A Review of Community-Based Interventions and Educational Initiatives for Overdose Prevention & Treatment for Opioid Use Disorder in the United States

Sachi Kulkarni
Bachelor of Science in Public Health
Special Departmental Honors
Department of Public Health
School of Human Ecology
The University of Texas at Austin
May 8, 2024

Sonia K. Gonzalez, DrPH
Department of Public Health
Supervising Professor

Kasey Claborn, PhD
Steve Hicks School of Social Work
Department of Psychiatry, Dell Medical School
Second Reader

ABSTRACT

Author: Sachi Kulkarni
Title: A Review of Community-Based Interventions and Educational Initiatives for Overdose Prevention in the United States and Proposed Areas of Further Study
Supervising Professor: Dr. Sonia Gonzalez, DrPH
Second Reader: Dr. Kasey Claborn, PhD

Opioid use disorder (OUD) is a major health challenge facing the United States today, with 80,411 people dying from opioid-involved overdoses in 2021, accounting for 75.4% of overdose deaths. OUD disproportionately affects American Indian/Alaska Natives, people who live in rural areas, and young people ages 18-25. Each of these groups requires a distinct approach to reduce overdose deaths and OUD. This literature review included 22 papers to elucidate the specific aspects of successful community-based interventions and educational initiatives for overdose prevention deployed in the United States. Cultural sensitivity, peer involvement, and advancements in technology such as telehealth were found to be crucial next steps and key aspects of successful interventions.

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Introduction and Background

The "Opioid Epidemic"

The United States is currently in an "opioid epidemic", earning the name both because of the class of drug prompting this crisis as well as the widespread impact the crisis is having on the country as a whole. Opioids are classified as depressants, a class of drugs which includes heroin, prescription-strength painkillers such as fentanyl, codeine, and morphine, and tranquilizers such as carfentanil.[1] Ingestion of high amounts of these substances can lead to euphoric effects on which a person can become dependent, leading to opioid use disorder (OUD). Overconsumption can also lead to potentially fatal reactions such as severe respiratory depression or, eventually, coma or death due to overdose.[2] An opioid use emergency has been in effect since its declaration in 2017, but this health concern did not begin then; the current emergency is contributed to by three separate waves of events that led to opioid overprescription and use. The first wave began in 1999, with increased marketing and prescription of opioids, increasing overdoses due to prescription opioids. The second wave came in 2010, with increased heroin use. The third wave began in 2013, largely due to illicitly manufactured fentanyls (IMFs) contaminating the supply of heroin, counterfeit pills, and cocaine, among others.[2] Currently, a "fourth wave" is being formed in the U.S., spurred on by potent illicit fentanyl, fentanyl analogs such as carfentanil, and increased stimulant use such as cocaine and methamphetamine.[3]

Drug overdoses are currently the leading cause of death for Americans ages 18 to 45, and according to the Centers for Disease Control and Prevention, the age-adjusted drug overdose death rates involving fentanyl, methamphetamine, and cocaine increased from 2016 to 2021.[1,4] Fentanyl, a synthetic opioid 50 to 100 times more potent than heroin or prescription opioids, is

primarily responsible for this, with just 2 milligrams of fentanyl proving lethal. Illicitly manufactured fentanyl can contaminate heroin, cocaine, and other street drugs with little to no visual differences from the pure versions of these drugs in order for drug traffickers to increase dependency on fentanyl and increase profit.[2] Out of all drugs analyzed, fentanyl was involved in the highest rate of drug overdose deaths in people aged 25 to 64.[5]

For individuals outside of metropolitan areas, i.e. rural areas, deaths due to drug poisoning, including opioids, are higher than in metropolitan areas. Nonmedical usage of drugs is also more prevalent, as well as the rate of use of opioid analgesics. Surveys indicate nonmedical use of prescription opioids by adolescents is also higher in rural areas.[6]

Given this information and the widespread impact of opioid use and substance use disorder (SUD) on the population, particularly people ages 18 to 25, interventions and educational initiatives are needed in order to educate the population about opioid use, encourage those who wish to enter recovery to pursue treatment, and slow the epidemic as a whole. Additionally, access to naloxone, an opioid overdose reversal medication, as well as education on its usage is critical in reducing fatalities due to drug overdoses.[4]

Depictions of Opioid-Involved Mortality in the United States

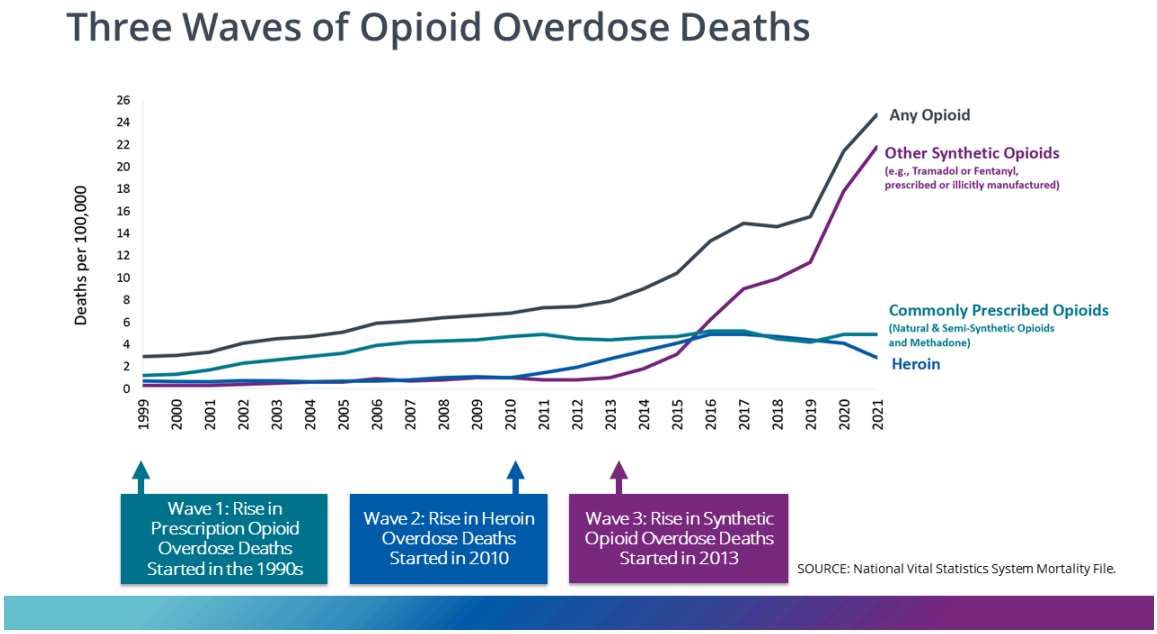

Figure 1. A graph of the three waves of overdose deaths in the United States, 1999-2021. *Centers for Disease Control and Prevention.*[2]

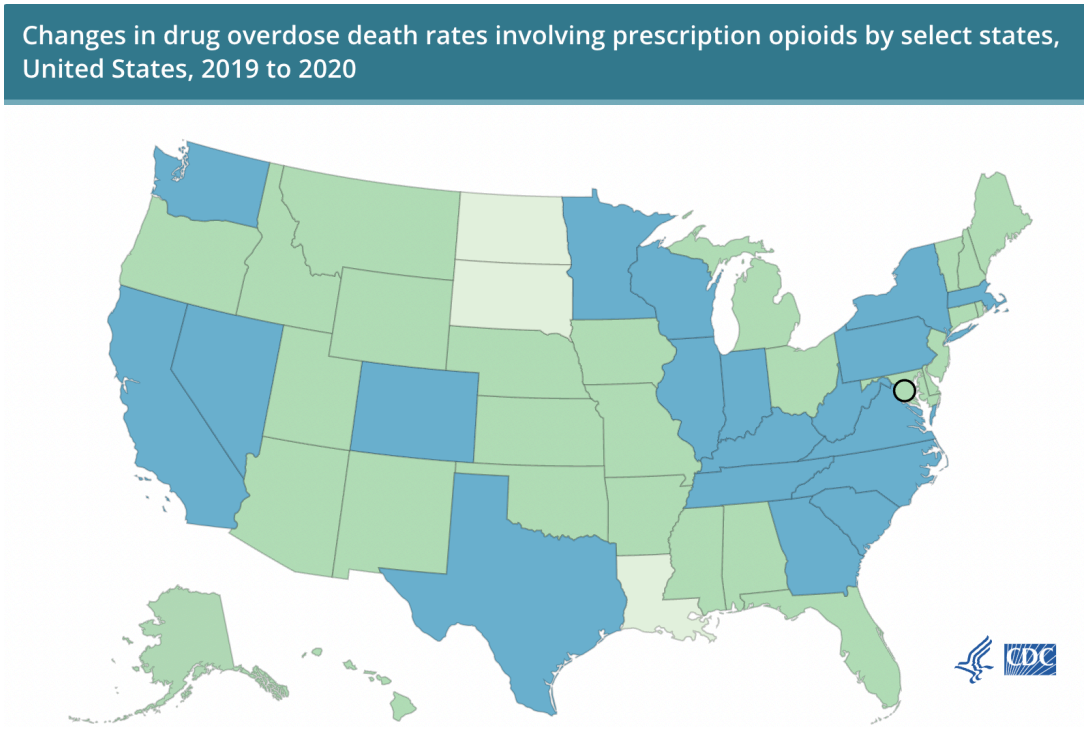

Figure 2. Map of increase (blue) or stability (green) in overdose death rates involving prescription opioids in select states, 2019 to 2020. States colored in light green were

excluded from the study due to inability to meet criteria. *Centers for Disease Control and Prevention.*[7]

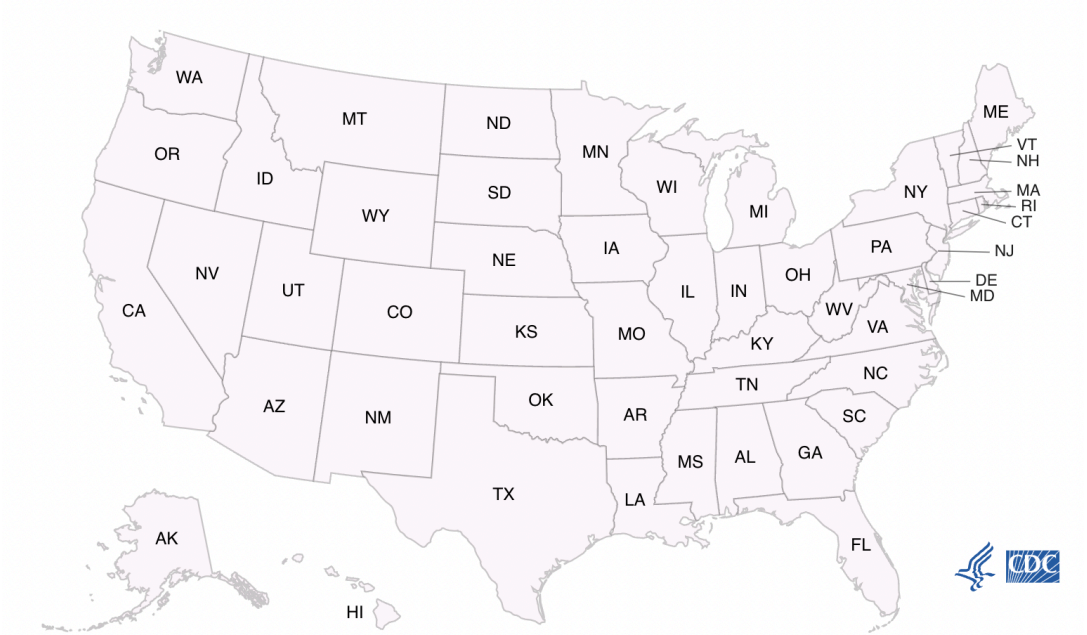

Figure 3. Age-Adjusted Drug Overdose Mortality by State, 1999. All states' death rates were between 0 and 18.18. *Centers for Disease Control and Prevention*.[8]

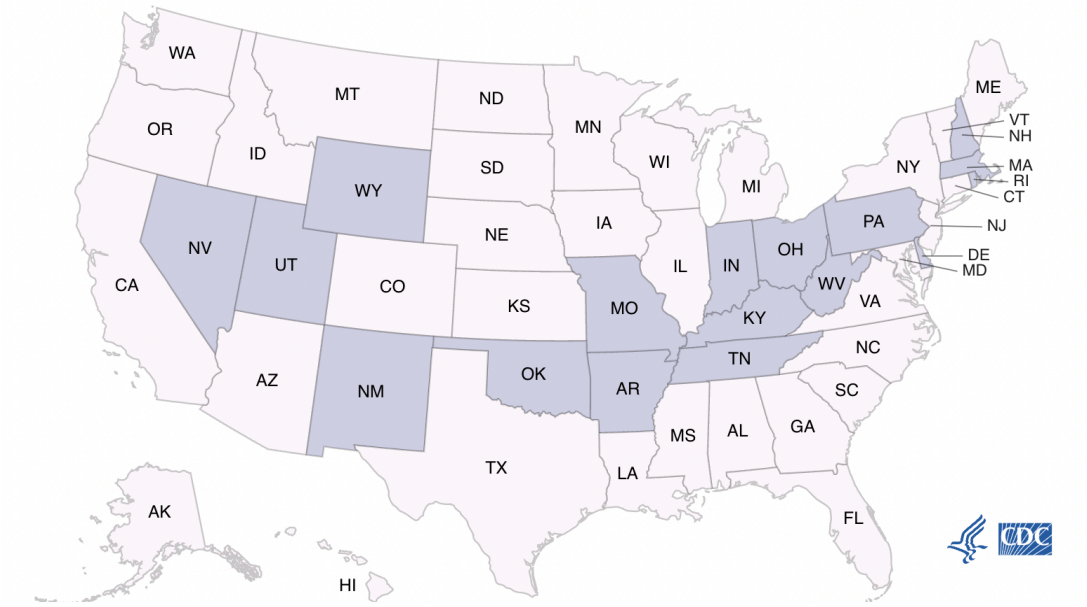

Figure 4. Age-Adjusted Drug Overdose Mortality by State, 2014. All states' death rates were either between 0 and 18.18 (light pink) or 18.18 and 36.36 (purple). *Centers for Disease Control and Prevention*.[8]

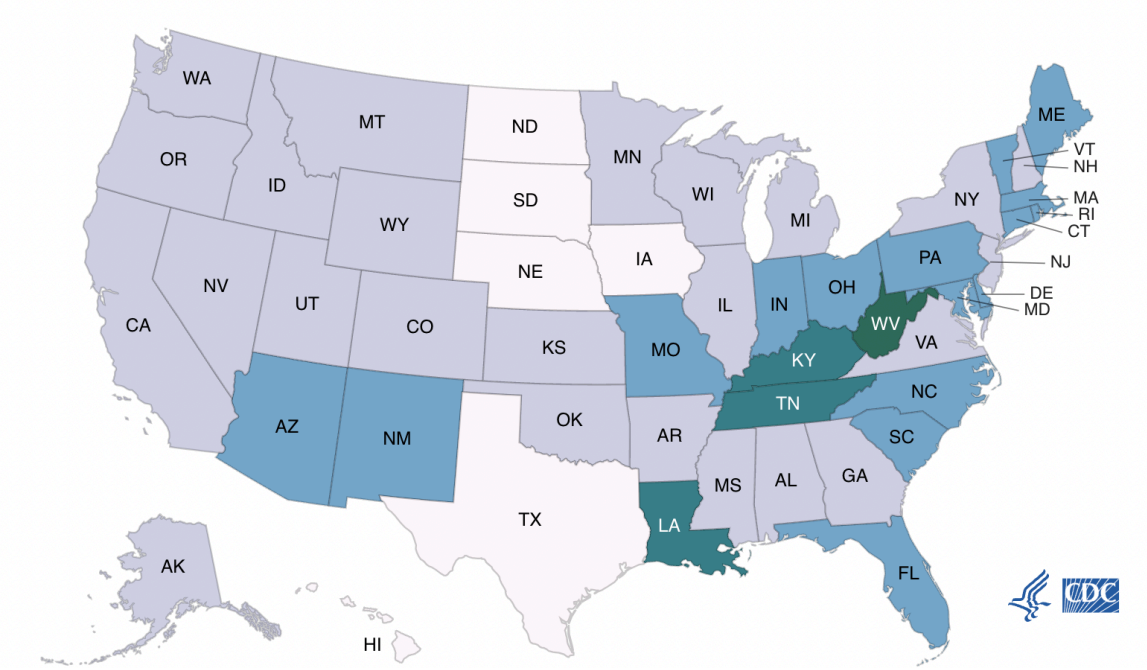

Figure 5. Age-Adjusted Drug Overdose Mortality by State, 2021. All states' death rates were between 0 and 18.18 (light pink), 18.18 and 36.36 (purple), 36.36 and 54.54 (blue), 54.54 and 72.72 (teal), and 71.71 and 90.9 (dark green, West Virginia only). *Centers for Disease Control and Prevention*.[8]

Historical Context

It is important to acknowledge the history behind the reactions of the U.S. government to substance use, and how criminal justice policies surrounding substance use disproportionately target marginalized communities. The reaction of the U.S. government to substance use is colloquially called the "War on Drugs" and began in the late 1800s with anti-opium laws that targeted Chinese immigrants. The prohibition of alcohol in the 1920s was arguably, in part, a response to increased immigration of Eastern European people whose cultures generally embraced alcohol. Soon after, anti-marijuana legislation was enacted in 1937, intending to target Hispanic people, who law enforcement agencies feared may use and distribute marijuana.[9]

President Richard Nixon then began the "War on Drugs" with the Controlled Substances Act of 1970, which created the five "schedules" of drugs rated by medical benefit and risk of

misuse: Schedule I being the most dangerous, and Schedule V being the least. These five schedules are still used today to associate punishment with distribution, obtainment, or use of scheduled substances.[10] Drug offenses are the leading cause of arrest nationwide. Although all races use substances at similar rates, Black people made up 24% of all drug-related arrests in 2020, yet only comprised 13% of the population. [11] Overdose deaths disproportionately impact Black and American Indian/Alaska Native (AI/AN) people.In 2020, 39 Black people per 100,000 died from an overdose and 36 AI/AN people died from an overdose, compared to 31 White people per 100,000. From 2019 to 2020, disparities in overdose death rates (number of overdose deaths per 100,000 people) were even more evident; for Black people, there was an increase of 44% and an increase of 39% for AI/AN people, compared to an increase of 22% for White people.[12]

Current Policies Surrounding Opioid Use Disorder

Expanding access to treatment for OUD and substance use disorder (SUD) is a reactionary intervention. Given that the COVID-19 pandemic exacerbated the already-present mental health crisis and caused increases in opioid overdoses and rates of fentanyl and heroin use, policies before and after the pandemic differ.[13] Federal and state governments have sought to increase the availability of OUD treatment during and after the COVID-19 pandemic to varying levels of success. While all states and Washington, DC, have implemented at least one telehealth policy, only 17 states have enacted policies specifically aimed at improving access to OUD treatment for new patients via telehealth. One example of this type of policy is the Centers for Medicare & Medicaid Services (CMS) allowing telehealth reimbursement at levels similar to in-person visits for fee-for-service Medicare beneficiaries using the Coronavirus Preparedness

and Response Supplemental Appropriations Act and the Coronavirus Aid Relief and Economic Security (CARES) Act.

CMS waiving restrictions and allowing telehealth appointments via mobile phone also helped increase accessibility to services. Privacy laws were created with the intention of lowering the potential of disclosing personal health information (PHI) over non-secure mediums. However, they present a barrier to SUD treatment, as devices are required to be securely protected. Nine states relaxed privacy laws during COVID-19, increasing utilization of certain technologies for telehealth appointments.

With regards to healthcare licensing, the addiction medicine workforce is in short supply already, and only opioid treatment programs (OTPs) can dispense medication for opioid use disorder (MOUD). While all states have adopted at least one policy pertaining to healthcare professional licensing permissions, only 35 states have broadened scope of practice laws for mid-level providers such as physician assistants and nurse practitioners, who can prescribe buprenorphine, a type of MOUD, under the 2016 Comprehensive Addiction and Recovery Act. However, in some states, mid-level providers are required to collaborate with a physician to prescribe, slowing the delivery of MOUD to the patient. Although 44 states have expanded access to the initiation and delivery of MOUD, no state has implemented all of these policies to expand access to OUD treatment during and after the COVID-19 pandemic.

Thesis Statement

The goal of this thesis is to explore the various public health interventions currently in progress across the United States specifically targeting substance use disorder and overdose prevention, particularly opioid use disorder. Current strategies involve a variety of different

players, from treatment professionals and clinicians to public health staff and law enforcement. This thesis will also analyze interventions that specifically target communities, such as local and tribal interventions, which are currently underway as well. Because each community is different and they are numerous in the United States, it is unlikely that all possible literature will be analyzed. The objectives of this thesis are to conduct a review of as much literature as possible, as well as offer recommendations for further research and improvements to the interventions based on community need and expertise. Other objectives are to research aspects of successful and widely-used overdose prevention interventions for a variety of populations, including impact of reducing harm and overdose rates, key components and strategies employed in successful programs, and exploring challenges and barriers associated with initiatives.

Methodology

The research design of this thesis was a literature review, conducted from August 2023 to April 2024. Three databases were used to gather literature: PubMed, Academic Search Complete, and EBSCOHost. The following search terms were used to collect as much literature for analysis as possible. These search terms were: (1) opioid use disorder AND community AND intervention, (2) opioid use disorder AND community AND education AND intervention, (3) opioid use disorder AND rural AND intervention, (5) opioid use disorder AND tribal AND intervention, (6) opioid use disorder AND young adult AND intervention, (7) opioid use disorder AND intervention AND evaluation, (8) opioid overdose intervention, (9) opioid overdose evaluation. Literature before 2010 was excluded to capture the current situation and its changes since the second wave of the crisis began in 2010, but included literature skewed heavily to 2018-2023 due to the increased interest in the opioid crisis during this period. Systematic reviews and narratives were included for a total of 22 papers.

Results

This literature review focuses on three particular groups: American Indian/Alaska Native (AI/AN) people, people who live in rural areas, and young adults aged 18-25. All three of these groups are at increased risk for overdose, as outlined above. The interventions covered by the literature were assessed by Dr. Thomas R. Frieden's Six Components Necessary for Effective Public Health Program Implementation.[14] These components are defined as follows, and are shortened in the table below:

> "(1) Innovation to **develop the evidence base** for action; (2) a technical package of a **limited** number of high-priority, evidence-based **interventions** that together will have a major impact; (3) effective **performance management**, especially through rigorous, real-time monitoring, evaluation, and program improvement; (4) **partnerships** and coalitions with public- and private-sector organizations; (5) **communication** of accurate and timely information to the health care community, decision makers, and the public to effect behavior change and engage civil society; and (6) political commitment to **obtain resources and support** for effective action."[14]

These components were analyzed in order to further delve into the aspects of the study which made it effective, and two components per paper were chosen to be analyzed. Most of the 22 papers analyzed were randomized controlled trials.

Table 1. Study Breakdown by population and component(s) included

Study Number	Target Population	Developed Evidence Base	Limited Interventions	Performance Management	Community Partnerships	Communication	Obtain Resources & Support
1[15]	general	☑					☑
2[16]	general				☑	☑	
3[17]	general	☑				☑	
4[18]	general				☑	☑	
5[19]	general	☑	☑				
6[20]	tribal					☑	☑
7[21]	tribal				☑	☑	
8[22]	tribal			☑	☑		
9[23]	tribal				☑	☑	
10[24]	tribal	☑			☑		
11[25]	tribal			☑			☑
12[26]	tribal		☑		☑		
13[27]	rural	☑			☑		
14[28]	rural		☑			☑	
15[29]	rural				☑		☑
16[30]	rural	☑	☑				
17[31]	rural				☑		☑
18[32]	young people	☑			☑		
19[33]	young people		☑	☑			
20[34]	young people				☑	☑	
21[35]	young people	☑					☑
22[36]	young people		☑				☑

Significance of Communication & Social Support

A key theme throughout most, if not all, of the interventions above was communication. Williams et al. found a significant increase in knowledge among community members after a single one-hour presentation on OUD and MOUD, as well as positive attitude change towards MOUD. A higher rate of students agreed with the statement "Medications are often necessary for successful treatment of opioid use disorder" after the presentation, and more than 80% of students reported that they felt slightly or much more positive about MOUD after undergoing the presentation.[16]

Feasibility was also important to consider. Kidorf et al. note that despite eligibility for a study on whether community support interventions (CSIs) reduced substance use, many people chose not to participate. However, out of those who did participate in the study and in CSIs, 24% (4 participants) met criteria for a significant reduction in substance use (>75%). These results show that CSIs are partially effective in reducing substance use and are feasible to be implemented in OUD treatment programs.[15]

Gender was also seen to lead to differing ways of being introduced to substance use. Bolshakova et al. found that women were more likely to try new injection drugs at a partner's house and rely on that partner for additional doses of the drug. This may necessitate different interventions for women which could involve self-esteem lessons, lessons on how to recognize a problematic or abusive relationship, and drug safety education to create an interdisciplinary intervention. Prevention is also very important in reducing harm via substance use, but universal prevention such as scare tactics has proven to be inefficient. Instead, effective preventive programming for adolescents should prioritize addressing precursor behaviors, building resilience, and minimizing exposure to substance-use environments. For older teens or those at

higher risk of opioid misuse, interventions can focus on enhancing motivation against substance use and developing self-control skills while promoting active decision-making involvement.[17]

Fox et al. tested a community-based buprenorphine treatment initiative in order to assess whether education impacted initiation of buprenorphine treatment. The harm reduction agency staff provided "(1) buprenorphine education, (2) motivational interviewing, (3) referrals to buprenorphine-prescribing doctors, and (4) treatment retention support." While it was not seen that clients had a significant increase in buprenorphine treatment initiation, harm reduction workers' knowledge of the topic increased to 79% from 52%.[18]

Lott and Rhodes found limited effectiveness in carrying naloxone in an education-only initiative which was intended to increase naloxone familiarity and education. However, the educational group session successfully enhanced the understanding of opioid overdose and naloxone among patients seeking treatment for opioid use disorder.[19]

In a study exploring the attitudes of 18 AI/AN people aged 10-24 living on a Southwest American Indian Reservation Community, Waugh et al. found that there is a necessity for upstream prevention strategies, such as enhanced employment opportunities and expanded after-school activities. This is because participants described being bored after school and using substances to ameliorate that boredom. Additionally, family was found to play an important role in both initiation of and continued opioid use, as participants recalled seeing their family members take opioids and receiving opioids from family members. This could suggest that family education surrounding opioids could be helpful, as the survey found that families were also confused about what an opioid was to begin with and how nonmedical use can lead to addiction. Family role in treatment of OUD varied between helpful and supportive and passive (in which the family's only role was to send the person to in-person treatment).[20]

The significance of culturally appropriate treatment and the integration of Western therapeutic approaches with tribal traditions and ceremonies was deemed important, particularly by Richer et al. This group of researchers found that two particular interventions, the Penobscot Tribal Healing to Wellness Courts (THWC) and the Little Earth of United Tribes Intensive Outpatient Program (IOP) were effective examples of culturally-based interventions for AI/AN people and communities. The THWC integrates individual and community wellness, practicing cultural traditions such as smudging (burning traditional medicines such as sage) at every therapy session and encouraging attendance of cultural events such as drumming. Technology was also used during COVID-19 to create virtual support groups. The Little Earth IOP was specifically designed to target opioid use rates rather than general substance use. Traditional methods of healing are incorporated, such as urban farming to promote healthy eating and inspire a connection with the earth and a joint family program to encourage families to learn more about OUD, along with mental health services. Tribal sovereignty was also deemed important, as state, local, and tribal policy requirements for care can present bureaucratic challenges and barriers to care.[21]

In a study done by Tipps et al., tribally-operated wellness courts and banishment were used as consequences for substance use and bringing illicit substances onto the reservation, particularly in the Northern Plains area. While tribally-operated wellness courts have shown some promise in diverting people from the criminal justice system and into more holistic and culturally relevant treatment, they have not shown a significant decrease in recidivism. Banishment was also seen as an ineffective punishment, both because it does not change behavior and because it is difficult for tribal authorities to enforce. Litigation by suing opioid manufacturers was also seen as ineffective.[22]

In order to identify key components to culturally re-center and implement MOUD among AI/AN communities, Hirchak et al. conducted a 2-day face-to-face meeting of a national Collaborative Board (CB), including Elders, treatment providers, people with lived experience, cultural leaders, and researchers from over 25 communities, organizations, and universities. As in other studies, the importance of culture was stated by CB members, as well as integration of traditional practices such as sweat lodge into Western MOUD. Aspects of community psychology rather than individual were emphasized, such as sociocultural competence, empowerment, and reflexive practice. Self-efficacy was also regarded as important. Addressing stigma and historical distrust was important in inspiring trust between the provider and patient and non-judgmental service delivery and attitudes. It is important to consider that AI/AN people are not a monolith, and not all of these results will yield positive results in all AI/AN people. As such, cultural diversity is high among AI/AN tribes.[23]

Radin et al. outlined challenges faced by AI/AN people in accessing care for OUD. Participants noted disparities in access and affordability. Although communication and coordination between health and service programs are perceived to be improving, they fall short of the desired level, with divergent primary goals among programs potentially hindering collaborative efforts. Education on addiction, parenting, familial support, pathways to healing, available services and resources, as well as essential life skills for maintaining health and well-being could engage families and improve self-esteem of AI/AN people with OUD.[24]

A study by Ivanich et al. suggests that people use substances as a way to “cope” or “escape”. Alcohol and drugs are also easily accessible, increasing overdose potential. The authors also indicate that a lack of understanding of and misperceptions about opioid safety, including prescription medication, could be addressed in AI/AN communities to lower overdose

potential. Tribal values such as “not turning your back on family” can have negative implications; as one participant in the study describes, her son asked for money to presumably use on substances, saying she does not care for him if she does not give him money. While this was difficult for the participant, she recognized that giving him money would enable him and prolong his OUD. Community, Tribal, and family support and involvement for health/wellness was repeatedly brought up as factors that could help abate the crisis.[25]

In the final paper analyzing tribal interactions with OUD in this literature review, Young et al. investigated a Facebook Group intervention for AI/AN women recovering from OUD. This group found higher success in sharing gender-specific information which depicted AI/AN people or ideas, such as Native traditions, personal stories, and historical trauma, which has been listed in the above studies as a major contributing factor in hesitancy to access Western healthcare resources to treat OUD. This was a successful intervention because the people in the group trusted the moderators to disseminate helpful coping skills and information. This trust was built on the understanding that the moderators were genuine and reliable.[26]

In rural communities, which are especially hard-hit by the opioid crisis, varying support for harm reduction strategies were seen. Lack of transportation, scarce SUD/OUD services, and cost are treatment barriers, and education could help to refer and access treatment for OUD. Rural communities are very heterogeneous and care coordination between addiction medicine specialist providers and rural primary care providers is paramount. This can be done through telehealth.[24-27]

Contrary to what may be popular belief, Curcija et al. found that their dissemination endeavors and survey findings revealed a notable level of interest and willingness among rural individuals and community organizations to engage in discussions about OUD. This may be

partly due to individuals' baseline high levels of knowledge about OUD, as the authors note. Community-based interventions disseminated messages and materials concerning OUD and local treatment options, reaching a significant number of community organizations and members. However, both the literature and their research affirmed the existence of stigma that continues to surround OUD.[28]

Rigg et al. claims that policy decisions have been so far ineffective in addressing the opioid epidemic in rural America. This is in part due to the geographic heterogeneity of the population and the tendency of policy creators to think of rural America as a monolith. The U.S. Census only uses the delineation of rural and urban areas, which can prove to be a challenge in research as counties' statuses can and do change over time, and the word "rural" itself has a cultural meaning not covered by this delineation. Assuming rural counties' economies rely on industries such as mining, agriculture, and manufacturing is not entirely unfounded, but reducing rural counties to such leads policy creation to only target these industries, when OUD is a problem for all industries. Additionally, the stereotype of rural counties being homogenous and non-diverse partially precludes the possibility of creating policies which target the people of color, people with disabilities, and LGBTQ+ people who live in rural areas.[37] Recommended strategies to address the opioid crisis in rural areas include the expansion of telehealth, introducing more upstream interventions and prevention methods, using unmanned aerial vehicles to deliver medication to patients in order to circumvent transportation barriers, increasing the behavioral health and addiction medicine workforce in rural areas, and establishing harm reduction programs such as syringe service programs in rural communities. Prescriber education was specifically mentioned, as rural doctors have been shown to prescribe opioids at a higher rate than urban doctors.[29]

In Hser et al.'s study to investigate care coordination, during the intervention period involving referral and coordination between the clinic and a telemedicine company for MOUD, five out of the six sites investigated experienced a rise in patient-days on MOUD compared to the preceding six-month period. The most substantial increases were observed in clinics with limited MOUD capacity or with a higher proportion of patients commencing MOUD treatment during the intervention period. This shows that rural health care should coordinate with specialty care in order to serve as many people as possible.[30]

In rural Alabama, Albright et al. investigated the causes of opioid use. This study incorporated and measured social determinants of health and their correlation with opioid use. The study found that three social determinants of health—education level, housing stability, and employment status—were found to be significantly correlated with the frequency of opioid use.[31]

In young people ages 18 to 25, early introduction of substance use was seen as a determining factor in OUD development. Increasing the capacity of organizations and systems at a broader level and fostering a more widespread recognition of opioid use as a health concern would help deploy effective interventions among this group. Peer education was regarded as highly effective due to peer-to-peer interactions and in-depth understanding of the attitudes surrounding substance use in peer educators. Finally, maintenance treatment was indicated in this age group, with OUD being treated as a chronic disease which requires long-term treatment.[29-32]

Given the intersectional and multifaceted nature of youth opioid use and the ensuing crisis, Nairn et al. emphasizes the importance of creating and assessing innovative treatments tailored to youth-specific circumstances and requirements is crucial. These treatments should encompass socio-economic, psychological, neurobiological, and environmental factors contributing to opioid use among young people. Peers were particularly important in determining

attitudes towards overdose, and behaviors of peers are predictive of opioid use behavior. Researchers acknowledged the lack of research in this area and called for more studies which involve youth themselves.[33]

Prevention, especially for youth, was hailed as an effective strategy by Danielson et al. The authors of the paper emphasize universal screening for SUD in frontline clinics such as dentists and doctors' offices starting at age 11, interventions for SUD delivered as secondary prevention strategies, usage of universal prevention strategies such as school curriculum to teach coping skills and substance use safety skills, sustained resources for youth-facing programs targeting SUD, and de-stigmatization.[34]

Finally, the results of a study by Thrul et al. indicated that the occurrence of OUD outcomes in adulthood could be impacted by the effectiveness of earlier prevention and intervention strategies, including policy changes and modifications in social structures aimed at decreasing the occurrence of cannabis and tobacco use disorders. Achieving success in addressing OUD outcomes will likely necessitate enhanced access to effective OUD treatments and encourage safer opioid use. Interventions targeting social and individual determinants of health at earlier stages of life and of OUD development may also play a crucial role.[36]

Discussion

Literature Gaps

In both 2021 and 2022, age-adjusted drug overdose deaths were the highest for AI/AN people, at 56.6 and 65.2 deaths per 100,000 people respectively. This is a 15.0% increase in just one year.[38] However, literature on this topic, particularly on the intersection of AI/AN communities and interventions for substance use disorder, is lacking. This impacts more than just research; it also impacts policy, which affects more than just an individual person. While policymakers and researchers can and should interact with one another in order to create research-based policies that serve people best, there are few incentives for researchers to do this. Additionally, while policymakers prefer quick and relevant information, researchers prefer a complex, thorough methodology to investigate an issue. Knowledge transfer through organizations such as the Center for Health Economics of Treatment Interventions for Substance Use Disorder, HCV, and HIV (CHERISH) is key to bridging this gap and inspire quality and trust in these relationships.[39]

Additionally, in studies surrounding youth, male participants were more likely to be recruited, and there are very few studies surrounding interventions and treatments for youth at-risk for OUD. This was suggested to be ameliorated by involving more young people in studies as peer educators.[32]

Proposed Areas of Further Study

The following proposed further areas of study would enhance effectiveness, accessibility, and sustainability of these initiatives and new initiatives to abate the crisis.

Evaluating Long-Term Impact

As mentioned above, evaluating the long-term outcomes and sustainability of community-based interventions and educational initiatives is crucial to finding a basic solution that can be adapted to fit a variety of different populations. This is particularly important because OUD is a chronic illness and requires continuous treatment for long periods of time, perhaps for a person's whole life. While many studies have demonstrated short-term effectiveness in reducing overdose rates and/or increasing the number of people entering treatment, there remains a need to assess the durability of these outcomes over time. Longitudinal studies tracking individuals and communities engaged in overdose prevention programs can provide valuable insights into the persistence of behavior change, the maintenance of community partnerships, and the ongoing impact on overdose rates.

In a 4-year post-clinical trial outcomes study conducted by Craft et al., encouraging results following buprenorphine treatment were seen. A relationship between opioid craving, withdrawal, and DSM criteria and opioid misuse was seen in people in long-term recovery. However, Counseling and 12-step groups were seen as helpful resources for longitudinal care and keeping people in treatment or abstinent from substance use. Continued MOUD treatment was said to be the biggest predictor of success even four years after initial treatment initiation.[40]

Addressing Social Determinants of Health

Addressing social determinants of health in overdose prevention efforts could also enhance understanding the intersectionality of the issue and its role in determining health behavior. Future research could explore how community-based interventions can effectively integrate housing assistance, employment programs, and mental health resources, among other

social support, to address the underlying factors contributing to substance use and overdose risk. By adopting a holistic approach that addresses the complex interplay of socio-economic factors, mental health conditions, and substance use disorders, community-based initiatives can potentially achieve more sustainable and equitable outcomes.

Assessing Scalability of Interventions

The scalability of successful interventions also needs to be researched. Numerous pilot programs and small-scale interventions such as overdose prevention centers in New York City and conditional cash transfer programs for remaining sober in Los Angeles have demonstrated promising results by reducing the number of fatal overdoses and reducing stimulant use respectively.[41,42] However, scaling up these efforts to reach larger populations remains a significant challenge, particularly considering political resistance in certain parts of the country. Future studies could explore strategies for adapting and implementing evidence-based interventions in diverse community settings. Dissemination methods, such as peer-to-peer networks, digital platforms, and community-led advocacy campaigns, can inform efforts to effectively disseminate overdose prevention strategies and knowledge across different populations and regions.

Radin et al. noted that 78% of AI/AN people lived in urban and suburban settings in 2010, according to the U.S. Census; however, most AI/AN research represented in the literature has been conducted in reservation and rural settings.[24]

Integration of Technology into the Treatment Cascade

The integration of technology and data-driven approaches into community-based overdose prevention efforts is also extremely important and should be further investigated.

Digital health tools, such as smartphone applications for naloxone distribution like TxCOPE developed by the University of Texas at Austin's Addiction Research Institute, overdose risk prediction algorithms, and online peer support networks could enhance the reach, accessibility, and effectiveness of interventions.[43] Geospatial mapping techniques and community-based reporting could allow community organizations, research organizations, and local public health agencies to identify high-risk areas, funnel resources more efficiently, and tailor interventions to meet the specific needs of particularly vulnerable populations.

Investigating Co-Occurring Conditions

SUD also often co-occurs with other public health challenges, such as infectious diseases, mental health disorders, and chronic pain management.[44] Community-based initiatives that address these overlapping health concerns can improve overall health outcomes for affected individuals. By integrating overdose prevention efforts with initiatives targeting HIV/AIDS, Hepatitis C, mental health stigma reduction, and access to non-opioid pain management alternatives, communities can create more comprehensive and inclusive approaches to addressing substance use-related harms. By advancing knowledge in these areas, researchers and practitioners can contribute to the development of more effective, equitable, and sustainable overdose prevention efforts that save lives and promote community well-being.

Using Public Health Theories to Combat the Opioid Epidemic

Public health theories provide frameworks for understanding the complex dynamics of substance use and overdose prevention, guiding research efforts aimed at developing effective interventions and policies.

Social Cognitive Theory (SCT) is a crucial aspect of treatment for OUD. This theory involves self-efficacy, behavioral capacity, self-control, moderating emotions, outcome expectations, and outcome expectancies. Among adults with chronic pain, social cognitive predictors contribute significantly to the likelihood of opioid misuse. Increased levels of pain acceptance and self-efficacy in managing pain positively correlates with higher satisfaction with pain support. Individualism also correlates positively with pain self-efficacy and pain acceptance, and negatively with the risk of opioid misuse. Conversely, collectivism is associated positively with the risk of opioid misuse. These results show that SCT is effective in addressing chronic pain in adults and highlights the importance of considering the interplay among social, cognitive, and psychological factors shaping pain experiences, and how this can affect the risk of opioid misuse in this population.[45]

The **Social Ecological Model (SEM)** says that health behaviors are influenced by multiple levels of influence, including individual, interpersonal, community, and societal factors. The SEM could highlight the interconnectedness of risk factors across different levels, including gender and race, and underscores the importance of implementing multi-level interventions such as community group sessions paired with individual therapy. Examples of possible research topics informed by the SEM could be how individual-level factors such as substance use patterns, mental health status, and access to healthcare services interact with interpersonal dynamics within social networks, community norms, and broader societal factors such as policies and regulations. By understanding the complex interplay of these factors, interventions can be designed to address overdose risk comprehensively, targeting not only individual behaviors but also social and environmental determinants of health.

Another relevant theory is the **Health Belief Model (HBM)**, which states that individuals' health behaviors are influenced by their perceptions of susceptibility to a health threat, the severity of the consequences, the benefits of taking preventive action, and the barriers to doing so. The HBM highlights the importance of understanding individuals' perceptions of the risks associated with substance use and overdose, as well as their beliefs about the effectiveness of preventive measures such as naloxone distribution and harm reduction education. Cognitive dissonance is also a part of this model, as people generally want to align their behavior with their attitudes or beliefs, and are more likely to change their attitude to fit their behavior if it does not already fit. Potential HBM-guided research could investigate how to effectively communicate overdose risk information, address misconceptions about naloxone and its use, and reduce barriers to accessing overdose prevention resources, all of which were discussed in the results section. By addressing individuals' perceptions and beliefs about opioid overdose and substance use, interventions can be tailored to increase the likelihood of engagement and adherence to preventive behaviors, ultimately reducing overdose morbidity and mortality.

The **Diffusion of Innovations (DOI)** theory explores how new ideas, practices, or technologies are adopted within a population over time. This theory primarily concerns dissemination and implementation of evidence-based interventions and policies surrounding OUD. By understanding the factors that influence the adoption and spread of overdose prevention strategies among different communities and stakeholders, researchers can develop strategies for accelerating the uptake of interventions such as naloxone distribution programs, drug safety education, and harm reduction services. Considering the characteristics of innovative interventions, the communication channels through which they are disseminated, and the social

networks through which information flows, researchers can develop tailored dissemination strategies that maximize reach and impact in a certain population.

Conclusion

In conclusion, this literature review highlights the critical importance of community-based interventions and educational initiatives in addressing the opioid overdose crisis in the United States. These efforts not only focus on individual-level interventions but also emphasize community engagement, collaboration with stakeholders, and the integration of evidence-based practices into local contexts. The review emphasizes the need for interventions that address socio-economic disparities, stigma, and structural barriers to treatment access.

For AI/AN people, recurring themes that created successful interventions were involvement of family and community members, integration of cultural traditions and practices into culturally-appropriate OUD treatment, and education on opioid usage and what opioids are.

For rural communities, which are particularly affected by the overdose crisis, recurring themes that created successful interventions were expansion of telehealth to circumvent transportation barriers, increasing the behavioral health and addiction medicine workforce in rural areas in order to expand access to treatment, introducing more upstream interventions and prevention methods to stop OUD before it begins, prescriber education on appropriate prescription of opioids to lower unneeded prescriptions, and establishing harm reduction programs such as syringe service programs in rural communities.

For young people aged 18-25, peer interactions were found to be crucial in determining opioid use behavior and attitudes surrounding opioid use. Though less stigma than older people was found in this age group, the literature indicated that stigma is still an apparent concern. This can be ameliorated by peer education, involvement of young people in interventions, and increasing research on interventions surrounding OUD that specifically target young people. Prevention was particularly important in this age group, and could potentially occur in

adolescence by educating on OUD and how to help people with OUD, screening for OUD, and other destigmatizing interventions.

The literature review also identifies several areas for future research and intervention development. These include exploring innovative approaches to enhance the scalability and sustainability of community-based initiatives, integrating technology and data-driven strategies into overdose prevention efforts, and addressing the intersectionality of substance use disorders with other public health challenges. Additionally, there is a need for continued evaluation of the long-term impact of interventions, as well as the effectiveness of interventions tailored to specific populations, such as adolescents, rural communities, and AI/AN people. By advancing knowledge in these areas and implementing evidence-based practices, the burden of opioid overdose can be reduced while promoting health equity for all individuals affected by OUD.

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Biography

Sachi Kulkarni is a student at The University of Texas at Austin majoring in public health with a concentration in biostatistics and public health informatics and a minor in government. Kulkarni is passionate about eliminating health disparities, harm reduction, and public health education. She was a Fall 2023 Bill Archer Fellow and spent the semester in Washington, D.C. interning at the White House Office of National Drug Control Policy, Office of Public Health, in which she supported the Biden-Harris administration's efforts surrounding harm reduction, prevention, treatment, and recovery from substance use disorder. On campus, Kulkarni has served as the harm reduction director for Longhorn EMS and founded the Health Disparities Student Collaborative Texas, a student organization focused on educating students about public health issues. She is also a lead undergraduate research assistant for the Health Innovation Lab within the Addiction Research Institute. After graduation, Kulkarni plans to attend medical school and pursue a career in healthcare advocacy, policy creation, and public health.