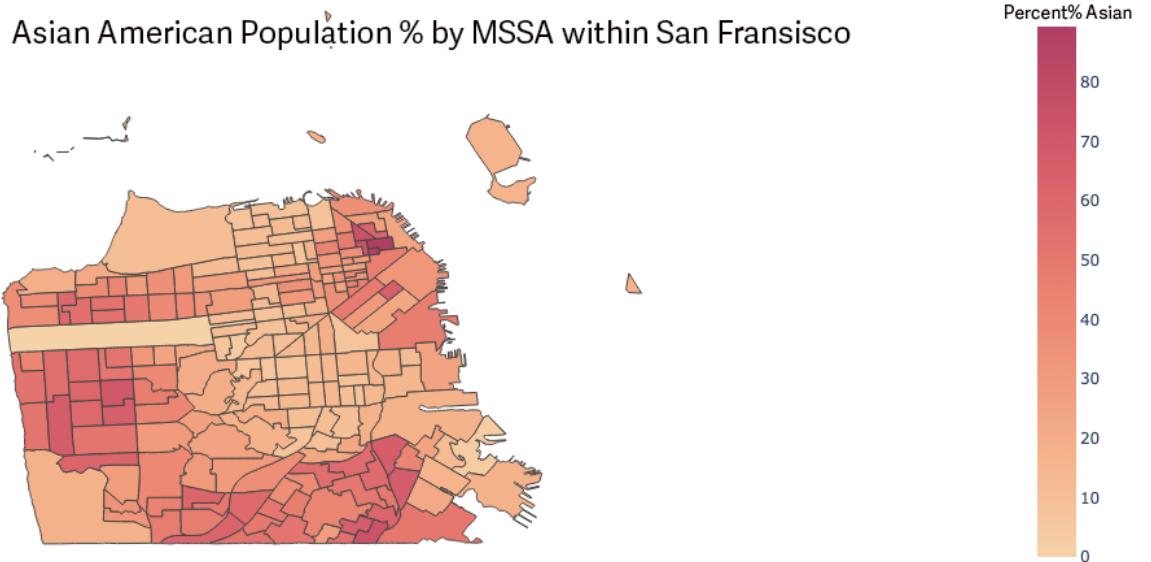
Primary Care Shortage Score by MSSA within San Fransisco



2. Senior Population (65+):



3. Asian Population:



Using PCSA Scores as a measure of accessibility, the South/South-Eastern region of San Francisco appears to significantly deal with healthcare shortages as they have the highest PCSA scores within the Bay Area and meet the score ≥ 5 criteria for being a Primary Care Shortage Area. According to Map 3, this southern region of San Francisco has a large Asian population proportion.

Additionally, although it falls just below the required score to be designated as a Primary Care Shortage Area, the North-Eastern region of San Francisco has a relatively high PCSA score compared to the surrounding area. As we can see from Maps 2 & 3, this area is in the higher end of elderly and Asian population proportions when compared to San Francisco as a whole.

Income Inequality Index of Bay Area Counties

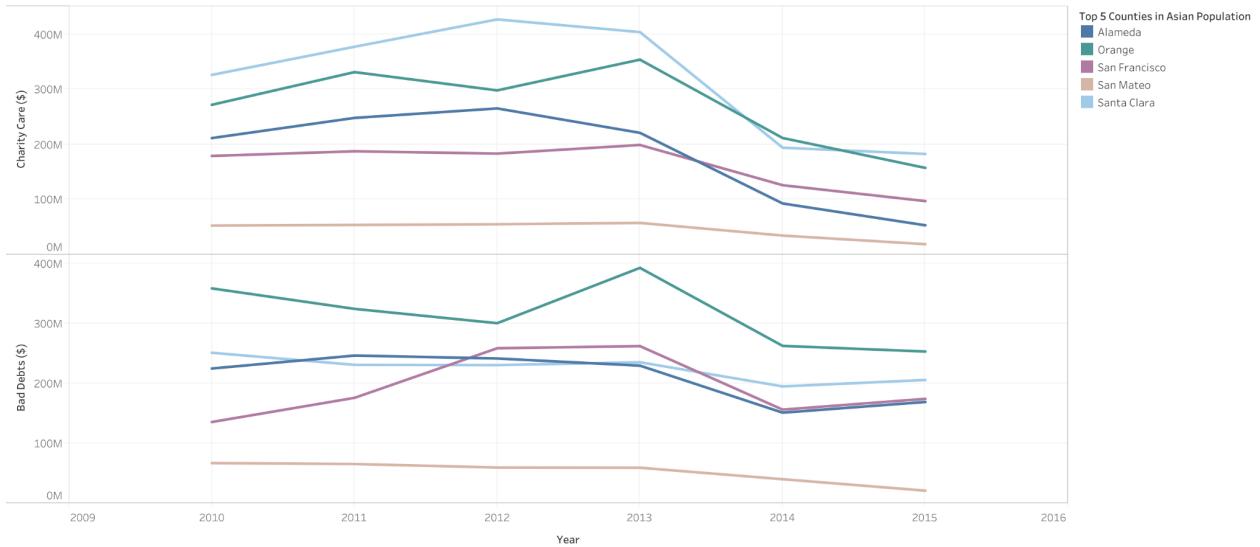


Another important aspect we explored was the distribution of income measured by the Gini index. This index represents how income is distributed across a population. An index of 0.0 signifies perfect equality, where every household earns an equal share of income. In contrast, an index of 1.0 indicates total inequality, where all income is concentrated in one single household, leaving none for the rest. Generally, a higher Gini index indicates a greater income inequality.

Our findings show that San Francisco has the highest Gini index in the Bay Area, at 0.5073. This implies that there is the greatest income inequality in San Francisco compared to its Bay Area counterparts. Income disparity plays a significant role in healthcare access, influencing crucial factors such as the availability of healthcare information and the immediacy of resources that individuals can access. While it is crucial to focus on improving the healthcare system itself, efforts to address broader societal issues like income inequality are also vital steps to ensure equitable healthcare access for all.

Beyond income inequality, we also see disadvantages that Asian elderly are faced with in issues with communication and language barriers when receiving care.

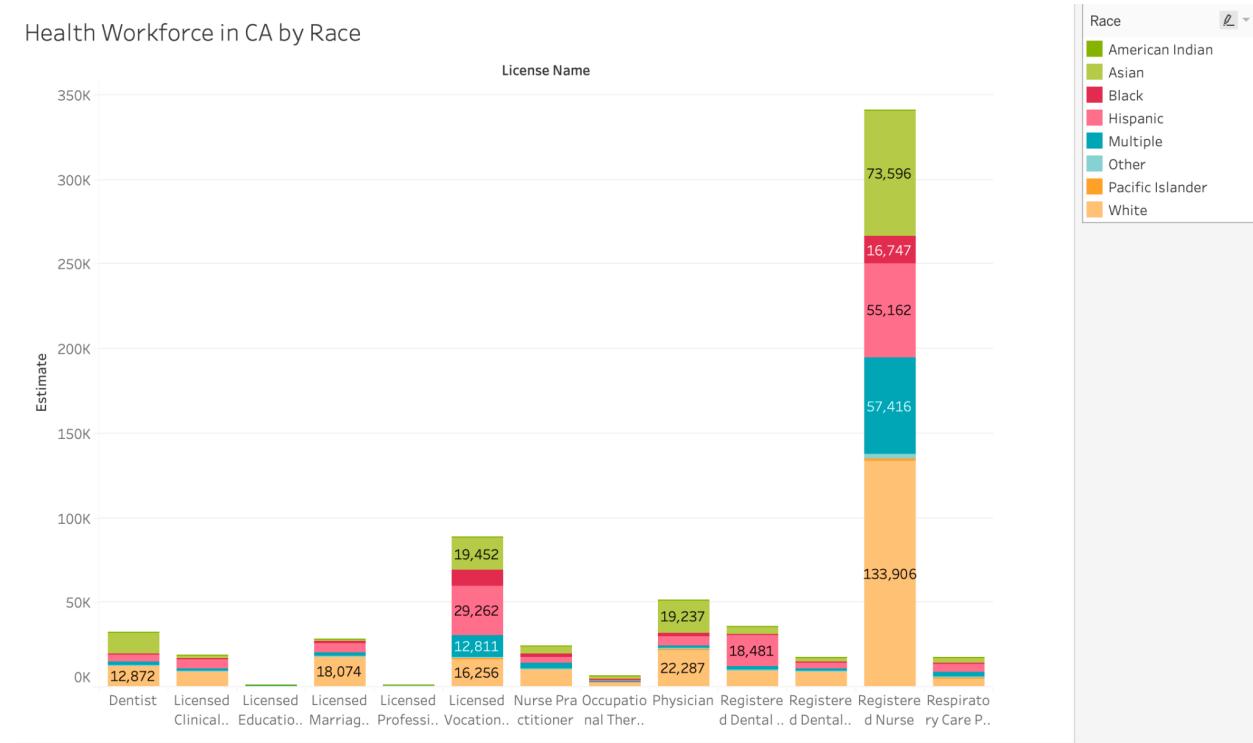
Change in Charity Care and Bad Debt Over Time in California



Then, we honed in on healthcare coverage by analyzing California hospitals' financial and utilization data for charity care and bad debts. More specifically, charity care represents the amount of money paid for a patient's hospital care by outside services, such as insurance, on behalf of a patient. On the other hand, bad debt is more of a loss for hospitals, as it accounts for debts due to a patient's unwillingness to pay.

As demonstrated by the visualization above, in hospitals in the top five counties in California, by Asian population, charity care experienced a slight increase from 2010 to 2012 but had a sharp decrease in the following years, accentuating how charity care could continue to decrease, which could prove detrimental to hospital revenue. Moreover, bad debts tend to fluctuate in the same time frame for those same counties; however, its trajectory is headed toward an increase in bad debt, which also puts hospitals at a disadvantage. As a result, this visualization may indicate that hospitals surrounding Asian communities have been struggling financially in recent years, which will inevitably affect patient care and healthcare access.

4 - Analyzing Healthcare Accessibility for Asian Elderly



From the CalHHS DataBase, we found a dataset with information about the race and ethnicity of healthcare workers in California. This visualization shows the distribution of race across various health-related careers. We see a high proportion of white workers across all fields, specifically a high concentration in Registered Nurses.

It's not safe to assume the languages that each race speaks, but roughly, a majority of a specific race speaks the language native to their ethnicity. With a higher percentage in non-Asian healthcare providers, the amount of providers speaking a recipient native tongue e.g. for Asian elderly, continues to be slimmer.

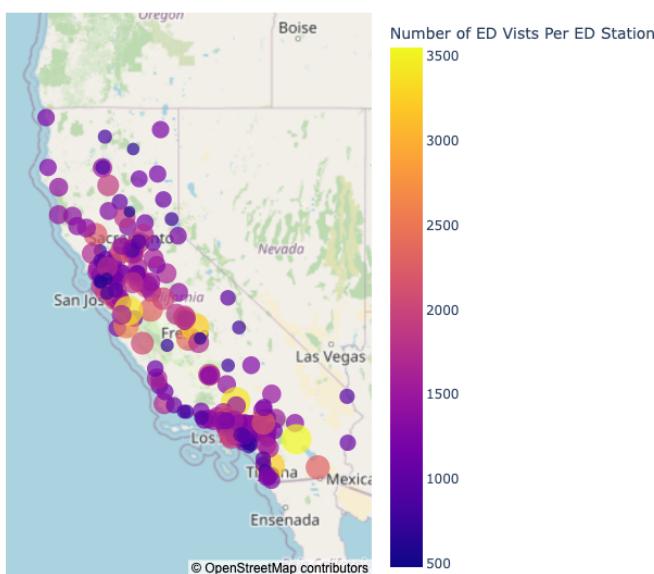
We see these results in a journal titled "Healthcare Communication Barriers and Self-Rated Health in Older Chinese American Immigrants" (Aug. 2016) where researchers identified that older Chinese American immigrants face healthcare barriers due to lack of language resources and low health literacy, specifically when looking at the older Chinese American immigrant population in San Francisco. From the journal's abstract, researchers state that "[t]he study

sample (81 % females, mean age = 62) included 67 % who spoke English poorly or not at all, 34 % who reported needing a medical interpreter, and 37 % who reported "often" or "always" needing assistance to read health information." From a 705 sample size of Chinese immigrants in SF ages 50-75, we see a large percentage of immigrants requiring language assistance and healthcare literacy assistance. Having a lack of such resources can eventually lead to lack of healthcare accessibility and lower health and wellness for older Chinese American immigrants.

Even for the average person, no matter their demographic, a lack of knowledge in one's health conditions and inability to communicate with a healthcare provider can serve as detrimental to one's health. It's vital to provide the necessary resources for under-represented populations, such as the Asian elderly population, for everyone to receive the adequate healthcare they need.

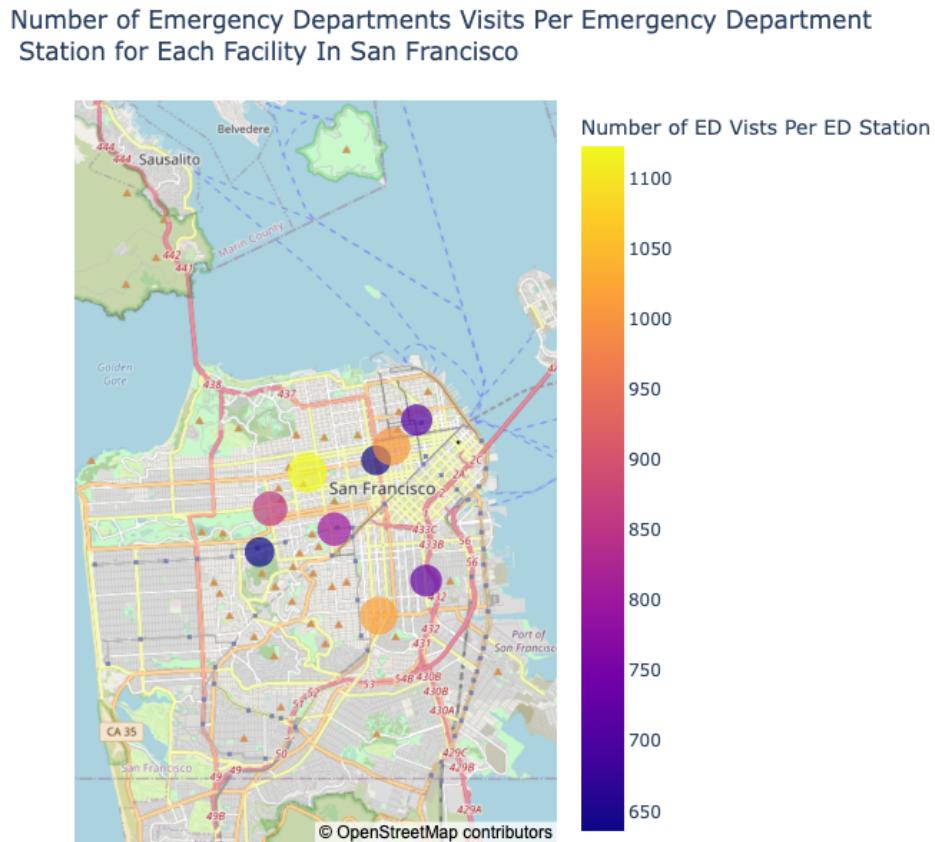
The following visualizations are obtained from California Health and Human Services' 2021 "Emergency Department Volume and Capacity" dataset. It lists hospital facilities in California with their respective total number of emergency department encounters and emergency department treatment stations. To better understand the facilities' level of emergency department burden, the two categories are then used to calculate the ratio of number of emergency department visits to emergency stations for each facility.

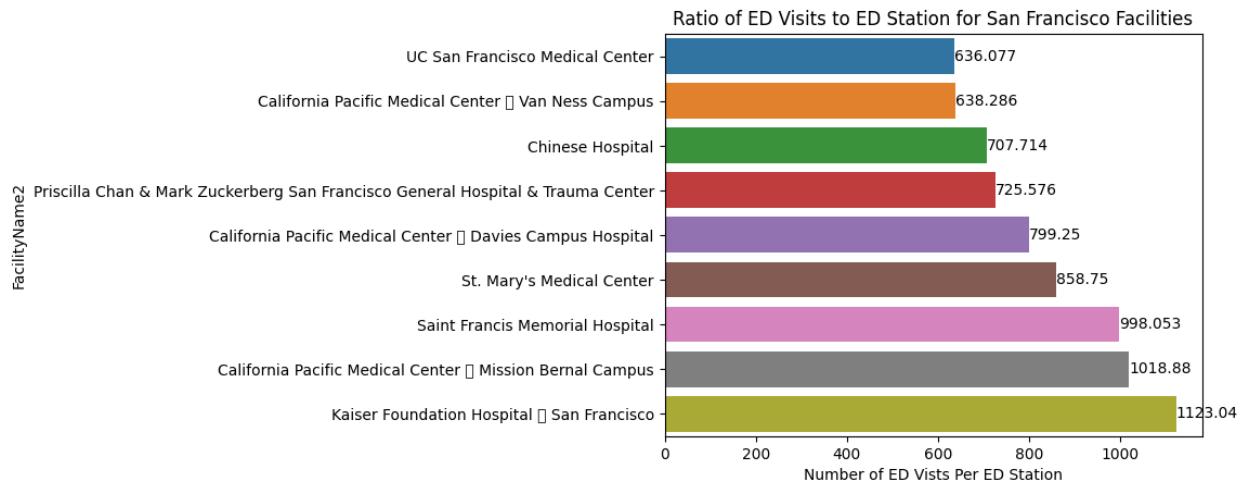
Number of Emergency Departments Visits Per Emergency Department Station for All Facilities In California



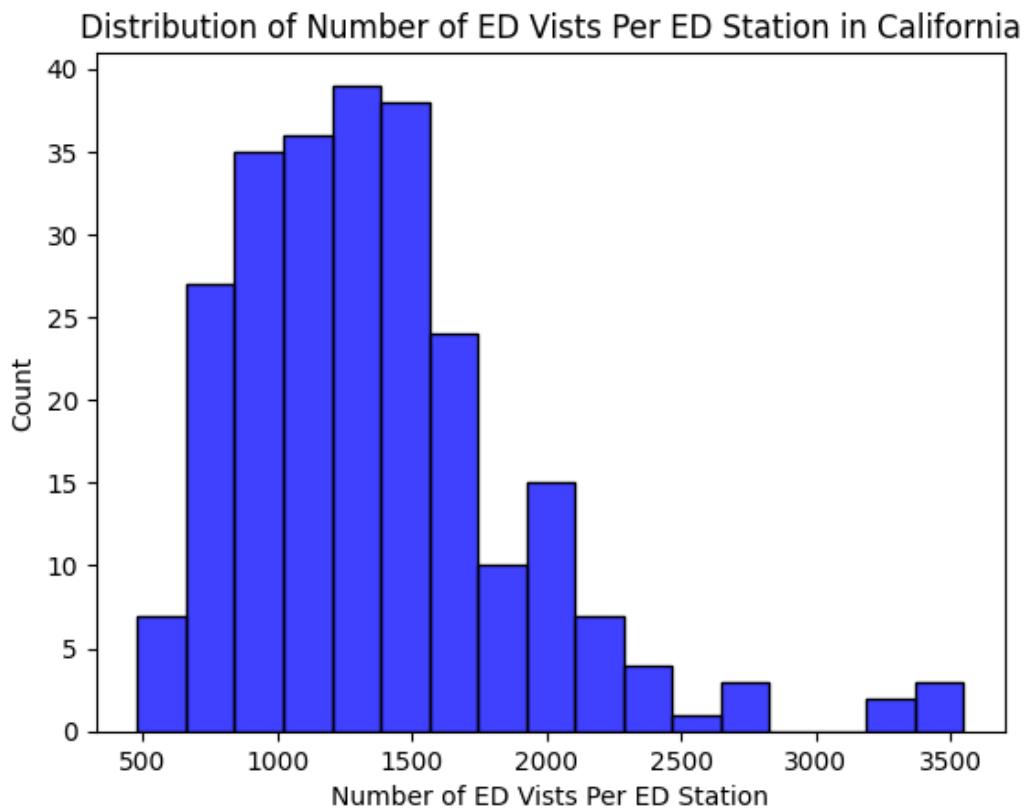
To provide a general overview of the hospital facilities in California, the graph above displays the number of emergency department visits per emergency department station across the state. The highest ratio being at around 3548.166 visits per station at the John F. Kennedy Memorial Hospital in Riverside.

The next graph focuses on the ratio of facilities located specifically in San Francisco and is accompanied by a barplot of the facilities' ratios.





In San Francisco, the hospital with the least emergency department burden is at the UC San Francisco Medical Center with a ratio of 636.077, while the hospital with the highest emergency department burden is at the Kaiser Foundation Hospital San Francisco with a ratio of 1123.04. From the map of San Francisco, the latter hospital can be found to be located in the center Northern region of the county.



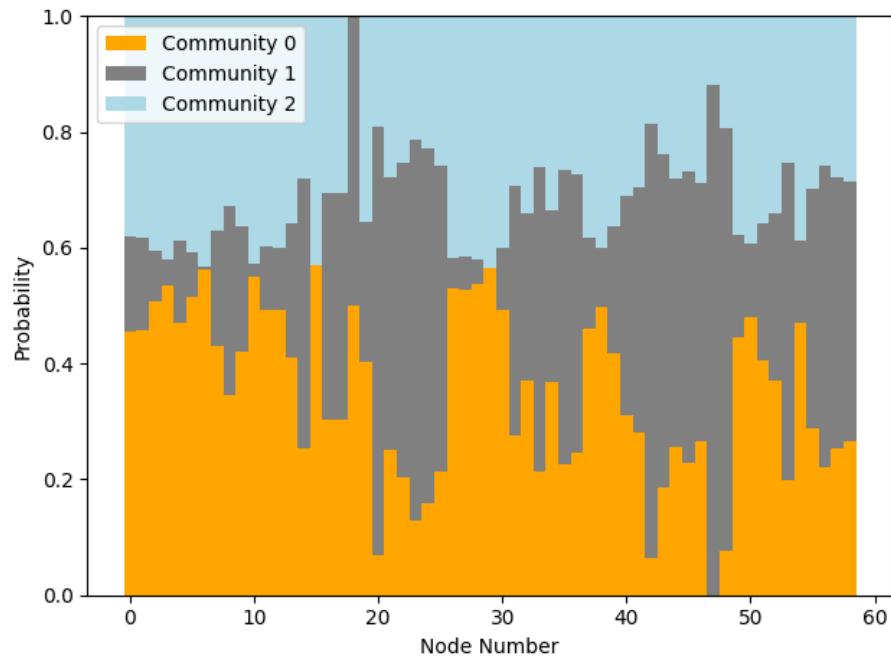
The histogram above shows a distribution of the emergency department visits to treatment station ratio for the facilities in California. This allows us to compare the ratios of the San Francisco facilities to the rest of the state. The mean ratio is found to be around 1369.06, with a standard deviation of approximately 526.45 visits per station. The highest ratio of 1123.04 in San Francisco is slightly below the mean and within one standard deviation below the mean.

5 - Extended approaches: Machine learning applications

The traits of the high-health-risk elderly population in California

The dataset records seven main characteristics of the elderly population (age 60+) of counties in California, and we selected data from years 2014-2020. We used a NMF-based community detection model that's able to perform on multi-layered data, with each layer representing data from a certain year. The adjacency matrices assess the similarity between each pair of counties through cosine similarity metric. By adjusting the hyperparameter controlling the number of clusters we target and some weight parameters, we are able to determine the community detection result which partitions the counties into communities according to their shared traits. In other words, counties classified as belonging to the same community share more similar patterns in their elderly populations.

The following stacked bar plot shows the probability of each node (county) belonging to a specified cluster when setting the number of targeting clusters as 3. The node is likely to belong to the community represented by the greatest color column.



With this information, we can further extend our analysis by mapping the counties identified as the same cluster components and observe the shared patterns that contribute to the clustering results. More connections may be observed between the regions if we combine the analysis with further model training and visualizations.

6 - The Issue with Asian Representation

As seen by the data analysis and visualizations from above, a majority of our data filtration is geared towards the “Asian” population. However, one thing many data reporters and collectors fail to recognize with data collecting and reporting is the lack of acknowledgement for the incredible amounts of diversity within the Asian community. Experiences from East Asian groups may, and likely are, completely different from the experiences of Southeast Asian, South Asian, Pacific Islanders, and many other ethnic groups under the umbrella of the term “Asian”. It would be careless and inconsiderate of us, as data researchers and data scientists, to ignore this fact and simply generalize all data for one group of “Asians”.

As much of the data we’ve analyzed performs this generalization, we urge future data collectors and reporters to be more specific with their methods rather than generalizing for efficiency. The

lack of diversity within the term “Asian” can cloud the needs of smaller pan-Asian communities and lack of resources e.g. the large population of Chinese Americans can cloud over the issues of smaller Asian ethnic groups like Pacific Islanders.

The following two journals provide incredibly valuable insight into the need for more discrete data reporting for the Asian population. We urge you all to look further into these issues!

“Barriers to Healthcare among Asian Americans”

<https://www.tandfonline.com/doi/full/10.1080/19371910903240704>

and

“Using Name Lists to Infer Asian Racial/Ethnic Subgroups in the Healthcare Setting”

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3249427/>

6 - Conclusion

Providing the necessary resources for Asian elderly in a large and expensive city like San Francisco is vital for their population to thrive and receive the adequate care needed. Resources like language translation services, improved healthcare reporting for pan-Asian ethnicities, and many more can all help better care for all Asian elderly, not only in San Francisco, but all of the US. As we continue to learn more about what under-represented communities like the Asian elderly population in San Francisco need due to lack of resources and representation, it’s crucial for us to continue shining light on these issues through exploratory data analysis and publications for the betterment of a community.

Citations

Tsoh JY, Sentell T, Gildengorin G, Le GM, Chan E, Fung LC, Pasick RJ, Stewart S, Wong C, Woo K, Burke A, Wang J, McPhee SJ, Nguyen TT. Healthcare Communication Barriers and Self-Rated Health in Older Chinese American Immigrants. *J Community Health*. 2016 Aug;41(4):741-52. doi: 10.1007/s10900-015-0148-4. PMID: 26746205; PMCID: PMC4930414. <https://pubmed.ncbi.nlm.nih.gov/26746205/>.

Wong EC, Palaniappan LP, Lauderdale DS. Using name lists to infer Asian racial/ethnic subgroups in the healthcare setting. *Med Care*. 2010 Jun;48(6):540-6. doi: 10.1097/MLR.0b013e3181d559e9. PMID: 20421828; PMCID: PMC3249427. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3249427/>

Wooksoo Kim & Robert H. Keefe PhD and ACSW (2010) Barriers to Healthcare Among Asian Americans, Social Work in Public Health, 25:3-4, 286-295, DOI: 10.1080/19371910903240704 <https://www.tandfonline.com/doi/citedby/10.1080/19371910903240704?scroll=top&needAccess=true>