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Cycles of Solace and Distress: A Mixed Methods Investigation of Substance Abuse Patterns, Risk Factors, and Service Gaps in Alaska

Ahmed F. Alanazi
King Faisal University

Abstract—**Objective: This mixed methods study examined the prevalence, sociocultural correlates, and service utilization patterns of substance abuse across urban, rural, and remote Alaskan communities. Methods: Quantitative data came from the 2015-2020 National Survey on Drug Use and Health (NSDUH) Alaska subsample (n=2,847) and state treatment admission records (n=18,432). Qualitative data included 45 semi structured interviews with individuals in recovery, 20 key informant interviews with healthcare providers, and 12 focus groups in five distinct regions (Anchorage, Fairbanks, Juneau, Bethel, Utqiaġvik). Results: Quantitative analyses indicated that alcohol use disorder (AUD) prevalence was 12.8% in Alaska, significantly higher than the national average of 7.2% (p<.001). Methamphetamine admissions rose 210% between 2015 and 2020. Qualitative themes revealed three core drivers: seasonal isolation polypharmacy, intergenerational trauma from colonial policies, and a fragile continuum of care. Conclusions: Alaska requires culturally integrated, regionally stratified interventions that extend beyond the hub city model. Peer supported telehealth and indigenous healing partnerships show promise.**

Index Terms—**substance abuse, Alaska Native health, rural mental health, methamphetamine, alcohol use disorder, mixed methods**

I. INTRODUCTION

Substance abuse represents a disproportionately severe public health crisis in Alaska. The state consistently reports age adjusted mortality rates from drug overdoses and alcohol related liver disease that exceed the national average by margins of 40% to 60% (Alaska Department of Health and Social Services [ADHSS], 2021). However, these aggregate figures obscure a more complex reality. Alaska is not a monolithic region. It comprises a strategic metropolitan hub (Anchorage),

smaller regional centers (Fairbanks, Juneau, Matanuska Susitna Borough), hundreds of remote villages accessible only by air or water, and the arctic slope. Each ecological setting produces distinct substance use risk profiles, preferred substances, and barriers to treatment.

The existing literature has documented elevated rates of alcohol consumption among Alaska Native populations (Bezrutczyk et al., 2018; Cheadle & Whitbeck, 2019), yet most large scale epidemiological surveys underrepresent non road system communities. Furthermore, a troubling transition from alcohol to methamphetamine and synthetic opioids has been observed in state level treatment data since 2015 (Jones & Bell, 2020). This transition has not been systematically explored using mixed methods that incorporate lived experience narratives alongside admission statistics.

Theoretical frameworks applied to Alaskan substance abuse have often borrowed from rural health disparities models (Hunsaker & Jensen, 2017) or colonial trauma theory (Gone & Trimble, 2019). Neither fully captures the seasonal extremes, the high cost of imported goods including alcohol, or the paradoxical effect of local option dry communities that restrict alcohol sales but may inadvertently shift demand to prescription pills or smuggled methamphetamine (Wood & Shorkey, 2018). A hybrid model is needed that integrates structural vulnerability (Quesada et al., 2014) with ecological momentary risk factors specific to high latitude environments. Therefore, this study addressed three research questions. First, how do prevalence rates of alcohol, methamphetamine, and opioid use disorders differ across Alaskan geographic strata (urban, suburban, rural, remote arctic)? Second, what individual, interpersonal, and structural factors do Alaskan residents identify as precipitating or perpetuating their substance use? Third, what barriers and facilitators to treatment access emerge from the perspectives of both users and providers in regions with intermittent transportation and limited behavioral health infrastructure?

By answering these questions, the manuscript aims to generate actionable recommendations for a state that has one of the lowest treatment capacity to need ratios in the nation (Substance Abuse and Mental Health Services Administration [SAMHSA], 2020).

II. METHODS

Study Design and Rationale

This investigation employed an explanatory sequential mixed methods design (Creswell & Plano Clark, 2018). Phase 1 comprised quantitative analysis of secondary data to identify geographic and demographic prevalence patterns. Phase 2 involved qualitative fieldwork designed to explain, contextualize, and elaborate upon unexpected quantitative findings such as the rapid rise of methamphetamine in non-metropolitan areas. Integration occurred at the interpretation level, where quantitative trends directly informed purposive sampling for qualitative interviews.

III. QUANTITATIVE PHASE

Data Sources

Three secondary sources were utilized. The first was the National Survey on Drug Use and Health (NSDUH) public use files for 2015 through 2020, restricted to respondents residing in Alaska (N=2,847). The second was the Alaska Treatment Admissions Data System (ATADS) maintained by ADHSS, containing 18,432 unique admission records for substance use disorder treatment between January 1, 2015 and December 31, 2020. The third was the Alaska Bureau of Vital Statistics mortality data for drug and alcohol related causes (n=1,207 deaths over the same period).

Measures

For NSDUH, substance use disorder (SUD) was defined using DSM 5 criteria for past year alcohol, methamphetamine, cocaine, heroin, and prescription opioid misuse. Geographic strata were constructed using the Alaska Department of Labor economic region definitions: Anchorage Municipality (urban core), Other Railbelt (Mat Su, Fairbanks), Southeast (Juneau, Ketchikan), Southwest (Bethel, Dillingham, including remote villages), and Northern (Utqiaġvik, Nome, Kotzebue). The ATADS variables included primary substance at admission, route of administration, age at first use, prior treatment episodes, and referral source. Mortality records provided underlying cause of death coded to ICD 10 categories F10 (alcohol related) and F15 (other stimulants including methamphetamine).

Statistical Analysis

The principal investigator {PI} calculated weighted prevalence estimates with 95% confidence intervals using survey procedures in SAS 9.4 to account for NSDUH complex sampling. Chi square tests compared SUD prevalence across geographic strata. Logistic regression modeled odds of methamphetamine versus alcohol as primary substance, adjusting for age, sex, race (Alaska Native vs. non Native), and rurality. Joinpoint regression (version 4.9) identified significant changes in quarterly admission rates over the six year period. Statistical significance was set at alpha=.05, two tailed.

IV. QUALITATIVE PHASE

Participant Recruitment and Sampling

Following the quantitative analysis, the PI purposively recruited 45 individuals who self-identified as being in recovery or currently using substances. Recruitment occurred through syringe exchange programs (n=12), tribal health consortia (n=15), and peer support groups (n=18). Inclusion criteria were age 18 or older, residence in Alaska for at least two years, and self-reported substance use within the past five years. Additionally, the PI recruited 20 key informants: 8 clinical directors of treatment centers, 6 community health aides, 4 police officers specializing in drug interdiction, and 2 state policy advisors. Twelve focus groups were conducted stratified by region: three in

Anchorage, three in Fairbanks, two in Juneau, two in Bethel, and two in Utqiaġvik. Each focus group had 5 to 9 participants.

Interview Protocols

Semi structured interview guides were developed from the quantitative results. For example, because the logistic regression showed that Alaska Native individuals living in remote villages had a 4.2 times higher odds of methamphetamine admission compared to non-Native urban residents, the PI asked specific questions about the availability of methamphetamine versus alcohol in villages. The guide covered four domains: (a) initiation patterns, (b) daily or seasonal use routines, (c) treatment seeking history, and (d) perceptions of community resources. All interviews were audio recorded with consent and transcribed verbatim. Participants received a $50 gift card to a local grocery store.

Data Analysis

Qualitative data were managed in NVivo 12. The PI conducted reflexive thematic analysis following Braun and Clarke's (2019) six phase procedure. Two coders independently coded ten transcripts (22%) and achieved an inter rater reliability of kappa=.84. Discrepancies were resolved through discussion with the third author. Themes were generated using an inductive approach but were subsequently mapped onto the quantitative domains during integration. The PI used member checking with five participants to verify the final thematic structure.

Integration Procedure

The PI applied a weaving approach (Fetters et al., 2013) where quantitative and qualitative findings are presented together within each result domain rather than separately. A joint display matrix was constructed to compare geographic prevalence patterns with theme frequency counts across regions.

Ethical Considerations

The study adhered to the ethical principles of the Belmont Report, including respect for persons, beneficence, and justice. All participants provided written informed consent before enrollment. For participants in geographically isolated areas with limited internet access, consent forms were mailed with a prepaid return envelope, and a follow up telephone call reviewed the study purpose, risks, and voluntary nature of participation. Participants were informed that they could withdraw at any time without penalty. All identifying information was removed from transcripts, and pseudonyms were used in all reported quotations. Data were stored on an encrypted, password protected server accessible only to the research team. Compensation was provided as Amazon gift cards. Participants who expressed distress during interviews were offered immediate referral information for local or telehealth based support services.

V. RESULTS

Quantitative Findings: Prevalence and Temporal Trends

The weighted past year prevalence of any substance use disorder in Alaska from 2015 to 2020 was 14.3% (95% CI: 13.1, 15.5), significantly higher than the pooled national estimate of 9.1% (95% CI: 8.9, 9.3). Alcohol use disorder alone accounted for 12.8% (95% CI: 11.6, 14.0). Methamphetamine specific disorder prevalence was 3.9% (95% CI: 3.3, 4.5), while opioid disorder (heroin or prescription) was 2.1% (95% CI: 1.7, 2.6).

Significant geographic variation emerged (Table 1). The Southwest region (including Bethel and surrounding villages) showed the highest AUD prevalence at 18.2%, but the Northern region showed the highest methamphetamine use disorder at 6.7%. The urban core of Anchorage had intermediate rates for alcohol but the highest prescription opioid misuse at 3.4%.

Table 1. Weighted Prevalence of Past Year Substance Use Disorders by Geographic Region, Alaska 2015-2020 (NSDUH, N=2,847)

Region	AUD % (CI)	Meth % (CI)	Opioid % (CI)
Anchorage	11.2 (9.8-12.6)	3.5 (2.9-4.1)	3.4 (2.8-4.0)
Other Railbelt	13.5 (11.9-15.1)	4.1 (3.4-4.8)	2.0 (1.5-2.5)
Southeast	10.9 (9.1-12.7)	2.9 (2.1-3.7)	1.9 (1.3-2.5)
Southwest	18.2 (15.4-21.0)	5.8 (4.2-7.4)	1.4 (0.8-2.0)
Northern	15.4 (12.7-18.1)	6.7 (4.9-8.5)	1.2 (0.6-1.8)

Note. AUD = alcohol use disorder; CI = confidence interval.

Temporal analysis of ATADS admission data revealed a striking crossover. In 2015, alcohol accounted for 62% of all admissions and methamphetamine for 18%. By 2020, alcohol admissions had declined to 48% while methamphetamine admissions surged to 37% (p for trend $<.001$). Joinpoint regression identified a significant inflection point in Q2 2017, where the quarterly increase in methamphetamine admissions accelerated from 2.1% to 7.8% per quarter. The mortality data corroborated this shift: age adjusted alcohol related deaths declined by 12% from 2015 to 2020, but methamphetamine involved deaths increased by 310% (from 9.2 to 37.8 per 100,000).

Qualitative Findings: Three Core Themes

From the 45 individual interviews, 20 key informant interviews, and 12 focus groups, three superordinate themes were identified. Each theme is presented with subthemes and representative quotations.

Theme 1: Seasonal Isolation Polypharmacy

Participants across all regions described a cyclical pattern of substance use tightly coupled with extreme seasonal changes. In winter, with as few as four hours of daylight in the Northern region, participants reported using alcohol or benzodiazepines to induce sleep and escape what multiple

individuals called the crushing darkness. Conversely, summer months with 24 hour daylight were associated with methamphetamine and cocaine use to sustain energy for fishing, construction, or hunting.
A 34 year old male from Utqiaġvik stated, “Winter is for drinking yourself to sleep. Summer is for speeding to stay awake for three days straight. You never get a normal rhythm. Your body doesn’t know when to stop.” A community health aide from Bethel elaborated, “We see people switch substances like seasons. January, they come in with alcohol withdrawal seizures. June, it’s meth psychosis. We don’t have a protocol for seasonal polypharmacy, but it’s real.”

This theme appeared in 82% of individual interviews and all twelve focus groups. Participants often used the phrase dual season use. Key informants noted that treatment programs designed for lower latitudes do not account for this oscillation. A clinical director from Fairbanks explained, “Our 28 day model assumes stable environmental cues. Here, a person admitted in November is in total darkness. The same person discharged in March returns to light. That changes everything about relapse risk.”

Theme 2: Intergenerational Colonial Pain and the Substance as Anesthetic
The second theme connected substance abuse directly to historical trauma from boarding schools, forced relocation, and land dispossession. This theme was voiced most consistently by Alaska Native participants (n=33 of the 45 individuals) but was also acknowledged by non Native providers.
A 52 year old Yup’ik woman from a village near Bethel said, “My grandmother was beaten for speaking Yup’ik at the mission school. She drank to forget. My mother drank because that was the only way she knew to be close to her mother. I drank for the same reason. The alcohol is not the problem. The alcohol is the medicine that stopped working.” A 41 year old Inupiat man added, “People say why do you use meth in the village. I tell them, because my grandfather’s land was taken, his language was taken, his dignity was taken. Meth gives me back five minutes of feeling like I am not a ghost.”

Key informants reinforced this interpretation. A behavioral health director for a tribal consortium stated, “We have tried to import CBT and motivational interviewing from the Lower 48. Those tools assume a certain baseline safety and trust. They do not address the fact that for many of our people, the substance is the only reliable anesthetic for a pain that is collective, not individual.” Focus group participants in Anchorage described a phenomenon they called colonial hangover, where even second and third generation urban dwellers internalized the belief that substance use was an inevitable inheritance.
Quantitative data supported the qualitative depth: Alaska Native individuals had 3.2 times higher odds of meeting SUD criteria than non-Native Alaskans after adjusting for rurality and income (95% CI: 2.5, 4.1). However, the qualitative data revealed that this disparity is not merely demographic. It is intergenerational, spiritual, and narrative based.

Theme 3: The Fragile Continuum of Care and the Hub City Bottleneck

The third theme concerned structural barriers to treatment. Alaska's hub city model concentrates inpatient detoxification and residential treatment in Anchorage and to a lesser extent Fairbanks and Juneau. Remote village residents must fly to these hubs, often at personal expense or with limited tribal sponsorship. Once there, they face months long waiting lists, an absence of culturally specific services, and a discharge plan that returns them to the same village environment with no transitional support.

A 29 year old woman from Nome described a typical journey: "I got a voucher from the tribe for a 30 day rehab in Anchorage. I flew 800 miles. I sat on the waiting list for six weeks in a homeless shelter. I used meth the third night in the shelter because I could not take it. When I finally got into treatment, I was using again. They discharged me back to Nome with a bus ticket. There is no bus in Nome. There is no follow up."

A police officer in Bethel observed, "We arrest the same fifteen people for meth possession every three months. They go to Anchorage for court ordered treatment, they complete it, they come back, and within two weeks they are using again because the village has exactly one part time counselor who comes twice a month. The system is designed to fail."

Provider key informants identified three specific gaps. First, a shortage of detoxification beds: Alaska has 0.8 detox beds per 10,000 population compared to the national average of 2.4. Second, no medication assisted treatment for methamphetamine, which is the fastest growing primary substance. Third, a virtual care infrastructure that remains underfunded despite broadband expansion. A community health aide in Utqiaġvik said, "We have telehealth for diabetes. We have telehealth for cardiology. For substance use, we have a phone number that rings to an answering machine in Anchorage."

In focus groups, participants proposed solutions that were strikingly consistent across regions: (a) village based peer recovery coaches, (b) seasonal specific relapse prevention plans that differentiate winter and summer triggers, and (c) legal changes to allow tribal courts to mandate traditional healing camps as an alternative to incarceration. These proposals were not being systematically implemented at the time of data collection.

Integration: Joint Display of Quantitative and Qualitative Findings

The joint display (Table 2) cross tabulates geographic prevalence patterns with theme frequencies from focus groups. Regions with higher methamphetamine prevalence (Northern, Southwest) had the highest proportion of participants mentioning seasonal polypharmacy as a primary driver. Regions with higher AUD prevalence (Southwest) produced the most frequent mentions of intergenerational pain. All regions endorsed the fragile continuum of care theme, but participants in the Railbelt (closest to Anchorage) paradoxically reported the most frustration, possibly because of proximity without access.

Table 2. Joint Display of Quantitative Prevalence and Qualitative Theme Endorsement by Region

Region	Meth Prevalence %	% Participants Endorsing Seasonal Polypharmacy	% Endorsing Intergenerational Pain	% Endorsing Fragile Continuum
Anchorage	3.5	44	51	89
Other Railbelt	4.1	68	58	94
Southeast	2.9	39	47	81
Southwest	5.8	83	92	98
Northern	6.7	91	88	97

The integration suggests a dose response like relationship: methamphetamine prevalence rises with seasonal polypharmacy endorsement, while intergenerational pain endorsement correlates with both alcohol and methamphetamine, indicating a trans substance risk factor. The fragile continuum theme is nearly universal, implying that system level failures affect all regions irrespective of prevalence.

VI. DISCUSSION

This mixed methods study produced three principal findings. First, substance abuse in Alaska has undergone a rapid epidemiologic transition from alcohol to methamphetamine as the primary treatment admission diagnosis, a shift that intensified after 2017 and is most pronounced in the Northern and Southwest regions. Second, the drivers of use are not generic to rurality but are ecologically specific, including seasonal photoperiod extremes that encourage cyclical polypharmacy and a deeply embedded intergenerational colonial trauma narrative that transforms substance use from individual pathology to collective anesthetic. Third, the existing hub and spoke treatment system creates a fragile continuum of care, where remote residents undergo expensive, lengthy travel to urban centers only to return to environments devoid of transitional or aftercare support.

Comparisons with prior literature show both convergence and divergence. the alcohol prevalence estimates align with Bezrutczyk et al. (2018), but the methamphetamine findings exceed previous reports, suggesting that Alaska may be following a trajectory similar to rural parts of the western United States but accelerated by isolation (Jones & Bell, 2020). The seasonal polypharmacy theme has no direct precedent in the substance abuse literature, although related concepts exist in circadian rhythm research (Hunsaker & Jensen, 2017). This may represent a novel contribution specific to high latitude environments. The intergenerational trauma theme robustly confirms Gone and Trimble's (2019) colonial trauma theory but extends it by showing how substance preference (alcohol vs. methamphetamine) is sometimes narrated as a generational evolution rather than a random choice.

The fragile continuum finding echoes rural health disparities research (Quesada et al., 2014) but adds the distinctive Alaskan twist of air travel dependence. Unlike other rural regions where

personal vehicles can eventually reach a hospital, many Alaskan villages have no road connection. This geographic reality transforms a simple shortage of beds into a crisis of logistics.

VII. LIMITATIONS

Several limitations warrant attention. To begin, NSDUH excludes institutionalized populations and homeless individuals not residing in shelters, likely underestimating prevalence among the most severe users. Additionally, ATADS data include only admissions to publicly funded treatment, missing private pay or tribal self-insured admissions. Furthermore, qualitative participants were self-selected and may overrepresent individuals with more insight into their substance use patterns. Likewise, the study did not collect biological confirmation of substance use, relying entirely on self-report. Finally, the study period ended in 2020, before the full impact of the COVID 19 pandemic on Alaskan substance patterns could be assessed. Preliminary state data suggest worsening methamphetamine availability during 2021 to 2022, but those figures are not yet peer reviewed.

Implications for Policy and Practice

One immediate recommendation is that Alaska should expand village based peer recovery coaching, a low cost intervention that bypasses the hub bottleneck. The qualitative data showed strong support for this model. A second priority is that treatment protocols must become seasonally responsive, meaning discharge planning should include winter specific relapse prevention (light therapy, structured indoor activities) and summer specific strategies (sleep hygiene, work rest scheduling). A third necessary action is for the state to fund a medication development program for methamphetamine use disorder, given that no FDA approved pharmacotherapy exists and Alaska has become an inadvertent epicenter. Fourth, and critically, tribal healing camps with on the land programming should be reimbursed by Medicaid as a covered service, a change requiring federal waiver approval but strongly supported by the qualitative participants. Finally, real time surveillance systems that combine wastewater testing (already piloted in Bethel) with emergency department syndromic surveillance could provide earlier warning of substance transitions.

VIII. CONCLUSION

Substance abuse in Alaska is not a single epidemic but a constellation of regional syndromes shaped by latitude, colonial history, and infrastructural fragility. What presents as alcohol dependence in a Southwest village may emerge as methamphetamine psychosis in an arctic slope town, yet both share roots in seasonal extremes, disrupted kinship networks, and a medical system designed for temperate, road connected landscapes. The rapid rise of methamphetamine, the seasonal cycling of substances, and the intergenerational narratives of pain documented in this study demand a response that is simultaneously medical, cultural, and political. Medical interventions must include pharmacotherapy development for stimulant use disorder and expanded

detoxification capacity. Cultural responses require the full reimbursement of tribal healing camps, the integration of traditional knowledge into relapse prevention, and the restoration of place based identity as a protective factor. Political action must address the fragile continuum of care by funding village based peer recovery coaches, mandating seasonal responsive discharge planning, and rethinking the hub city bottleneck that forces remote residents to travel hundreds of miles for services that do not exist upon return. A one size fits all model imported from the Lower 48 will continue to fail. Instead, Alaska must invest in locally governed, ecologically adapted, and trauma informed systems that recognize the unique temporal and spatial dimensions of life above 60 degrees north. That means winter specific safety plans that account for darkness and isolation, summer specific strategies that manage extended daylight and disrupted sleep, and year round access to culturally safe care delivered in one's own community rather than in an urban shelter far from family and land. Without such investment, the cycles of solace and distress described by participants will persist across generations, becoming not a crisis to be solved but an inheritance to be endured. The choice is not between intervention and inaction, but between a future shaped by local voices or one repeated from somewhere else.

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