

The Opioid Epidemic in San Bernardino: Educational Material Interventions

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Abstract

The San Bernardino County opioid crisis in California consists of a relationship between socioeconomic, racial, and educational factors that highlight vulnerabilities to opioid misuse. This community-based study focused on implementing educational materials that address opioid misuse in San Bernardino. These educational materials were designed to raise awareness of prevention strategies among schools, healthcare providers, and the general public. Through a combination of outreach efforts and survey data, the effectiveness of Think Neuro's opioid educational pamphlets was evaluated. Results indicated an increase in opioid-related awareness and a reduction in stigma associated with opioid misuse. However, challenges such as differing accessibility to healthcare and information highlight the need for continued and focused public health strategies. This paper underscores the critical role of education in preventing the opioid crisis and recommends the expansion of these efforts to ensure more coverage and deeper community engagement. The ultimate goal is to reduce opioid misuse rates and their harms by empowering individuals and communities with the knowledge and resources necessary to make informed decisions.

Keywords

Opioid Epidemic, San Bernardino, Educational Interventions, Community-Based Approach, Health Disparities, Stigma Reduction, Opioid Misuse Prevention, Public Health Education

1. Introduction

The opioid epidemic remains one of the most pressing public health crises in the United States, characterized by widespread misuse of prescription opioids and illicit narcotics. Initially developed as potent analgesics for managing severe pain, opioids such as codeine, fentanyl, hydrocodone, and morphine have demonstrated significant risks when misused. Globally, more than 60 million people use opioids annually, and improper use—including exceeding prescribed dosages—substantially increases the likelihood of overdose and death [1].

Over 560,000 people in the United States have died from opioid-related causes since 1999, with an average of 130 deaths occurring daily [2]. Underrepresented and marginalized communities have been disproportionately impacted by the opioid crisis. For example, incarcerated Black individuals are less likely than incarcerated White individuals to receive medications for opioid use disorder, raising the question of racial bias or discrimination [3]. Black and Hispanic populations have also experienced rising rates of opioid dependency and overdose fatalities, often exacerbated by limited access to healthcare, education, and support services [4]. San Bernardino County, located in California, exemplifies the devastating effects of the opioid crisis. In 2021, the county reported 354 fentanyl-related overdose deaths, marking a significant public health challenge [5]. The interplay of economic challenges, insufficient healthcare infrastructure, and limited community awareness contributes to the region's vulnerability to opioid misuse [6].

Addressing the opioid epidemic requires a multifaceted public health approach that incorporates pharmacological treatments, behavioral therapies, and community-based education. Evidence-based medications, such as methadone, play pivotal roles in managing opioid dependency and preventing overdose deaths [7]. Meanwhile, behavioral therapies are essential for addressing the psychological factors that perpetuate substance abuse [8]. The cause for and response to opioid use disorder treatment including pharmacological and behavioral treatments varies by gender. For instance, buprenorphine treatment is particularly effective in females [9]. However, many individuals face significant barriers to accessing these resources, underscoring the importance of community outreach and education.

To combat the opioid epidemic in San Bernardino County, our study sought to provide educational resources tailored to the community's unique challenges. Through partnerships with local organizations and school districts, we collected baseline data on substance misuse and developed targeted educational materials emphasizing the risks associated with opioid misuse, available treatment options, and community resources. By empowering residents with knowledge and tools, our initiative aimed to mitigate the effects of opioid abuse and foster resilience within the community.

Understanding the multifaceted nature of the opioid crisis is critical to implementing effective interventions. Social determinants of health must be prioritized in public health strategies [10]. By addressing these factors, communities like San Bernardino can build sustainable solutions to combat the opioid epidemic.

2. Data and Methods

This research aimed to create effective, accessible educational materials on opioid abuse, informed by authentic data collection within the San Bernardino community. To assess baseline knowledge and awareness, pre- and post-surveys were developed with both multiple-choice and free-response questions. These surveys targeted individuals with limited English proficiency and those directly or indirectly impacted by opioid use. The instruments were designed to evaluate community awareness of substance abuse, gather opinions on opioid-related education, and identify gaps in accessible resources.

Primary data collection occurred from September 2023 to December 2023. Participants were recruited through direct outreach to opioid-related organizations, community centers, schools, and healthcare facilities in San Bernardino. Methods included email, phone calls, and social media campaigns. A \$5 incentive was provided to encourage survey completion. While this incentive improved response rates, we acknowledge it may have introduced response bias by attracting more informed or motivated participants.

The post-survey was distributed in January 2024, with final responses received by March 2024. Surveys were translated and distributed in English, Spanish, and Chinese to accommodate the linguistic diversity of the community. Participants provided informed consent, and responses were anonymized for analysis.

Statistical methods included both qualitative coding of open-ended responses and quantitative visualizations such as pie charts, bar graphs, and regression analysis. Low p-values across several response categories indicated strong statistical significance in changes between pre- and post-survey responses. This dual-method approach allowed for a comprehensive evaluation of changes in awareness and understanding after exposure to the educational materials.

2.1. Pamphlets

Based on insights from survey data, two bilingual educational pamphlets were developed to improve public awareness of opioid misuse, signs of addiction, detoxification symptoms, and available support services in the San Bernardino area.

Pamphlet 1 emphasized a text-based design, providing detailed written explanations on identifying opioid misuse, recognizing withdrawal symptoms, and accessing treatment options. It included a frequently asked questions section, emergency contact information, and local and national support services.

Pamphlet 2 featured a visual and narrative-driven layout, incorporating illustrated recovery stories, infographics on the physical effects of opioid abuse, and a decision-making flowchart for responding to overdoses. This design was intended to be more accessible to individuals with limited literacy or educational backgrounds.

Both pamphlets were distributed digitally and in print through community partners, including healthcare providers, rehabilitation centers, schools, and local businesses. The impact of each pamphlet was assessed through survey responses,

measuring changes in participants' perceived knowledge and reported likelihood of engaging in preventive or supportive actions. This dual format approach addressed a range of community needs by combining detailed information with accessible visual engagement.

2.2. Variables

Independent Variable: Existing education on opioid awareness

Dependent Variable: Gained awareness of support services and the opioid epidemic in San Bernardino County

Mediators

During the course of this research, we identified a range of mediators that can influence an individual's understanding of opioid awareness and how this awareness affects their access to addiction resources and support services.

Socioeconomic Status (SES)

Socioeconomic status (SES) reflects an individual's position within society, influenced by education level, income, and occupation. It plays a significant role in determining access to resources and opportunities, such as quality education, healthcare, and social networks. People with lower SES are more prone to chronic health issues and reduced life expectancy due to limited access to resources and increased stress.

Economic Stability

Economic Stability is closely linked to opioid abuse, with economically unstable areas experiencing higher rates of opioid prescriptions, abuse, and overdose deaths. Research shows that lower-income individuals are 2.1% more likely to abuse opioids compared to the general U.S. population [3]. However, not all low-income regions are equally affected, as some high-poverty areas, particularly in the South, experience less impact from the opioid epidemic. Economic distress, unemployment, and certain job types contribute to opioid abuse, but moving to more economically stable neighborhoods has been shown to reduce drug use.

Unemployment Status

Unemployment can lead to stress-related health problems and stigma, impacting mental well-being. Individuals facing unemployment might seek opioids to manage their stress, due to limited access to support. Normalizing opioid education is crucial, as it helps individuals make informed decisions and promotes healthy coping strategies. Ensuring accessible addiction treatment for all, including the unemployed, can prevent and address opioid addiction effectively.

Housing Stability

Individuals experiencing homelessness face disproportionately higher risks of opioid-related health issues and have less access to treatment compared to those with stable housing. Barriers such as competing life responsibilities, past trauma, and difficulties with healthcare access impede their engagement with opioid use disorder treatment. Improving education about opioid use disorder treatment for this population is crucial for better outcomes.

Race

San Bernardino County's diverse racial and ethnic composition—approximately 54% Hispanic or Latino, 14% Black or African American, and 26% white non-Hispanic residents—plays a crucial role in understanding how opioid use disorder (OUD) impacts different communities within the region [11]. The county also has one of the highest poverty rates in California, with over 15% of residents living below the poverty line, which compounds barriers to equitable healthcare access.

There is a notable racial disparity in OUD treatment, with African American and Hispanic communities disproportionately receiving methadone as their primary medication-assisted treatment, while white populations more frequently receive buprenorphine—a medication with fewer stigmas and greater treatment flexibility [12]. These differences are not merely clinical choices but often the result of structural inequities in healthcare access and provider bias. Moreover, Black patients are significantly less likely to be referred to or successfully connected with treatment facilities following emergency room visits or hospitalizations, perpetuating cycles of untreated addiction and health disparities [12].

Given San Bernardino's racial diversity and socioeconomic challenges, these systemic treatment disparities underscore the importance of community-based educational interventions that are culturally and linguistically accessible. The present study's focus on educational pamphlets and outreach aims to bridge gaps in awareness, no longer stigmatize opioid use disorder, and promote informed treatment-seeking behaviors in historically marginalized communities.

Age

Age is a key variable in opioid misuse education, as individuals aged 34 - 44 have the highest overdose-related death rates, and youths aged 15 - 24 show the largest increase in deaths [13]. With an aging population, opioid misuse among older adults is expected to rise due to comorbidity and pain-related issues [13].

Gender

Gender and minority status, particularly among LGBTQ+ populations, are key variables in opioid education, as these groups face unique challenges such as stigma and discrimination, contributing to higher rates of substance use disorders [14]. Specialized treatment programs for LGBTQ+ individuals have proven more effective than non-specialized ones [14], yet only 7% of programs offer such care [15]. The lack of cultural competency in healthcare exacerbates barriers to effective treatment [16]. Opioid education can help no longer stigmatize addiction and promote better treatment outcomes.

Sex

Sex is a variable in opioid use disorder, with men experiencing 2 - 3 times higher overdose mortality rates than women [17]. However, the gender gap is narrowing as more women and adolescent girls initiate opioid misuse [17]. This trend may relate to higher rates of depression and mood disorders in women [7], highlighting the need for targeted prevention strategies based on sex-specific risk factors.

Healthcare System

Opioid prescribing in the U.S. increased fourfold from 1999 to 2010, paralleling a rise in opioid-related deaths [18]. Many individuals with co-occurring mental health and substance use disorders remain untreated [18]. Barriers like geographical disparities, physician stigma, and inadequate training further hinder access to opioid use disorder treatment [18].

Education About Opioids

Opioid education plays a vital role in reducing stigma and promoting understanding of opioid addiction. The NIH found that education significantly improved attitudes towards addiction, helping communities view it as a brain disease rather than a personal failure. This shift encourages individuals to seek help without fear of public judgment [18]. Education also helps individuals recognize the risks of opioid misuse, empowering them to make informed choices during medical appointments and avoid peer pressure. Additionally, increased awareness aids healthcare providers in preventing overprescription and reducing the likelihood of addiction.

Substance Abuse

Substance use disorder (SUD), caused by recurring drug use, can be treated through therapeutic and medicinal interventions such as opioid agonists which mimic opioid effects without inducing euphoria. SUD is influenced by genetic predispositions, environmental factors, and interpersonal stress, which can also heighten co-occurring conditions like anxiety and depression.

Government Funded Programs

Government-funded substance abuse treatment programs, though essential, face challenges such as lengthy grant application processes and budget restrictions, which can hinder efforts to address the opioid epidemic. Additionally, reporting requirements may discourage organizations from seeking government support. However, programs like the Comprehensive Addiction and Recovery Act (CARA) have been successful, providing over \$181 million annually for opioid addiction treatment, law enforcement naloxone access, and response programs, demonstrating the positive impact of well-structured government funding.

Public Policy

Public policy plays a key role in addressing the opioid epidemic by regulating access to opioids and providing treatment and support. Policies can limit drug availability, create addiction recovery programs within the criminal justice system, and support communities through recovery. However, restrictive policies may also drive those already addicted to seek drugs from illegal sources, highlighting the need for policies that balance prevention with adequate healthcare and support for individuals currently battling addiction.

Area of Residency

Increased opioid usage is closely linked to area of residency, as racial and ethnic composition, along with social isolation, play significant roles. Marginalized adults in socially disadvantaged or isolated areas face a 5.5% higher risk of opioid use disorder [19]. Furthermore, while urban areas report higher rates of overdose

mortality and hospitalization, rural areas have seen rising opioid-related deaths over the past two decades, dispelling the myth that drug use disorders are primarily an urban issue [20].

3. Results

3.1. Educational Pamphlets

To evaluate the effectiveness of our educational pamphlets, we asked participants which of the two pamphlets they preferred. As shown in **Figure 1**, a large majority favored Pamphlet 1, the text-based design. Participants cited its detailed explanations and accessible language as particularly helpful. While Pamphlet 2 used infographics and narratives to enhance accessibility for those with limited literacy, its visual emphasis was less favored overall. This suggests that structured written content may resonate more with community members, especially when addressing complex topics such as opioid misuse. [21]

Participant Preference for Opioid Education Pamphlets

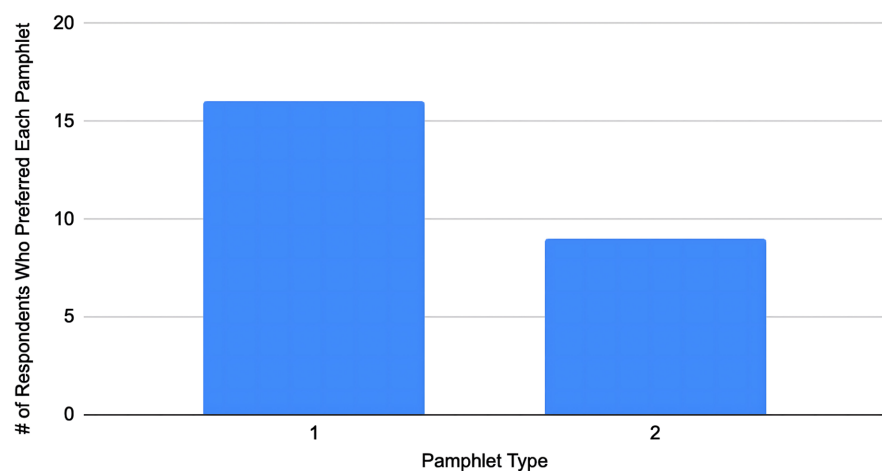


Figure 1. Bar graph-pamphlet preference.

3.2. Socioeconomic Status (SES)

Socioeconomic status (SES) plays a critical role in shaping health outcomes and access to resources, particularly in the context of opioid misuse and prevention. In our study, participants were surveyed to examine the influence of SES on the effectiveness of opioid education materials. Based on the statistical analysis conducted, SES was not found to be a significant factor in determining how individuals responded to the educational content provided. As shown in **Figure 2**, a linear regression analysis revealed an R^2 value of 0.0001614, indicating a negligible correlation between SES and the responses to the opioid education materials. Additionally, the logistic regression analysis yielded a p-value of 0.9063, further confirming that SES has no statistically meaningful impact on our study sample. While our data suggests that SES did not significantly influence outcomes within the scope of this project, this result may reflect limitations in survey representa-

tion rather than a true absence of correlation. To provide additional community context, **Figure 3** illustrates participants’ perceptions of homelessness as a contributing factor to opioid addiction. The bar graph highlights that a substantial portion of respondents view housing insecurity as intertwined with substance misuse.

		Regression Analysis		
		Chi-Square = 0.0138	df = 1	p-value = 0.9063
Coefficient	Standard Error	p-value	Odds Ratio	95% Confidence Interval
Socioeconomic Status	0.0416	0.9064	1.0424	(0.5216, 2.0833)
Constant	-0.0329	0.9882		

Figure 2. Regression analysis values of socioeconomic status.

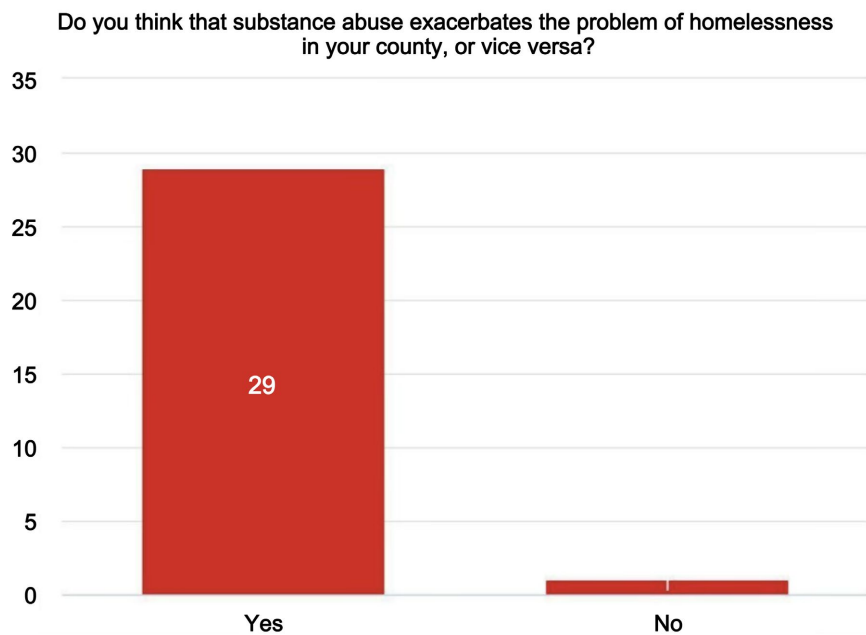


Figure 3. Bar graph—impact of homelessness on San Bernardino.

Figure 4 visualizes the distribution of SES scores among participants. The line graph underscores the lack of variability in SES-related outcomes, reinforcing the minimal predictive power found in our regression analysis. While our data suggest that SES did not significantly influence outcomes within the scope of this project, this result may reflect limitations in survey representation rather than a true absence of correlation.

In our study, although SES alone did not show significant predictive power, we retained a figure illustrating participants’ perspectives on homelessness and its relationship to opioid addiction. The inclusion of this bar graph reflects community concerns over overlapping social issues and suggests that socioeconomic hard-

ships—such as housing insecurity—are viewed by respondents as major contributors to the opioid epidemic.

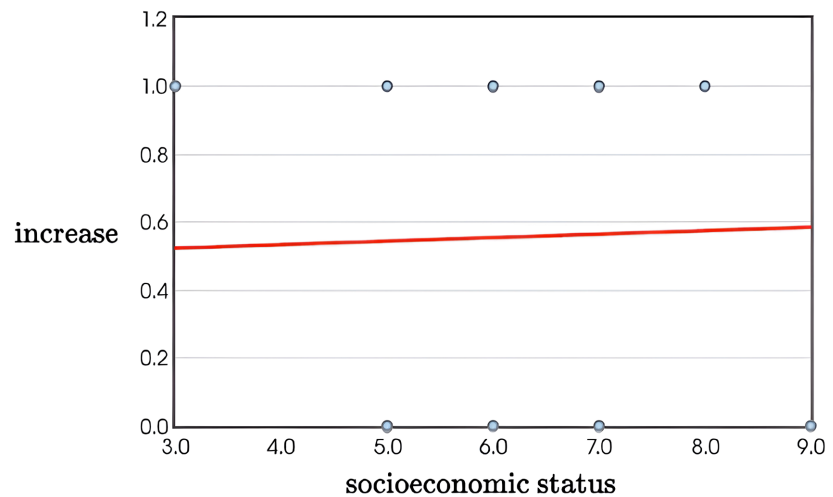


Figure 4. Line graph-socioeconomic status.

To better understand the nuanced role of SES in opioid education, future research should aim to improve participant diversity and response rates. Underrepresentation of individuals from lower-income or marginalized communities may have diluted the statistical power of our analysis. Strategies such as in-person engagement, follow-up communication, and enhanced participation incentives could improve the reach of future surveys and yield more robust data. Our project’s targeted distribution of free, credible opioid education pamphlets to these groups represents a foundational strategy toward mitigating disparities in awareness and prevention.

3.3. Public Welfare

In our analysis of public welfare concerns related to opioid epidemic education, we observed a strong relationship between awareness of the opioid crisis and the perceived threat to public welfare. The data was gathered from a survey that assessed respondents’ perspectives on the impact of opioid abuse on the well-being of their community.

To visualize these findings, we included two bar graphs. **Figure 5** displays the first graph, which reflects a unanimous “Yes” response from all participants when asked if the opioid crisis is a threat to public welfare.

Figure 6 displays the second bar graph, which highlights a significant disparity in community perception: 27 participants responded “No”, while only 3 participants responded “Yes” when asked if there are enough addiction treatment resources. This suggests a broad community concern regarding insufficient access to drug addiction resources.

To further quantify this relationship, we conducted a regression analysis to assess the statistical significance of opioid awareness and concerns about public wel-

fare. Although a figure is not presented for this regression model, the analysis revealed a statistically significant relationship ($p < 0.01$).

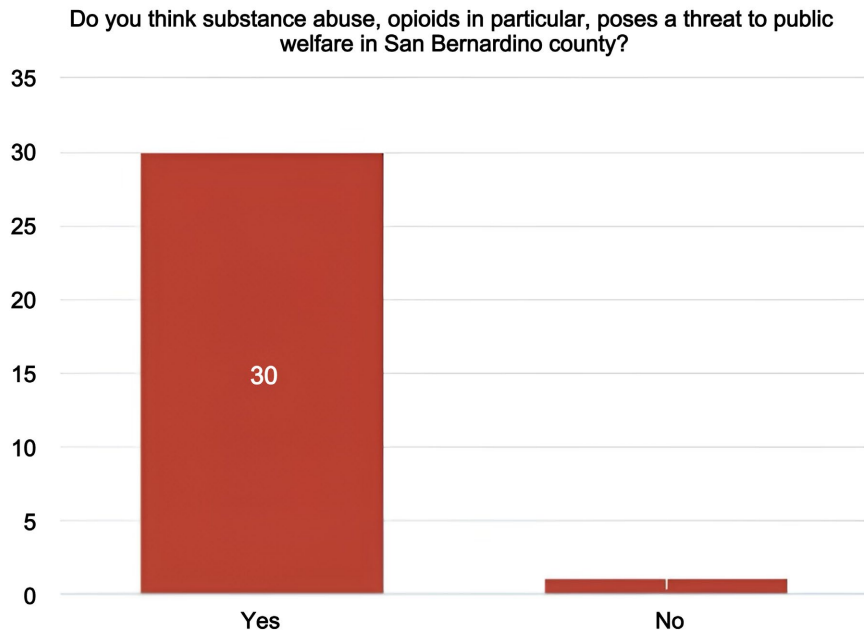


Figure 5. Bar graph—threat of opioids.

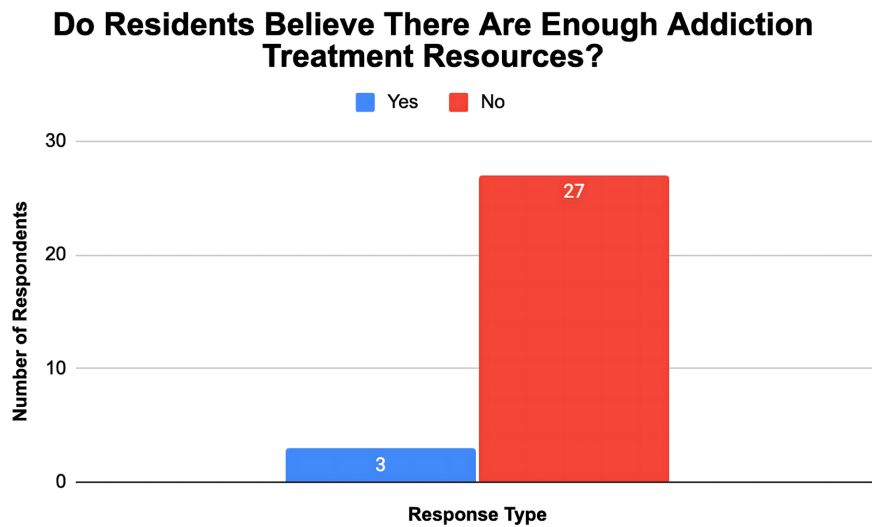


Figure 6. Bar graph—do residents believe there are enough addiction treatment resources?

The affirmative responses in both figures reinforce the urgency of educational and policy-driven interventions. This outcome aligns with literature emphasizing the need for localized, community-informed strategies in combating opioid misuse [22].

3.4. Known Victim of Opioid Abuse

To further investigate the impact of personal experiences on perceptions of opioid

education, we conducted a regression analysis that is summarized in **Figure 7**, focusing on individuals who reported knowing someone affected by opioid addiction. This analysis aimed to assess whether those with direct or indirect exposure to opioid misuse responded differently to educational materials—specifically Educational Pamphlet 2—compared to those without such experiences.

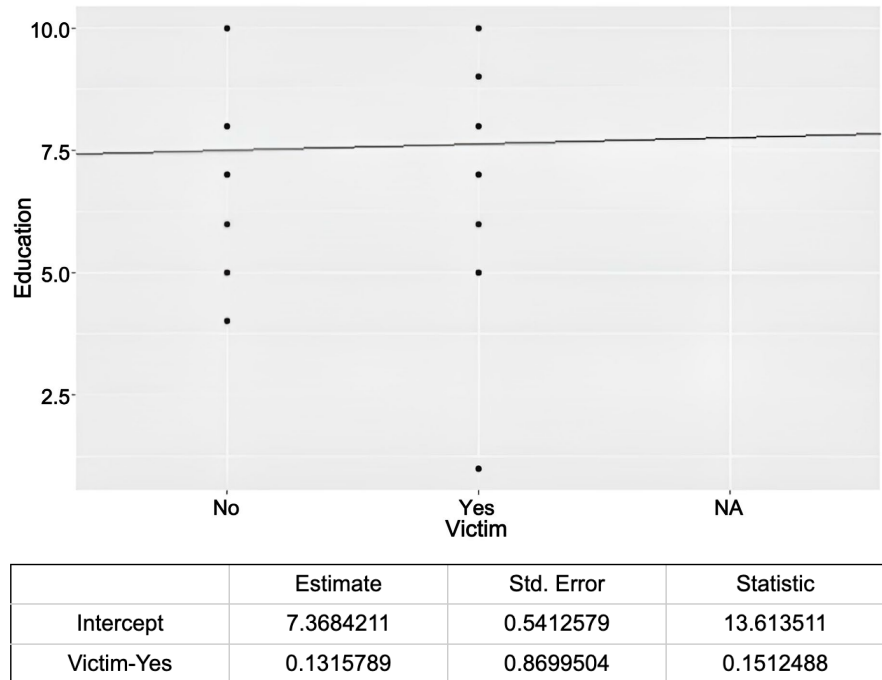


Figure 7. Regression analysis and results-known victim of opioid abuse.

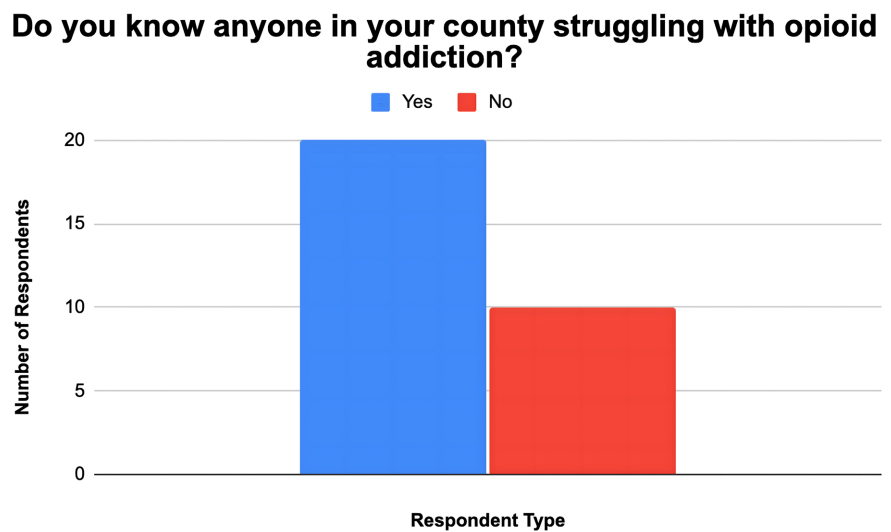


Figure 8. Bar graph—known victims of opioid addiction.

The results of the regression analysis revealed a statistically significant relationship between exposure to Pamphlet 2 and reported familiarity with someone currently struggling with opioid addiction. Although the p-value was highly signifi-

cant ($p < 0.01$), the model's explanatory power was minimal ($R^2 = 0.006$), indicating that knowing someone affected by addiction explains only a small portion of the variance in educational outcomes. While this suggests a weak statistical association, personal connection to opioid misuse may still shape how individuals engage with the educational materials in ways that are not captured by our model. To visually represent this connection, a bar graph in **Figure 8** was included showing participants' responses to the question: "Do you know anyone in your county currently struggling with opioid addiction?" Among the 20 respondents, 20 answered "Yes" and 10 answered "No". This figure emphasizes that a substantial portion of the surveyed population has personal connections to the opioid crisis, reinforcing the importance of targeted educational efforts.

Furthermore, individuals who responded "Yes" were more likely to report gaining meaningful insights from Pamphlet 2. These participants engaged more deeply with the content, likely due to personal relevance of the topic. The pamphlet not only provided factual information but also included supportive resources, which proved valuable to those who are either directly or indirectly affected by opioid misuse.

The data suggests that educational materials such as Pamphlet 2 are particularly impactful for individuals who have personal ties to the opioid epidemic. These findings signify the importance of tailoring public health communication to resonate with diverse audience backgrounds, particularly those communities most affected by the crisis.

3.5. Age

Age is a well-documented variable influencing opioid misuse, prescription patterns, and educational outcomes. To explore the relationship between age and effectiveness of our educational materials, both descriptive statistics and regression analyses were conducted.

			Regression Analysis			
			<i>Chi-Square =</i> 2.6205	<i>df =</i> 1	<i>p-value =</i> 0.1055	
Variable	Coefficient	Standard Error	<i>p-value</i>	Odds Ratio	95% Confidence Interval	
Age	-0.081	0.0661	0.2203	0.9222	(0.8102, 1.0497)	
Constant	1.6536	1.2485	0.1853			

Figure 9. Regression analysis-age.

In **Figure 9**, our regression model assessing the relationship between age and responses to Pamphlet 2 yielded an R^2 value of 0.005085, indicating a very weak correlation between age and self-reported opioid education following exposure to that pamphlet. While bar graph trends in **Figure 10** suggest older respondents had

more baseline awareness, the visual pattern does not translate into statistical significance and the role of age in predicting educational response should be interpreted cautiously. Pamphlet 2's visual format may not have resonated differently across age groups, and its impact was relatively uniform.

Age vs. Pre-Intervention Understanding of Opioid Abuse

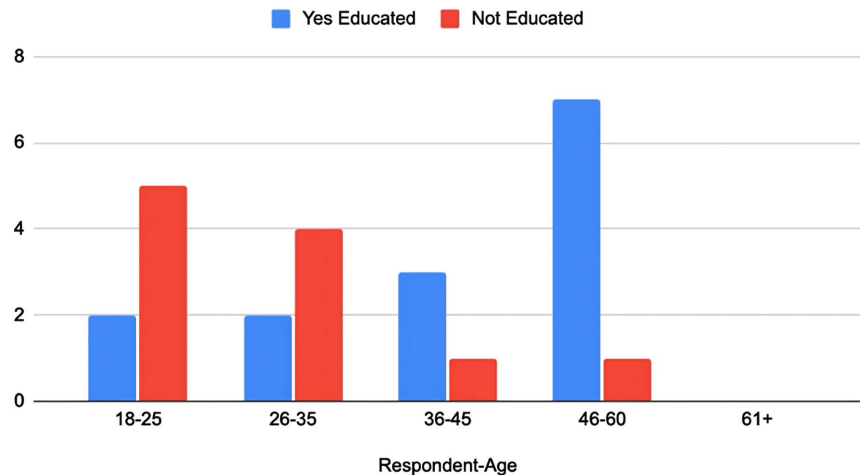


Figure 10. Bar graph—age and education on opioid addiction.

Educational Outcomes by Age Group: Comparing Pamphlet Interventions

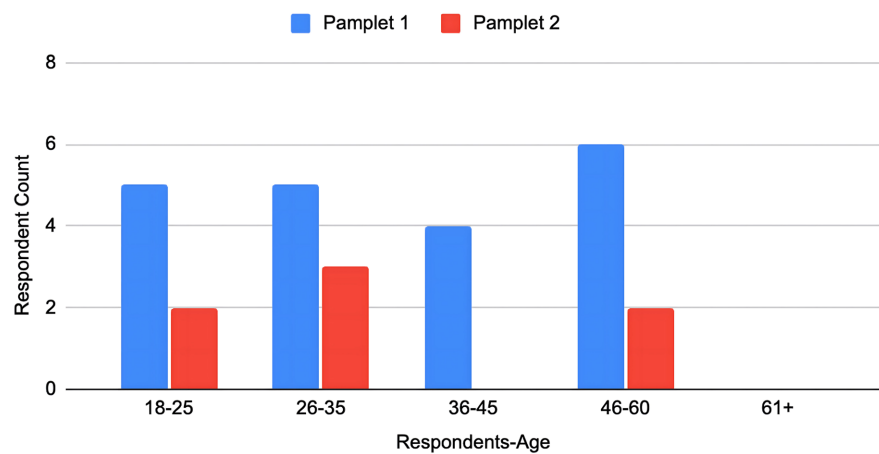


Figure 11. Bar graphs—age vs pamphlets.

However, when comparing baseline opioid education levels prior to pamphlet exposure, a bar graph analysis revealed that older respondents generally reported greater pre-existing awareness of opioid risks and resources. This finding aligns with external national trends: a study by Dufort and Samaan (2020) found that problematic opioid use among adults over age 50 rose from 1.1% in 2002 to 2.0% in 2014, a shift largely attributed to long-term opioid prescriptions for chronic pain.

In contrast, while opioid use disorder among adolescents has declined in recent

years, emerging research suggests that factors such as depression, peer influence, and media exposure continue to put this population at risk [23]. These opposing trends signify the need for age-specific educational interventions, as different age demographics face distinct vulnerabilities and levels of prior knowledge.

Further supporting this approach, we created a comparative bar graph in **Figure 11** that mapped respondents' age groups against their preferences for Pamphlet 1 vs. Pamphlet 2. Across all age groups, Pamphlet 1—focused on detailed written content about opioid misuse, symptoms, and support resources—was consistently rated as more informative and useful, particularly among older respondents. These findings suggest that content depth and clarity may be more effective than visual simplicity alone when educating diverse populations. While our regression model showed limited statistical correlation, the visual data from both bar graphs and respondent distribution analyses reinforce the importance of age as a contextual factor in opioid education strategy.

3.6. Race

Figure 12 displays a pie chart depicting the racial demographics of survey participants and indicates that 56% of respondents identified as Asian, with the remainder representing White, African American, Hispanic, and other racial identities. This comparison reflects a limited representation of certain racial groups disproportionately affected by opioid use disorder (OUD), which may influence the generalizability of findings.

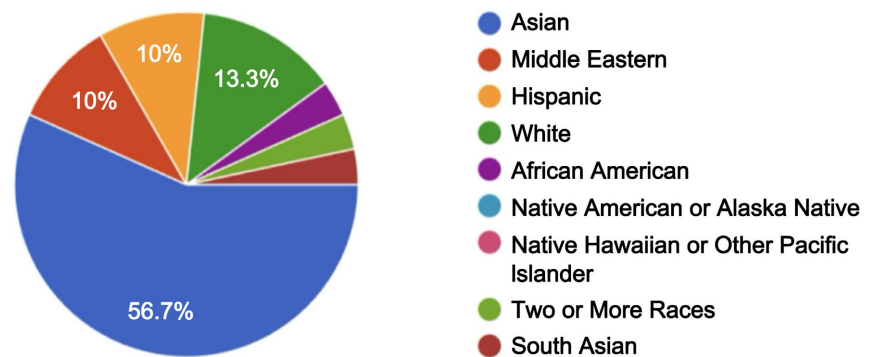


Figure 12. Pie chart—race.

To explore the relationship between race and opioid education outcomes, a regression analysis in **Figure 13** was conducted. The results did not yield a statistically significant correlation between race and education score change post-intervention ($p > 0.05$), indicating that within this sample, race alone did not predict knowledge gain. However, the underrepresentation of key marginalized groups, particularly Black and Hispanic individuals, may have limited the detection of such effects. It is also important to note that the regression model's R^2 was low, suggesting that additional social determinants and structural barriers not captured in the survey likely contribute to disparities in opioid knowledge and treatment access.

		Regression Analysis				
		<i>Chi-Square</i> = 1.664	<i>df</i> = 1	<i>p-value</i> = 0.2075		
Variable	Coefficient	Standard Error	<i>p</i> -value	Odds Ratio	95% Confidence Interval	
Race	2.11	0.5039	0.2203	0.0561	(0.772, 2.134)	
Constant	0.3306	0.2562	0.1853			

Figure 13. Regression analysis-race.

Numerous studies highlight that deep inequities in opioid treatment are access-based on race and geography. African American and Hispanic individuals are often limited to methadone-only treatment due to geographic and infrastructural constraints, while white individuals more frequently access newer alternatives such as buprenorphine [24]. These treatment gaps are compounded in rural areas, where access to healthcare facilities is sparse, and racially marginalized groups face compounded socioeconomic disadvantages. Data over the past two decades show a disturbing increase in overdose deaths among Black and Hispanic populations, particularly in rural regions where treatment options remain scarce.

In urban areas, where healthcare services are more concentrated, overdose mortality rates and opioid-related emergency department visits also disproportionately affect marginalized communities. Despite proximity to treatment centers, systemic barriers such as implicit bias in healthcare, insurance disparities, and language barriers continue to hinder effective care delivery. For example, recent studies show that Black patients are significantly less likely than white patients to transition from hospitalization to comprehensive opioid treatment plans [24], reflecting persistent racial disparities in both treatment quality and continuity of care.

These inequities signify the need for culturally competent education and treatment approaches. Educational materials must be tailored not only by literacy level and language, but also with sensitivity to cultural contexts and stigma. Pamphlets and outreach strategies should incorporate inclusive design principles to effectively reach racially marginalized communities and improve health literacy.

3.7. Gender

This study aimed to evaluate how gender and educational interventions influenced participants' understanding of the opioid epidemic. **Figure 14** highlights a female majority of 71% among our participants. Participants completed a pre-survey evaluating their baseline knowledge of opioid abuse, followed by a post-survey after receiving either pamphlet (text-heavy) or Pamphlet 2 (visual-based). **Figure 15** displays a line graph comparing male and female self-reported education scores on a scale of 1 - 10, illustrating the impact of each pamphlet and the gender-based response variation. **Figure 16** and **Figure 17** emphasize male and female education scores when viewing Pamphlet 1 and Pamphlet 2, respectively.

What gender do you best identify with?
31 responses

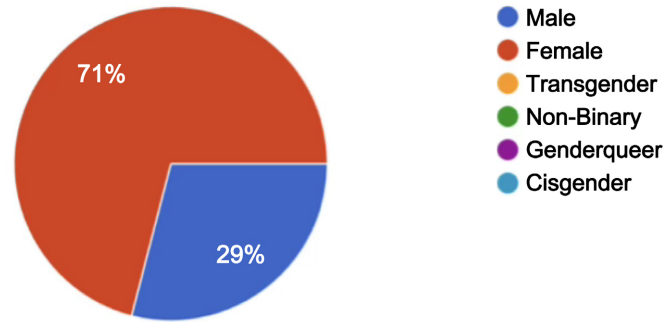


Figure 14. Pie chart-gender.

Self-Reported Opioid Education Scores by Gender

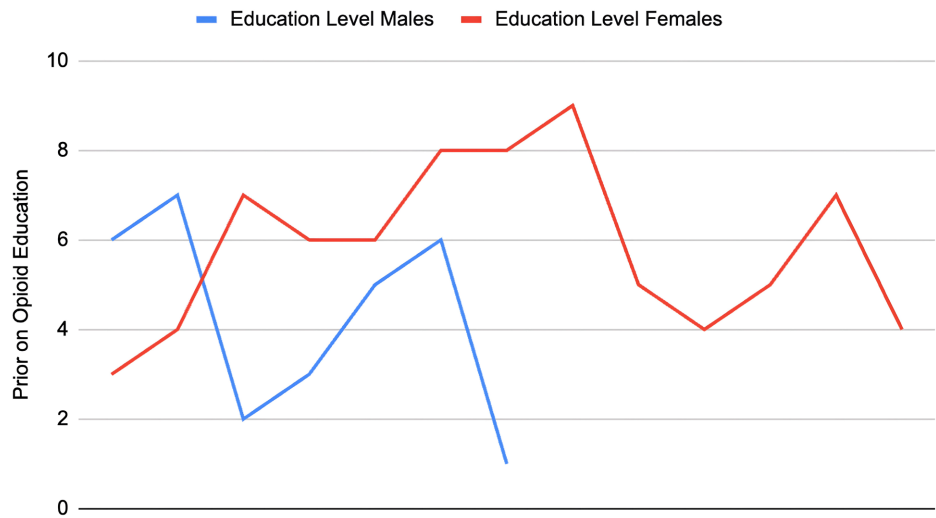


Figure 15. Line graph—self-reported pre-pamphlet education (Gender).

Impact of Pamphlet 1 on Opioid Awareness: Male vs. Female Responses

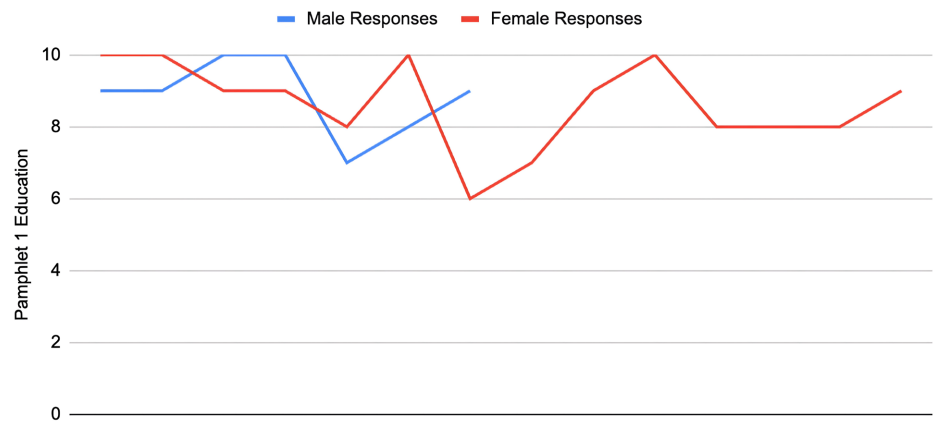


Figure 16. Line graph—impact of pamphlet 1 on gender.

Impact of Pamphlet 2 on Opioid Awareness: Male vs. Female Responses

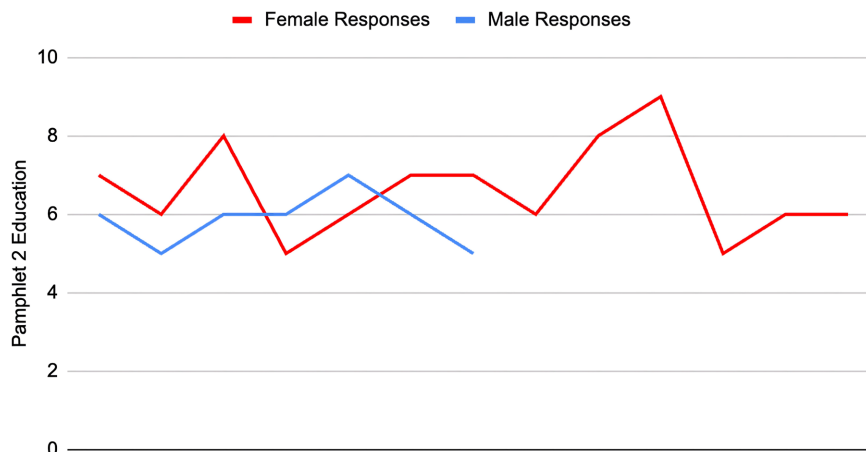


Figure 17. Line graph—impact of pamphlet 2 on gender.

			Regression Analysis			
			<i>Chi-Square</i> = 0.0375	<i>df</i> = 1	<i>p-value</i> = 0.2962	
Variable	Coefficient	Standard Error	<i>p-value</i>	Odds Ratio	95% Confidence Interval	
Gender	8.11	0.7718	0.0023	0.0672	(0.272, 1.172)	
Constant	-0.9747	0.9162	0.0075			

Figure 18. Regression analysis-gender.

Statistical analysis was performed using regression analysis to evaluate the relationship between gender and self-reported opioid education, as displayed in **Figure 18**. The results revealed a statistically significant relationship ($p < 0.01$), suggesting that gender does influence educational outcomes in opioid awareness interventions. However, the coefficient of determination ($R^2 = 0.0375$) indicates that while gender may be associated with differences in education outcomes, it explains less than 4% of the variance. Its practical impact may be limited, and results should be interpreted with caution. This finding suggests the presence of additional confounding factors—such as prior exposure to health education, cultural perceptions of drug use, or language barriers—which may also contribute to the observed outcomes.

These findings align with previous literature suggesting that gender plays a crucial role in drug education and treatment pathways. For example, Silver *et al.* (2020) emphasized that two infants are born every hour in the United States experiencing opioid withdrawal symptoms due to maternal opioid use—highlighting the specific vulnerabilities faced by women. Additionally, the co-prescription of opioids and benzodiazepines, particularly among women, increases the risk of overdose and adverse birth outcomes, and often reflects deeper structural inequi-

ties in care [16].

Healthcare disparities persist between males, females, and non-binary individuals, especially in how pain is assessed and treated. Women often report greater chronic pain but receive fewer opioids or face increased skepticism when seeking prescriptions [25]. This may influence how women interpret and engage with educational materials, potentially explaining their greater reported learning outcomes in this study.

4. Discussion

Think Neuro's research aimed to explore how the factors of age, race, sex, gender, and socioeconomic status contributed to the prevalence of the opioid epidemic.

Regarding age, the analysis showed that certain age groups were most likely to participate in opioid use disorder (OUD). Older adults, particularly those over 50, are more likely to overdose due to increased prescription opioid use, social isolation, and functional decline. Adolescents and young adults over the age of 18 overdose due to facing depression in addition to media exposure and peer pressure.

Race was a key factor when it came to OUD treatment: white populations who mostly populated urban areas were more likely to receive a variety of options for treatment and were successfully linked from hospitalization to treatment options, however, the marginalized communities of African American and Hispanic populations in rural areas were most likely to receive limited treatment due a lack of resources in these areas, and had higher rates of OUD.

Sex and gender were primary factors in analyzing OUD abuse: Men have typically participated in opioid misuse since their introduction and are more likely to die from OUD, yet recent research affirms how women are more likely to overdose and be assigned prescription opioids as they are more likely to suffer from depression and mood disorders, while also prescribed opioids for pain management during pregnancy. On gender, the LGBTQIA+ community has unfortunately been exposed to discrimination and harassment as most live in unsupportive communities, so many turn to opioids to resolve their mental conflict of unacceptance, which turns into addiction.

Although broader literature supports a strong relationship between low socioeconomic status and opioid-related harms, our results did not find a statistically significant correlation, reflecting limitations in sample diversity or measurement sensitivity. In turn, our results showed that there was a positive correlation between community factors and substance abuse based on communities with non-native English speakers and limited access to educational resources on drug health. Those with lower socioeconomic status not only had a lack of educational resources but also had a higher number of stressors due to poorer lifestyle conditions and were more prone to chronic disease, lower lifespans, and greater drug abuse.

Despite external evidence of SES influence, our data showed no statistically significant correlation. Similarly, age did not appear to affect responses to Pamphlet

2. Think Neuro prioritizes the goal of helping the San Bernardino area gain a greater understanding of the opioid crisis and the functions of opiates. Though socioeconomic status is linked to educational access, our results did not indicate a significant relationship between SES and responses to Pamphlet 2. In addition, while age was not a significant factor in responses to Pamphlet 2, future efforts should ensure age-inclusive outreach.

The purpose of our research was to find discrepancies in opioid treatment availability worldwide with a focus on the accessibility and changes surrounding opioid treatment in San Bernardino County. Based on past research, buprenorphine is given to prescribers based on a patient limit. The study projected that if clinics in San Bernardino County with lower patient limits filled their patient slots to reach capacity, more buprenorphine could be given [6], and more patients could be treated for addiction. The research described how many clinics in San Bernardino County are refraining from treating patients with buprenorphine. This correlates with our results, as African-American and Hispanic individuals are less likely to receive buprenorphine treatment [6]. Thus, our results correspond with previous research as there exists a significant correlation between racial discrimination and opioid treatment in San Bernardino County.

Prior research has indicated a strong relationship between one's age and awareness of the ongoing opioid pandemic. The youth of San Bernardino County are continually struggling with opioid misuse, especially those between the ages of 12 and 24. A research study conducted on individuals in this age range revealed that the knowledge youth gained from educational programs provided them with insight into the opioid crisis and decreased the stigmatization of the opioid crisis in their community [6]. Our results mirror this research as the majority of respondents professed their lack of education about the opioid crisis and its consequences. The research further provides insight into the power of educational awareness and its extent in decreasing the stigma surrounding opioid disorders.

One unexpected result from our study is the disproportionately higher rate of methadone treatment among African-American and Hispanic individuals, while white communities were more likely to access buprenorphine. This disparity likely reflects a combination of socioeconomic and geographic factors. Methadone treatment is historically more accessible in urban areas, where African-American and Hispanic populations are often concentrated. In contrast, buprenorphine is more commonly prescribed in suburban or rural areas with higher white populations. According to Kiang *et al.* (2021), the average driving time to the nearest methadone provider from a rural area is 12 minutes, compared to just 5 minutes in urban regions. In San Bernardino County, our findings align with this national trend—urban neighborhoods with higher minority populations show increased reliance on methadone clinics, while more affluent, predominantly white areas have greater access to buprenorphine providers. These findings have direct implications for our educational interventions. Culturally tailored messaging and strategic placement of resources are essential to ensure equitable access and engagement. Inter-

ventions must consider not only treatment availability but also the structural barriers that shape patient options across different communities.

With the increasing usage of opioids, an unanticipated result presents the difference in rates of prescribed opioids and death by overdose between men and women. In research conducted by the *Current Opinion in Psychiatry* journal, it was concluded that opioid overdoses have increased significantly in women. More so, they were twice as likely to be prescribed opioid analgesics in contrast to men. On the other hand, men were more likely to die from overdose by prescription compared to women. The reasoning behind this disparity comes from the fact that female bodies experience the pain-relieving effects of opioid painkillers at a slower rate than male bodies. As a result, women who use opioids experience the consequences of opioid misuse when personally medicating or are prescribed more opioids compared to men. These discrepancies in the pathways of opioids between different genders are indicative of a growing correlation, showing that gender plays a significant role in the use and effects of opioids.

While we aimed to consider key variables, several potentially confounding variables present in this study may have influenced our results, including mental health status of participants and prior exposure to opioid abuse education materials. Living with a mental health condition could affect how an individual engages with health education materials. Also, individuals who have prior exposure to opioid abuse education materials could have an established baseline of knowledge that affects how they view the opioid education pamphlets. The possibility of these pre-existing factors should be considered when pursuing further research on this topic and used as predictors when conducting regression tests.

Addressing the prevalence of overdose-reversing drugs like naloxone and the quality of drug overdose care is a limitation of this study. The presence of naloxone has greatly reduced overdose deaths; the abundance or lack thereof of naloxone in a facility should be added as another variable to observe. A public health study from 2023 demonstrated that naloxone greatly reduced the number of opioid overdose deaths, thus affecting how we perceive the specific variables: Is this group of people not overdosing because of the opioid education pamphlets or was there an abundance of naloxone and efficient opioid overdose care [26]? In addition, the presence of additional drugs that can amplify the effect of opiates, such as alcohol, may affect the amount of opioid deaths and the efficacy of the pamphlets.

Further research on the opioid epidemic may involve the assessment of OUD prevalence, treatment efficacy, and its differences within an urban or rural context. Investigating how urban neighborhoods with different socioeconomic conditions and healthcare access influence OUD characteristics could provide deeper insights than what was assessed in our study alone. Also, research can be conducted on how overlapping identities affect the accessibility and quality of treatment options. For instance, examining the unique challenges faced by African-American women in low-income urban areas versus those in rural settings could

highlight intersectional disparities in treatment access and outcomes.

The opioid epidemic caused an emotional rise in overdose passings, with fentanyl playing a key part. Over-prescription of painkillers in the past built reliance, and as controls were fixed, clients turned to cheaper, deadlier options. The emergency amplifies past passings, affecting families and communities. Unequal distribution sees higher rates among white, single, and those with a minimal educational background. Successful arrangements require a multi-pronged approach of avoidance, treatment, hurt diminishment, and law authorization.

The opioid epidemic has led to widespread mortality and community disruption, altering the lifestyle of individuals and leading some to overdose on their over-prescribed drugs. Many factors including access to education, different genders, race, and socioeconomic status display a strong sense of how populations are capable of becoming addicted to these opioids. Healthcare professionals, among others, have the power to prevent the spread of opioid addiction and put an end to the misuse of these drugs. Increasing the accessibility of certain resources can educate populations about the dangers opioids pose and spread awareness of the severity of this crisis. These steps may be able to decrease addiction rates significantly.

While the use of a \$5 incentive and recruitment through opioid-related organizations enabled efficient data collection and community engagement, these methods may have introduced selection bias by disproportionately attracting individuals already engaged with or aware of opioid-related issues.

To mitigate this bias in future research, broader outreach methods—such as random sampling within San Bernardino County, partnerships with neutral community hubs (e.g., public libraries or faith-based organizations), and stratified sampling strategies to ensure demographic diversity—could help ensure a more representative sample. Additionally, limiting or varying the use of incentives and conducting follow-up studies in unrelated community settings may further reduce potential bias.

To conclude, this study demonstrates the correlation between socioeconomic status and opioid misuse. Several mediating variables affect this correlation: education, access to resources, occupation, income, and more. Additionally, gender and race are variables that determine how minority populations are particularly vulnerable to opioid misuse and opioid use disorders. Cultural competency within healthcare and public education is necessary to prevent the propagation of stigmas and spread awareness about the opioid epidemic.

5. Conclusions

The regression model highlighted a weak negative relationship between Pamphlet 2 Response and age, suggesting age had little impact as a mediator on how individuals responded to opioid education material and underscores the importance of having effective education to deal with opioid usage. Yet, the external research highlighted age as a critical aspect of opioid use. As a progressing number of older

adults require opioid treatments due to chronic pain, there is frequent exposure to prescription opioids that contributes to the high rates of usage. On the contrary, younger generations' exposure to opioids is an effect of peer pressure and social media influence. Ultimately, emphasizing the need for educational interventions to address these groups' risk factors might pose a comprehensive approach to the opioid crisis.

Gender plays a significant role in the factors of drug prescription, management, and symptoms. Regarding women, the process of reproduction is heavily impacted by substance use, with birth defects seen to stem from a combination of anti-anxiety benzodiazepines and pain-relievers, especially when coupled with the result of social and economic disparities. The importance of gender is also apparent in the development of treatments and the diagnosis of symptoms, as mental health conditions and levels of pain are attributed to biological differences between males and females. In a study by the Kansas Board of Pharmacy, it was found that 65% of women are more likely to have a lifetime usage of opioids, with the age groups of 50- and 60-year-olds holding the highest percentage of over-doses. This pattern in women is similar to the observations by Curr Opin Psychiatry, who stated that opioid-related overdose increased in women more significantly than in men, aligning with the fact that women are about twice as likely to be prescribed opioids compared to men. Concerning symptoms, women are more likely to experience pain from opioid use, causing them to continue to use opioids to relieve the pain repeatedly. However, it was found that men are more likely to suffer from opioid overdose compared to women, at approximately 2 - 3 times a greater rate, cited from a study led by Dr. Eduardo Butelman, M.D., and his colleagues. It is also important to recognize the disparities among the transgender population, as drug use was 3.6 times greater in transgender people in comparison to cisgender people. Especially within youth, this drug use is considered to be the result of societal and psychological stress, anxiety, and depression. A numerical linear regression comparing responses from Pamphlets 1 and 2 regarding gender was conducted.

According to the data, the spread of the opioid epidemic was largely distinct between citizens, depending on their socioeconomic status. Considering income, education, housing, and occupation, certain families were highly affected by the opioid epidemic. Families with lower-income jobs and a lower socioeconomic status were likely to receive less education about the dangers of opioids. This would lead to frequent misuse of opioids, leading to addiction, and a rise in opioid cases. On the other hand, people with prestige who are capable of receiving education regarding the usage of opioids have a greater awareness of the dangers related to opioids. Although our survey showed no significant impact of socioeconomic status on the opioid epidemic, educating younger generations remains essential to combating the crisis. Through a successful relationship between socioeconomic status and people, a greater number of people involved in a survey would be needed to recognize the accurate impacts of the opioid epidemic. Survey analysis

indicated no statistically significant correlation between socioeconomic status and responses to Pamphlet 2. Socioeconomic status was not found to be a significant factor in the education of the opioid crisis according to those who responded to the survey. A logistic regression model is used to predict the probability of a discrete outcome given an input variable and socioeconomic status. The data indicated that socioeconomic status was not meaningful and findings were made by chance but research shows that socioeconomic status plays a large role in opioid education, in addition to health awareness. The data from the pamphlets also depict that individuals consistently ranked socioeconomic status as a factor in opioid education.

Our hypothesis recognizes the impact of multiple mediators directly involved with the opioid epidemic, including age, race, gender, and socioeconomic factors. Our results confirmed that race impacts the opioid epidemic, hence supporting our hypothesis. There is a relationship between the education received by different races regarding opioid use and opioid usage by race. Under-resourced groups including African-American, Hispanic, American Indian, and Alaskan Natives were all found to have a higher probability of opioid overdose deaths, possibly due to less access to services. This inaccessibility was noted, with our results finding that white communities were more likely to use buprenorphine to treat opioid abuse as compared to methadone, which is typically administered in African-American and Hispanic communities. Therefore, when prescribed methadone, African-American and Hispanic individuals are more likely to get addicted. However, evidence from the study indicated no correlation between age and “Pamphlet 2” responses from the San Bernardino community, indicating that age is an insignificant factor in the study of the opioid epidemic. Past literature has unanimously agreed that older individuals tend to have difficulty with opioid substance use. Our studies involved only a sample size of individuals in San Bernardino County; thus this factor needs to be explored more with a larger sample size to determine if age is a significant factor in the opioid crisis. Education also plays a significant role in the crisis as there is a direct relation between educated communities and their level of opioid misuse. The more education and awareness a community receives, the less likely they are to be heavily involved in the opioid drug crisis. In regards to gender, our research concluded that women have a higher chance of getting addicted and struggling to quit. According to results from this study, women feel pain more easily and are prone to psychological disorders, such as depression. Also, if a woman is pregnant and addicted to opioids, their children are likely to bear an addiction to opioids due to epigenetic marks. Our results also found that a discriminatory lack of support for the LGBTQ+ community has led to opioid overuse among individuals in the LGBTQ+ community. Our outreach data gathered regarding socioeconomic status did not have significance; however, educational interventions in other studies were found to have a key impact on preventing opioid abuse. Therefore, factors such as sex, socioeconomic status, and race are intertwined with the opioid drug crisis, but age requires further research.

The opioid epidemic in San Bernardino County has increased over time with a vast majority of individuals experiencing addiction or opioid-related deaths. Thus, educational pamphlets were created and distributed as a means to increase awareness of the opioid crisis. The impact and the correlation of such accessibility to educational resources were then studied based on various demographic factors.

Overall, this drug abuse is correlated with and has an association with the demographics of an individual, specifically in the interconnected fields of socioeconomic status, age, race, and gender. In regard to one's socioeconomic status, individuals who are most impacted are those who lack access to education and resources regarding the effects of opioid usage. Because higher education leads to financial stability via job opportunities, individuals can acquire an awareness of the issue and afford the healthcare necessary to treat repercussions from usage. Additionally, people of all ages in San Bernardino are affected by the crisis to various degrees. Middle age and younger demographics tend to be more concerned with societal expectations, such as job security, financial (socioeconomic) means, and/or peer pressure. On the other hand, the elderly population typically deals with chronic pain, and opioids tend to be prescribed as a pain reliever that develops into abuse/addiction. Thirdly, one's race also exacerbates the opioid crisis, specifically marginalized groups like African Americans and Hispanics. Due to racial biases as well as the lack of cultural competence in healthcare, disadvantaged groups are not prescribed proper medication; their pain levels are underestimated causing several individuals to seek drugs as a form of pain management/relief. As a result, there is a disparity between nonwhite and white populations. Nonwhite groups are more likely to die from opioid usage. Lastly, women are more likely to abuse opioids than men as a means of managing pain, specifically during and after childbirth, resulting in different treatment plans. This disparity calls for more cultural competency and gender sensitivity as a means of tackling the problem, not the people.

With these demographics in mind, educational pamphlets were distributed to the San Bernardino residents, specifically teens in high school, patients in rehab centers, students in University centers, and patients in hospitals. Given the minimal correlation between age or socioeconomic status and responses to the pamphlets, it can be inferred that the materials were accessible and understandable to a broad audience; the education and resources provided could be read by a person of various ages and socioeconomic backgrounds.

However, it is important to note that despite the accessibility to such pamphlets, sampling bias may have been a present flaw in the survey methods used. The surveys provided cash incentives and were distributed to individuals who were already in facilities catered towards opioid abuse; thus, moving forward, incentives should be removed to consider the opinions of outsiders and possess a truly random sample that minimizes bias. It is important to implement such pamphlets as a means of raising awareness, catering to demographics that are most impacted, and implementing preventive methods via accessible education to decrease the

death rate and addiction associated with opioids and their prescription. With further research and intervention, encouraging the education, awareness, and accessibility of resources that target such individuals can aid in the destigmatization of opioid abuse in marginalized individuals and disadvantaged populations.

Currently, our research focuses on the role of age, socioeconomic status, race, and gender in terms of educational outreach about the opioid epidemic in San Bernardino County. As we analyzed our results, we recognized certain areas that required further analysis to gain an accurate understanding of the opioid crisis and how to effectively educate the community of San Bernardino County.

An area that prompts further research is addressing barriers to treatment access to improve outcomes. Additional research is needed to understand social determinants of health, including education, and how education is associated with higher rates of opioid misunderstanding and overuse, access to healthcare facilities, and overall treatment. An educational background impacts an individual's understanding of the risks associated with opioid use, as well as the accessibility of treatment centers in case of overuse or overdose. Further research into understanding the kind of discrimination individuals are experiencing based on their race, sexual orientation, gender, or ethnicity can provide a broader understanding of how this type of mistreatment can exacerbate mental health issues and stigma. Individuals in difficult and unstable housing situations are largely misunderstood, as their circumstance increases their risk of opioid misuse.

Furthermore, a multidisciplinary approach is needed to effectively mitigate the effects of the opioid epidemic crisis. This prompts further research analyzing the clinical implications of medications as well as therapies for opioid use disorders. Research analyzing education regarding these therapies and medications, stigma within populations, and cultural competency in healthcare must be studied to influence policy and systemic changes. While prior research highlights significance, this study did not find significance for the correlation between education and the opioid crisis and socioeconomic status. Age as a variable also indicated close to no correlation to education of the opioid crisis. Future studies could expand research by sending surveys to more organizations within San Bernardino County. Furthermore, pursuing a national-level study could highlight trends within specific populations notably rural and low-income communities. Analyzing health literacy within these communities can call attention to systemic failures or inadequacies that must be addressed. Our study found that a majority of individuals believe that their local government and community organizations are inadequately addressing the opioid epidemic. Focus groups following up on these responses would determine the specific shortcomings of current policies and awareness of these policies. In response, targeted policy changes should include expanding access to naloxone by making it available over-the-counter at pharmacies and implementing statewide standing orders. Additionally, policies must focus on increasing funding to expand clinic capacity for substance use disorder treatment, particularly in under-resourced and high-need areas like San Bernardino.

Therefore, systemic barriers that may deter individuals from getting the care they need must be analyzed.

Beyond this, it is valuable to analyze the role preexisting mental and physical health conditions play in the opioid epidemic. It would be beneficial to conduct research to gain data on the number of people with OUD who report being diagnosed with another illness prior to using opioids. Hence, based on such results, it would signify the importance of specifically targeting populations with certain pre-existing conditions and their families with educational materials containing their risk of developing opioid use disorder. Such data can be collected through similar surveys, requiring individuals of San Bernardino County currently experiencing OUD to report comorbidity. Alternatively, to gain more accurate information we can contact local hospitals, clinics, and rehabilitation centers and gather data on the number of patients with opioid use disorder also presenting with another condition. Another factor of the opioid use epidemic we can further investigate is the genetic influences of opioid use disorder. Research has shown that certain genes code for opioid receptors and neurotransmitters that cause some to be more susceptible to opioid use disorder (“Opioid addiction”). Conducting research for this area in particular would require collecting DNA samples of those with OUD, and testing for any noticeable similarities in their genomes to determine the role of heredity in the opioid epidemic. Such data collection would require further funding, resources, and the involvement of professionals, however, it would be useful to gain a proper scope of genetic influences in this epidemic. Based on the results, if it is deemed that genes play a vital role in the development of OUD, research can focus on developing and spreading educational materials on the importance of genetic testing, and how it can measure one’s genetic predisposition to being more susceptible to drug abuse disorders.

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Contributions

A. R. A (Andrew Ryan Adachi) contributed to outreach through emails, wrote parts of the discussion, and analyzed variables.

S. G. (Sanvi Gupta) contributed to outreach efforts to San Bernardino non-profit organizations through email correspondence & to the creation of educational infographics on opioid abuse prevention. She also contributed to writing the culminating opioid education research paper's literature review, bibliography, discussion and conclusion sections.

T. K. K. (Tanishka Kaur Khanduja) did outreach with San Bernardino organizations and individuals via email, gathered and collated survey data, drafted the literature review, conclusion, as well as the discussion sections of the paper, described the variables being studied, and participated in the statistical analyses of the paper. She created infographics and participated in brainstorming activities related to socioeconomic status and how it correlates to our project.

A. S. (Aanya Sheno) Contributed to outreach efforts to rehab centers through creation of educational infographics and email outreach. They also contributed to writing the literature review, and discussion.

M. P. (Mahi Patel) contributed to the introduction of the literature review and worked on educational infographics

L. M. P. G. (Lorena Margarita Piche Garcia) contributed to outreach efforts to San Bernardino organizations through emailing & working on educational infographics & contributed to the abstract, introduction, methods, and results of the literature review.

D. S. (Dhruv Suresh) contributed to outreach efforts to San Bernardino organizations with infographics and emails, and contributed to the literature review on the impact of educational interventions on the opioid epidemic, as well as the data, variables, and statistics sections.

B. W. (Bill Wang) contributed to outreach efforts to San Bernardino organizations with infographics and email correspondence, and contributed to the bibliography, discussion, and conclusion of the literature review.

T. B. D. (Tiffany Bao-Tram Do) contributed to outreach efforts to organizations in the San Bernardino area through mass emailing. She also helped draft the discussion and conclusion of the opioid education paper.

A. Y. (Anna Yan) contributed to outreach efforts to San Bernardino organizations by sending frequent emails, creating educational infographics, and contrib-

uting to the results section of the literature review.

A. R. (Avigail Remias) contributed to the creation of infographics, conduction of research to address/combat the challenges associated with the opioid crisis, and implemented a comprehensive survey initiative within the San Bernardino health community, utilizing both email and phone outreach strategies.

E. J. (Edwin Joshy) Contributed with outreach efforts to numerous organizations in the San Bernardino Valley through email and cold calling, as well as producing personal drafts for discussion, variables, results(race) and conclusion sections of the paper.

A. S. (Arjun Shah) Contributed to outreach efforts to various San Bernardino organizations through email correspondence, as well as writing the Statistical Analysis, Conclusion, and Discussion sections of the paper.

E. F. (Elizabeth Fishman) contributed to outreach efforts to various San Bernardino organizations through email correspondence, as well as writing the Statistical Analysis, Conclusion, and Discussion sections of the paper.

G. E. S. (Giselle Eger-Slobig) contributed with outreach efforts to San Bernardino organizations by sending emails to organizations and schools, creating infographics, and contributing to the conclusion section of the paper.

M. C. U. (Maxwell Chibuike Ugochukwu Jr.) contributed with vigorous outreach with various organizations in the San Bernardino Valley via email updates and helped to develop discussion and results (race) sections for the project report.

B. Y. (Brian Yee) contributed to outreach efforts to local organizations in San Bernardino through email correspondence. He also contributed to efforts in drafting the literature review and bibliography.

M. V. (Michelle Vu) contributed to outreach efforts to various San Bernardino organizations through frequent email correspondence, creating education infographics, and contributing to the abstract, introduction, methods, discussion, results, conclusion, and bibliography of the literature review.

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I. C. D. (Isaac Collin Domingo) contributed with outreach efforts towards several medical centers in San Bernardino County via email and phone calls, as well as contributed to the written portion of discussion.

A. F. P (Akshar Falguni Patel). Contributed with collecting survey data and outreach efforts towards various nonprofits and medical centers in the San Bernardino County via email and phone calls. Contributed to the written portions of the literature review and introduction.

R. S. S. (Raquel Simas Silva) Assisted with outreach to organizations in the San Bernardino region by coordinating email communications and tracking responses. Contributed to writing the discussion and conclusion sections of the opioid education manuscript.

A. B. (Ajooni Behl) assisted with outreach efforts through consistent communication with San Bernardino organizations to address barriers for accurate information and accessibility regarding opioid education. Contributed to written portions of the literature review, results portion for socioeconomic status, and the abstract.

T. C. (Tahira Chaudhary) Assisted with the outreach of the San Bernardino County opioid epidemic by emailing shelters and organizations to spread awareness and communication of the epidemic. Contributed to the conclusion of the Opioid Epidemic paper.

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Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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Anna Yan	Northwood High School	N/A	Irvine, CA	USA
Avigail Remias	University of California, Berkeley	Integrative Biology	Berkeley, CA	USA
Edwin Joshy	Oakmont High School	N/A	Roseville, CA	USA
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