Midlife and Older Age Methamphetamine Poisoning Deaths in Hawai‘i

Gursimran K. Sidhu MPH; Tiana M. Fontanilla MPH; Treena S. Becker PhD

http://www.doi.org/10.62547/WWZL3153

Abstract

Unintentional and undetermined intent drug overdose fatality records from the State Unintentional Drug Overdose Reporting System (SUDORS) for Hawai‘i from July 1, 2020, to December 31, 2021 revealed that 58.2% of decedents were aged 50 – 75. The main substance associated with cause of death for those aged 50 – 75 years was methamphetamine, followed by a combination of mixed drugs. Of those aged 50 and older, 25.5% died from cardiovascular or neurological complications which were likely to be associated with chronic, long-term methamphetamine use. Based on death investigator narrative reports, 76.5% of the older decedents had a history of substance abuse, suggesting possible long-term substance use starting at a young age. The trajectory of substance use over the life course is often influenced by life events and transitions, which can be stressors. Hawai‘i *kūpuna* (older adults) should be screened for substance use and dependence to ensure that there is treatment if needed, for the entirety of this use trajectory. Also, barriers to *kūpuna* seeking treatment, such as stigma towards drug use should be addressed.

Keywords

substance abuse, overdose, addiction, older adults, midlife

Abbreviations and Acronyms

ED = emergency department
CDC = Centers for Disease Control and Prevention
OUD = opioid use disorder
SUD = substance use disorder
SUDORS = State Unintentional Drug Overdose Reporting System
TEDS-D = Treatment Episode Data Set: Discharges

Introduction

Substance use disorder (SUD) is defined as the recurrent use of drugs, including alcohol and tobacco, which causes significant impairment including health problems, disability, and failure to meet major responsibilities at work, school, or home.[1] Substance use can more often go undetected among older adults compared to younger adults because older adults may be in retirement or no longer have significant or prolonged interactions with the public.[2] Substance abuse can also present differently at an older age compared to a younger age. Symptoms of substance use, dependence, or abuse may be disguised by symptoms of aging or other age-related medical conditions. Dementia, anxiety, or depression are symptoms of SUDs in older adults, which can contribute to SUDs being underdiagnosed in the older adult population without proper screening.[3] Age at start of drug dependency is important to consider when addressing substance use among older adults. Some older adults begin experiencing SUD early in life and live into old age while continuing to abuse substances, and advancements in treatment as well as harm reduction strategies have extended the life span of this group.[4]

Based on National Vital Statistics System data, in 2018 – 2021,[5] among alcohol and/or drug induced deaths in the State of Hawai‘i, 28.3% of deaths were in the age group 60 – 79 years. In contrast, 6.8% of alcohol and/or drug induced deaths in Hawai‘i were among younger decedents, in the age range of 15 – 29 years. According to Hawai‘i State Department of Health, 12.0% of alcohol and / or drug related emergency department (ED) discharges from January 2018 through June 2022, were for patients of aged 65 years and over. In comparison, 2.0% of alcohol and/or drug ED discharges in the same period were for patients aged 18 or younger.[6]

Nationally, Hawai‘i ranks third highest in psychostimulant deaths by state.[7] A psychostimulant is a psychotropic substance with the ability to stimulate the central nervous system, causing excitation, elevated mood, and alertness.[8] These include illicit drugs such as methamphetamine and cocaine, as well as therapeutic drugs such as mixed amphetamine salts (eg, Benzedrine, Adderall), methylphenidate (eg, Ritalin), and modafinil (eg, Provigil).[9] High rates of methamphetamine use has been an ongoing problem in Hawai‘i for decades.

Methamphetamine is a powerful central nervous system stimulant that has well-documented health implications. Studies have shown that methamphetamine use can result in increased heart rate and blood pressure, leading to additional strain on the cardiovascular system.[10] Prolonged or excessive methamphetamine use can result in sustained high heart rates and blood pressure, increasing the risk of serious cardiovascular complications such as arrhythmias, myocardial infarction, and stroke.[11] In addition, chronic use of methamphetamine can exacerbate underlying conditions, such as dilated cardiomyopathy, which is a specifically known as methamphetamine-associated cardiomyopathy.[12] Methamphetamine use has been shown to have significant neural implications, causing long-lasting changes in the brain, particularly in regions associated with reward, motivation, and decision-making.[13] Methamphetamine

use has also been associated with changes in gray and white matter integrity in various brain regions which are involved in cognition, memory, and emotional regulation.[14] Chronic, long-term methamphetamine use has been shown to be associated with increased risk of mental health disorders such as anxiety, depression, and psychosis.[15] It is important to consider these neural and cardiovascular implications when examining SUDs among older adults because this disorder can be disguised as other age-related conditions that are common in older adults. Demographic trends in substance abuse treatment show that the numbers of patients in older age groups are increasing, and are projected to continue increasing, which suggests prolonged use of drugs from younger age into older age.[16] In other words, there may be an aging population of people with SUD.

Many older adults are at higher risk of substance abuse, which is an issue that is underexplored in Hawai'i. While illicit drug use typically declines after young adulthood, nearly 1 million adults aged 65 and older in the U.S. live with a SUD, as reported in 2018 data.[17] While the total number of SUD admissions to treatment facilities in the U.S. between 2000 and 2012 differed slightly, the proportion of admissions of older adults increased from 3.4% to 7.0% during this time.[18] Little is known about the effects of drugs and alcohol on the aging brain. However, older adults typically metabolize substances more slowly, and their brains can be more sensitive to drugs.[19]

The purpose of this study is to examine the extent to which individuals at midlife and old age in Hawai'i are dying from unintentional drug overdose and whether this may be related to chronic, long-term substance dependence.

Methods

The dataset used for analysis is from the State Unintentional Drug Overdose Reporting System (SUDORS), which is part of the Centers for Disease Control and Prevention (CDC) Overdose Data to Action Program and is a state-based surveillance system that collects data on unintentional and undetermined intent drug overdose deaths. Each state collects and abstracts data from death certificates, medical examiner/coroner reports (including scene findings, autopsy reports, and full postmortem toxicology findings), and death investigator narratives (including medical histories from primary care providers, and interviews with decedent family members, spouses/partners, and friends) for entry into a shared web-based CDC platform with the National Violent Death Reporting System.

This study was reviewed by the University of Hawai'i Office of Research Compliance and received an exemption for Institutional Review Board (IRB) approval. This analysis includes SUDORS data for unintentional overdose deaths from July 1, 2020, to December 31, 2021. The data from July to December of 2020 consists of deaths that occurred only in Honolulu County, due to each county having different systems and protocols and the resulting administrative delay in receiving their records in that period. The remaining period from January to December 2021 consists of data from all 4 counties. The following elements were analyzed: age, sex, cause of death, substances associated with cause of death, mental health diagnosis, history of cardiovascular disease, neurological damage, and history of substance abuse through analysis of the death investigator narratives.

The death investigator narrative is a written summary for each incident that captures a description of the fatal overdose incident; provides context about the circumstances of the incident including drug paraphernalia (if any) found at the scene; records medical history from the primary care provider (if any) including any known history of substance use; records interviews with family members and people in relationships with the decedents who had observed the decedents using or abusing drugs; and additional qualitative detail that cannot be quantitatively captured elsewhere in the data abstraction process.

The analytical approach taken was to first determine the extent of older decedents in the dataset. More than half of the cases were decedents aged 50 years and older. The full sample was then sub-divided to older decedents for further descriptive analysis. The age cutoff selected for older adults with SUD was 50 years and older to be consistent with other studies about older adults and SUD and opioid use disorder (OUD).[19-21] As such, the older group of decedents in this sub-sample was aged 50–75 years. The younger group of decedents aged 14–49 years was then used for comparison.

Results

The SUDORS data showed that there were 263 total unintentional and undetermined intent fatal drug overdoses in Hawai'i between July 1, 2020, and December 31, 2021. **Table 1** presents information about the decedent sample. The age range of decedents observed in the sample was 14–75 years old. Male decedents made up 76.4% and female decedents 23.6% of the 263 overdose deaths. From this full enumeration of substance use deaths accessed from the Medical Examiner/Coroner for analysis, the majority (58.2%) were decedents aged 50–79 years. Specifically, 28.1% of all decedents were in the age range 50–59 years, 26.6% of decedents were 60–69 years, and 3.5% of decedents were 70–79 years. In terms of substance types associated with cause of death, 64.3% of deaths were attributed to methamphetamine toxicity while opioid toxicity accounted for 16.4% of deaths. In terms of opioid and methamphetamine combination poisoning, mixed opioid - methamphetamine toxicity accounted for 11.4% of fatal unintentional overdoses. Older decedents aged 50–75 years were more likely to have died of methamphetamine poisoning compared to younger decedents aged 14–49 years (75.8% versus 48.2%). In contrast, younger decedents were more likely to have died from opioid poisoning than older decedents (21.8% versus 12.4%) or from mixed opioid-methamphetamine toxicity (16.4% versus

Table 1. Summary Decedents' Autopsy, Toxicology, Medical History and Death Investigator Narratives, SUDORS Hawai'i Fatal Overdose Data, 7/1/2020 – 12/31/2021

	All Decedents Aged 14 – 75 years N=263 %	Younger Decedents Aged 14 – 49 years n=110 %	Older Decedents Aged 50 – 75 years n=153 %
Sex			
Male	76.4	72.7	79.1
Female	23.6	27.3	20.9
Age Range			
10 - 19	2.3	4.5	
20 - 29	7.2	17.3	
30 - 39	13.7	32.6	
40 - 49	18.6	45.6	
50 - 59	28.1		48.4
60 - 69	26.6		45.7
70 - 79	3.5		5.9
Substance Type(s) Based on Decedent Toxicology	**%**	**%**	**%**
Only Methamphetamine	64.3	48.2	75.8
Only Opioid(s)	16.4	21.8	12.4
Opioid(s) and Methamphetamine Combination	11.4	16.4	7.8
Meth and Other Stimulant(s) Combination	0.8	1.8	None
Other Stimulant(s) Only	2.3	2.7	2
Opioid(s) and Other Stimulant(s) Combination	1.9	4.6	None
Other Drugs (No Opioids or Stimulants)	3	4.6	2
Death Investigator Narrative	**%**	**%**	**%**
Had History of Substance Use	69.6	60	76.5
Polysubstance Use in Cause of Death	23.6	30	19
Medical History of Cardiovascular Disease	43.7	40	46.4
Methamphetamine Use and Neurological Condition in Cause of Death	9.1	6.4	11.1
Methamphetamine Use and Cardiovascular Disease in Cause of Death	12.9	10.9	14.4

SUDORS = State Unintentional Drug Overdose Reporting System

7.8%). More younger decedents died from combinations of stimulants and opioids than older decedents. When studying the death investigators detailed narrative reports, it was found that 30.0% of younger decedents' cause of death was attributed to polysubstance use, defined as more than just a combination of opioids and stimulants, and included prescription medication for non-pain use, and illicit drugs. To a lesser extent, 19.0% of older decedents' cause of death was attributed to polysubstance use.

Next, the dataset showed that a higher proportion of older decedents had a recorded medical history of cardiovascular disease. The medical examiner/coroner record showed that 46.4% of older decedents had a medical history of cardiovascular disease, and 14.4% of older decedents' causes of death were attributed to both methamphetamine use and cardiovascular disease (eg, cardiomyopathy). Finally, based on available medical records in the SUDORS dataset, interviews with primary care providers, family members, and people in relationships with the decedents, 76.5% of older decedents had a history of substance use compared to 60.0% of younger decedents.

Discussion

According to the dataset, most overdose deaths among adults aged 50 years and older involved methamphetamine, and 25.5% of these older adults died from neurological or cardiovascular complications, which is consistent with long-term methamphetamine use over the life course. Additionally, most decedents had a known history of drug abuse. The statistics from **Table 1** strongly suggest that in Hawai'i, people who use drugs long-term tend to use methamphetamine and are far more likely to die from methamphetamine poisoning at midlife and old age as compared to younger age. The trajectory of substance use over the life course is often influenced by life events and transi-

tions, such as changes in education, work, marriage, military, or retirement.[21] As people enter later stages of life, there are many stressors that can increase the likelihood of substance abuse. Precipitants of increased substance use in older age include reduced responsibilities and retirement, caregiving, and bereavement.[22] However, motives for methamphetamine use in older age are largely underexplored. One study suggests that emphasis on quality of life, social isolation, apathy, lack of employment responsibility, comorbid psychiatric and medical illness, and indifference to the risks associated with substance use are factors needing further exploration when studying motivations for substance use among the elderly.[23] There is also some research on the motivations for methamphetamine use among gay and bisexual men over 50 that suggests some use it to enhance sexual experiences.[24]

Additionally, this study found that there were fewer deaths among older adults in Hawai‘i due to other stimulants, or combinations of methamphetamine or opioids with other stimulants when compared to the younger age group. It appears that older decedents tended to only use methamphetamine, instead of mixed drug use, possibly due to preference or availability.

According to the Treatment Episode Data Set-Discharges (TEDS-D) for Hawai‘i in 2020, there were fewer numbers of treatment episodes among persons aged 50 and older compared to younger ages.[25] As seen in our results, there are higher rates of unintentional and undetermined intent fatal overdoses among adults aged 50 and older compared to other age groups. This indicates an intervention opportunity to prevent overdose deaths among older adults by making it a priority to screen Hawai‘i *kūpuna* (older adults) for substance dependence and to offer them treatment support. Furthermore, it is important to address barriers to treatment that this population may experience. There is often stigma and shame surrounding SUD as a disease, which can create more of a challenge for *kūpuna* to recognize or admit that they may need help.

Limitations

A limitation of this study is that the SUDORS data from the 6-month period of July to December 2020 consists of deaths that occurred only in Honolulu County, which made up 76.0% of the total fatal overdose deaths reported to SUDORS for Hawai‘i in that period. This period was included to ensure all available data was analyzed and to increase the sample size. All counties in the state of Hawai‘i were captured in the remaining data.

Conclusion

More research is needed to expand understanding of older adults struggling with addiction in Hawai‘i. There is much attention towards addiction at younger age, but there needs to be more recognition of this issue among those in midlife and older age as well. Because of stigma, older adults who use drugs may be concealing, or unable to recognize, their addiction. The authors propose 3 public health recommendations to address this issue. The first recommendation is to engage older adult groups in the community to openly talk about drug use, particularly methamphetamine use, through key informant interviews, focus groups, and special interest groups such as the Executive Office on Aging Policy Advisory Board for Elder Affairs. Second, is to empower them to seek treatment by taking steps to reduce stigma and barriers through community education and outreach. Third, it is important to for providers to recognize mental health issues that commonly arise from age-related changes, such as dementia and memory loss, as well as life transitions in older age, and how they can affect substance use. Screening for SUD among older adults who have dementia, anxiety and depression may help address this issue. Providers should also take an age-sensitive and age-specific treatment approach.

Conflict of Interest

None of the authors identify any conflict of interest.

Acknowledgements

This research was supported by the Hawai‘i Overdose Data to Action Cooperative Agreement 6 NU17CE925009-03-05 from the Centers for Disease Control and Prevention of the U.S. Department of Health and Human Services (HHS). The contents are those of the authors and do not necessarily represent the official views of, nor an endorsement by, CDC/HHS, or the U.S. Government. The authors would like to acknowledge Dr. Mark Baker, Pali Momi Medical Center for his clinical insights from an Emergency Medicine and Addiction Medicine perspective.

Authors' Affiliations:
- Center on Aging, University of Hawai‘i at Mānoa, Honolulu, HI (GKS)
- Adult Mental Health Division, Hawai‘i Department of Health, Honolulu, HI (TMF)
- Center on Aging, University of Hawai‘i at Mānoa, Honolulu, HI (TSB)

Corresponding Author:
Gursimran K. Sidhu MPH; Email: gsidhu@hawaii.edu

References

1. Mental Health and Substance Use Disorders. Substance Abuse and Mental Health Services Administration. Updated November 22, 2022. Accessed May 18, 2023. https://www.samhsa.gov/find-help/disorders
2. Jeste DV, Blazer DG, First M. Aging-related diagnostic variations: need for diagnostic criteria appropriate for elderly psychiatric patients. *Biol Psychiatry.* 2005; 58(4):265-271. https://doi.org/10.1016/j.biopsych.2005.02.004
3. Jaqua EE, Nguyen V, Scherlie N, Dreschler J, Labib W. Substance use disorder in older adults: mini review. *Addict Health.* 2022; 14(1):62-67. https://doi.org/10.22122/ahj.v14i1.1311
4. Kuerbis A. Substance use among older adults: an update on prevalence, etiology, assessment, and intervention. *Gerontology*. 2020;66(3): 49-258. https://doi.org/10.1159/000504363
5. Centers for Disease Control and Prevention, National Center for Health Statistics. National Vital Statistics, Mortality 2018 – 2021 on CDC Wonder Online Database. Accessed October, 2021. http://wonder.cdc.gov/
6. Hawaii Substance Use Statistics: Emergency Department Discharges. State of Hawai‘i, Department of Health. Accessed May 18, 2023. https://bh808.hawaii.gov/
7. Centers for Disease Control and Prevention. CDC Wonder. Accessed February 2023. http://wonder.cdc.gov/
8. Favrod-Coune T, Broers B. The health effect of psychostimulants: a literature review. *Pharmaceuticals (Basel)*. 2010;3(7):2333-2361. https://doi.org/10.3390/ph3072333
9. Wood S, Sage JR, Shuman T, Anagnostaras SG. Psychostimulants and cognition: a continuum of behavioral and cognitive activation. *Pharmacol Rev.* 2013;66(1):193-221. https://doi.org/10.1124/pr.112.007054
10. Kevil CG, Geoders NE, Woolard MD, et al. Methamphetamine use and cardiovascular disease: in search of answers. *Arterioscler. Thromb. Vasc. Biol.* 2019;39:1739-1746. https://doi.org/10.1161/ATVBAHA.119.312461

11. Jones CM, Houry D, Han B, Baldwin G, Vivolo KA, Compton WM. Methamphetamine use in the United States: epidemiological update and implications for prevention, treatment, and harm reduction. *Ann. N. Y. Acad. Sci.* 2022;1508(1):3-22. https://doi.org/10.1111/nyas.14688
12. Won S, Hong RA, Shohet RV, Seto TB, Parikh NI. Methamphetamine-associated cardiomyopathy. *Clin Cardiol*. 2013;36(12):737-742. https://doi.org/10.1002/clc.22195
13. Bernheim A, See RE, Reichel CM. Chronic methamphetamine self-administration disrupts cortical control of cognition. *Neurosci Biobehav* Rev. 2016;69:36-48. https://doi.org/10.1016/j.neubiorev.2016.07.020
14. Guerin AA, Bonomo Y, Lawrence AJ, et al. Cognition and related neural findings on methamphetamine use disorder: insights and treatment implications from schizophrenia research. *Front. Psychiatry*. 2019;10:880. https://doi.org/10.3389/fpsyt.2019.00880
15. Stuart A, Baker AL, Bowman J, et al. Protocol for a systematic review of psychological treatment for methamphetamine use: an analysis of methamphetamine use and mental health symptom outcomes. *BMJ Open*. 2017;7(9):e015383. https://doi.org/10.1136/bmjopen-2016-015383
16. Han B, Polydorou S, Ferris R, Blaum CS, Ross S, & McNeely, J. Demographic trends of adults in New York City opioid treatment programs—an aging population. *Subst Use Misuse*. 2015; 50(13);1660-1667, https://doi.org/10.3109/10826084.2015.1027929
17. Substance Abuse and Mental Health Services Administration. Results from the 2018 National Survey on Drug Use and Health: Detailed tables. Rockville, MD: Center for Behavioral Health Statistics and Quality, Substance Abuse and Mental Health Services Administration. https://www.samhsa.gov/data/
18. Chatre S, Cook R, Mallik E et al. Trends in substance use admissions among older adults. *BMC Health Serv Res*. 2017;584(17). https://doi.org/10.1186/s12913-017-2538-z
19. Colliver JD, Compton WM, Gfroerer JC, Condon T. Projecting drug use among aging baby boomers in 2020. *Ann Epidemiol*. 2006;16(4): 257–265. https://doi.org/10.1016/j.annepidem.2005.08.003
20. Beynon CM, Mcveigh J, Roe B. Problematic drug use, ageing and older people: trends in the age of drug users in northwest England. *Ageing Soc*. 2007;27(6):799-810. https://doi.org/10.1017/S0144686X07006411
21. Hser YI, Longshore D, Anglin MD. The life course perspective on drug use: a conceptual framework for understanding drug use trajectories. *Eval Rev*. 2007;31(6):515-547. https://doi.org/10.1177/0193841X07307316
22. Foster C, Konnert C, Gorenko JA. Exploring life-course patterns of substance abuse: a qualitative study. *Aging Ment Health*. 2021;25(2):378-385. https://doi.org/10.1080/13607863.2019.1693966
23. Cummings N, Lantz M, GomezAbreu N, Sidor M. Infusing the "motivation" into motivational interviewing: addressing unique challenges in older adults with substance use disorders. *Am J Geriatr Psychiatry.* 2023; 31(3):S70-S71. https://doi.org/10.1016/j.jagp.2022.12.232
24. Santos GM, Miller D, Jain J, Gyamerah A, Wilson E, McFarland W, Raymond H. Prevalence and correlates of methamphetamine use among older men who have sex with men in San Francisco. *Generations.* 2020; 44(4):1-11.
25. Substance Abuse and Mental Health Services Administration, Treatment Episode Data Set (TEDS) Discharges, 2020. Rockville, MD: Substance Abuse and Mental Health Services Administration, 2021. Accessed March 2023. https://www.samhsa.gov/data/data-we-collect/teds-treatment-episode-data-set