

Drug Use, Homelessness and Health: Responding to The Opioid Overdose Crisis with Housing First Models

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1 **Drug Use, Homelessness and Health: Responding to the Opioid Overdose Crisis with**
2 **Housing First Models**

3 **Abstract**

4 **Background:** Canada is in the midst of an opioid overdose crisis and Alberta has one of
5 the highest opioid use rates across the country. Populations made vulnerable through structural
6 inequities who also use opioids, such as those who are unstably housed, are at an increased risk
7 of experiencing harms associated with opioid use. The main purpose of this study was to explore
8 if there was an association between unstable housing and hospital use for people who use
9 opioids. **Methods:** Analysis utilized self-reported data from the Alberta Health and Drug Use
10 Survey which surveyed 813 Albertans in three cities. Hospital use was modeled using a logistic
11 regression with our primary variable of interest being housing unstable status. Chi square tests
12 were conducted between hospital use and variables associated with demographics, characteristics
13 of drug use, health characteristics, and experiences of receiving services to establish model
14 inclusion. **Results:** Results revealed a significant association between housing instability and
15 hospital use, with unstably housed individuals twice as likely to become hospital users.
16 **Conclusions:** Results highlight the importance of concurrently addressing housing instability
17 alongside the provision of harm reduction services such as Housing First programs and
18 supervised consumption sites. These findings have significant implications for policy and
19 policymakers during the opioid overdose epidemic, and provide a foundation for future areas of
20 research.

21 **Keywords:** opioids; homelessness; harm reduction; hospital use

22

23 **Background**

24 Canada is currently experiencing a national opioid overdose crisis. Since January 2016,
25 there have been over 15,300 apparent opioid-related deaths across Canada with over 19,300
26 hospitalizations due to opioid-related poisonings (Government of Canada, 2020). Between 2013
27 and 2018, hospitalizations related to opioid poisonings across Canada increased by 27%, while
28 rates of hospitalization and emergency department visits continue to rise (CIHI, 2018). The
29 Government of Canada has taken important steps to support individuals who use opioids across
30 the country by increasing access to treatment, expanding awareness and prevention of opioid-
31 related harms, supporting data collection and research, increasing access to harm reduction
32 strategies such as supervised consumption sites, and working to decrease the tainted drug supply
33 (Government of Canada, 2020).

34 Alberta continues to have some of the highest rates of opioid-related deaths, emergency
35 department visits, and hospitalizations within Canada. In Alberta, 2,667 individuals died from an
36 accidental opioid poisoning since January 1, 2016, with over 140 deaths already reported in the
37 first three months of 2020 (Government of Alberta, 2020a; Government of Alberta, 2020b).
38 Emergency department visits related to opioids and other drug use increased 41% between
39 January 1, 2016 and the third quarter of 2019, while hospitalizations related to opioids and other
40 drug use increased 19% between January 1, 2016 and the third quarter of 2019 (Government of
41 Alberta, 2020b). In the last quarter of 2019, Alberta reported over 2,470 emergency and urgent
42 care visits associated with opioids and other drug use, with 13% of individuals visiting more than
43 once (Government of Alberta, 2020b). Although opioid-related deaths, emergency department
44 visits, and hospitalizations are reported at a broad level, there is a lack of publicly available

45 demographic data. Specifically, there is no government-based reporting on opioid use or
46 overdoses specific to individuals who are unstably housed.

47 According to the National Health Care for the Homeless Council (NHCHC), housing is a
48 crucial social determinant of health and a lack of housing, or being unstably housed, is associated
49 with mental health concerns, physical health problems, trauma, greater mortality rates, and
50 substance use disorders (NHCHC, 2017). Individuals who are unstably housed are at an
51 increased risk of experiencing opioid use and overdose. For example, Yamamoto et al. (2019)
52 found a significantly higher risk of opioid overdose in those who were homeless than those who
53 were housed. Similarly, a study by Doran et al. (2018) revealed a significant association between
54 homelessness and opioid overdose. Results from other studies suggest overdose is the leading
55 cause of mortality in the homeless population with rates up to 17 times higher than the general
56 population (Baggett et al., 2013; Baggett et al., 2015). In British Columbia, a 2017 report
57 revealed almost 30% of individuals who experienced an overdose reported unstable housing, and
58 those with no fixed address were at a higher risk of experiencing repeated overdoses (BC Center
59 for Disease Control, 2017). Finally, Zivanovic et al. (2015) found that unstable housing was
60 independently associated with increased mortality rates, suggesting housing status is an
61 important risk factor to be considered among individuals that use drugs. Thus, there is evidence
62 to suggest there is an association between unstable housing and opioid-related harms.

63 Individuals who are unstably housed and use opioids often lack access to safe, adequate
64 healthcare and are overrepresented in mental health concerns including substance use, anxiety,
65 and depression (Magwood et al., 2020; Amari et al., 2011; Latimer et al., 2017). Results from
66 some studies suggest housing instability is associated with higher unmet needs and lower rates of
67 access to a family doctor, resulting in significantly more hospitalizations and visits to emergency

68 departments (Khandor et al., 2011; Jaworsky et al., 2016; Hwang et al., 2013). Not only does
69 housing instability and a lack of healthcare impact the individual experiencing inequities, the
70 economic impacts are substantial. In 2013, homelessness was estimated to cost the Canadian
71 economy more than \$7 billion annually including costs associated with healthcare services
72 (Gaetz et al., 2013). Furthermore, Latimer et al. (2017) examined the costs associated with
73 housing homeless individuals with mental health concerns across five Canadian cities and found
74 the average annual cost ranged between approximately \$29,000 and \$56,000 per person. These
75 authors argue that for every \$1 invested in housing and individualized case managed supports,
76 resulted in an average savings of just over \$2 in public costs.

77 To build upon the knowledge surrounding the importance of housing as a critical social
78 determinant of health within the opioid epidemic, the purpose of this study was to examine if
79 housing instability was associated with an increased likelihood of accessing hospital services for
80 problems with emotions, mental health, or alcohol/ drug use with additional variables of interest
81 including demographics, drug use characteristics, health characteristics, and/or experiences
82 receiving services.

83 **Methods**

84 *Participants*

85 We utilized self-reported data from the Alberta Health and Drug Use Survey results
86 (Alberta Health and Drug Use Survey, 2017 which surveyed 813 Albertans in three cities,
87 Calgary, Red Deer and Medicine Hat. Participants were recruited through local coalitions of
88 service providers in those cities. Information was collected on: 1) socio-demographics, drug use
89 and health; 2) drug use, risk behaviours, and experience of harm; 3) outcomes related to health
90 status, health service use, and unmet healthcare needs; and 4) acceptability of potential new

91 health services. For the purposes of the current study, the total analytic sample was 432
92 participants and included those participants who: 1) reported using opioids via injection or non-
93 injection within the six-month period prior to participating in the Alberta Health and Drug Use
94 Survey (carfentanil, china white, codeine, demerol, fentanyl, heroin, hydrocodone,
95 hydromorphone, methadone, morphine, oxycodone, oxycontin, oxyneo, percocet, speed balls,
96 street methadone, and talwin); and 2) provided a true response (i.e., not ‘Refused’ or ‘Don’t
97 Know’) to questions within the variables of interest for the current study including hospital use,
98 demographics, characteristics of drug use, health characteristics, and experiences receiving
99 services. Ethics approval was obtained through the University of Calgary Conjoint Health
100 Research Ethics Board REB:

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102

103 *Insert Table 1*

104 *Procedure*

105 Data was analyzed using Stata. Hospital use was modeled using a logistic regression with
106 our primary variable of interest being housing unstable status. Chi-squared tests were conducted
107 between hospital use and potential confounders.. All demographic variables were included in our
108 final model. Variables regarding characteristics of drug use, health characteristics, and
109 experiences receiving services were included if they met a relaxed significance value ($p \leq 0.1$)
110 and had variance inflation factors (VIF) scores below 2.5 when tested for multicollinearity
111 between independent variables (in a logistic regression on hospital use, not reported). Testing for
112 multicollinearity was conducted due to the multiple variables measuring drug use characteristics.
113 Variables with the highest p-values were removed from the model until the coefficients from the

114 initial model showed a change larger than 20%, which constituted our threshold for confounding.
115 At this point, all variables were left in the model and were considered confounders.

116 Once the final set of variables was established, interaction effects were tested for
117 between demographics and other explanatory variables, only keeping the significant interactions.
118 The adjusted model contained a single significant interaction effect: sex and diagnosis with
119 addiction or a mental health disorder.

120 **Results**

121 *Sample Characteristics by Hospital Use with Pearson Chi-Squared Results*

122 Table 2 presents sample characteristics by hospital use and results from the chi-squared
123 tests assessing the association between hospital use and demographics, characteristics of drug
124 use, health characteristics, and experiences receiving services.

125 Of the 432 participants, the majority were unstably housed (55.6%), male (65.3%), non-
126 Indigenous (67.4%), and had an average age of 37.4 years (range between 16 – 68). Regarding
127 hospital use, 42.4% of participants reported using hospital care (overnight or longer) within the
128 six months prior to being surveyed. Among those that reported using hospital care, 67.8% of
129 participants indicated unstable housing compared to those that did not use the hospital where
130 only 46.6% indicated unstable housing. When looking at location and hospital use, hospital users
131 were more likely to be in Medicine Hat or Red Deer (53.6%).

132 Of the 432 participants, 31.7% had reported an overdose within the six months prior to
133 taking part in the survey, 53.9% of participants reported using drugs 2-3x per week or more, and
134 77.1% reported being heavily influenced by drugs weekly or daily. Chi-squared test results
135 revealed multiple significant associations between participants who reported hospital use and
136 characteristics of drug use such as overdosing ($p = <0.001$), frequently neglecting other tasks due

137 to use ($p = <0.001$), frequently needing to use in mornings after heavy usage the night before
138 ($p = 0.004$), frequent polydrug use ($p = 0.003$), frequently being heavily influenced by drugs ($p =$
139 0.011), others noting they are worried about the participants use ($p = 0.004$), frequently feeling
140 an irresistible longing to use ($p = 0.038$), frequently feeling guilty due to drug use ($p = 0.023$),
141 and believing that themselves or others have been hurt due to their use ($p = 0.040$). In contrast,
142 participants without these higher risk drug use characteristics were proportionally less likely to
143 report hospital use.

144 Of the 432 participants, 81.2% of participants reported being diagnosed with an addiction
145 or mental health disorder. Chi-squared test results revealed a significant association between
146 diagnosis with addiction or mental health concern and higher likelihood of hospital use ($p =$
147 0.001).

148 Of the 432 participants, 55.1% of participants reported they were unable to access a type
149 of service they felt they needed. Chi-squared test results revealed a significant association
150 between hospital use and more unmet needs due to not having access to needed services ($p =$
151 0.017). 56.9% of participants reported they were unable to access enough services they felt they
152 needed.

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159

160 *Insert Table 2.*

161

162 *Logistic Regression of Hospital Use*

163 Table 3 reports the results from the logistic regression on unadjusted and adjusted
164 models, including an interaction term accounted for in the adjusted results. In the fully adjusted
165 model, participants who reported unstable housing (OR:2.04, 95% CI:1.29-3.21), an overdose
166 (OR:3.59, 95% CI:2.21-5.83), and neglecting tasks due to drug use on a frequent basis (weekly
167 or more) (OR:2.19, 95% CI:1.28-3.73) remained independently significant with a positive
168 association. After testing for interaction effects between variables, the primary variable of
169 interest for unstable housing did not have any significant interactions with the other variables
170 contained in the model. Therefore, while controlling for all other variables in the model, those
171 who were unstably housed were twice as likely to become hospital users.

172 The interaction effect between sex and having been diagnosed by a professional with an
173 addiction and/or a mental health concern was significant. Among males, the effect of diagnosed
174 status is insignificant and has minimal impact on hospital use; however, among females, those
175 who had a diagnosis of an addiction and/or mental health concern from a professional were
176 28 times more likely to use the hospital (OR for females with a diagnosis =
177 $\exp(\text{interaction}) * \exp(\text{diagnosis}) = (22.443) * (1.261) = 28.26$) than their counterparts. These results
178 indicate that while controlling for all other factors within the model, the effect of diagnosis for
179 addiction and/or mental health concerns among males is minimal or negligible in relation to
180 hospital utilization. In contrast to this, diagnosed status among females has a significant and
181 notable reaction on hospital use.

182 *Insert Table 3.*

183

184

185 **Discussion**

186 The main purpose of this study was to examine if housing instability was associated with
187 an increased likelihood to access hospital services for problems with emotions, mental health, or
188 alcohol/ drug use specifically amongst individuals who use opioids. Additional variables of
189 interest included demographics, drug use characteristics, health characteristics, and/or
190 experiences receiving services.

191 Results revealed that being unstably housed was associated with hospital use even after
192 accounting for the additional variables. This finding is similar to previous studies that have
193 found an association between unstable housing and increased utilization of hospital services
194 (Magwood et al., 2020; Khandor et al., 2011; Jaworsky et al., 2016; Hwang et al., 2013).
195 Housing is considered a crucial social determinant of health and a lack of housing can have
196 serious consequences on the health of homeless individuals. Homelessness has been associated
197 with high mortality rates, extreme poverty, poor oral and dental health, and chronic conditions
198 such as diabetes, seizures, respiratory problems, tuberculosis (TB), Human Immunodeficiency
199 Virus (HIV), and widespread issues with alcohol and drugs (Hwang, 2001). Our findings support
200 the growing evidence base highlighting the importance of housing and recovery-oriented models
201 such as Housing First (Gaetz et al. 2013b). Housing First models are rooted in the belief that
202 housing, not compliance or sobriety, is the foundation for recovery and once housing has been
203 secured, a person can successfully address other areas in their life such as physical health, mental
204 health, substance use, employment, and education (Gaetz et al. 2013b). Housing First models are
205 based on five principles that: 1) allow individuals to access permanent housing with no
206 requirements or conditions; 2) emphasize individual choice and self-determination; 3) focus on
207 recovery within a harm reduction approach; 4) recognize the uniqueness of each individual and

208 their needs once housing is secured; and 5) support individuals to integrate into their community
209 with social supports (Gaetz et al. 2013b). Not only does securing housing increase the physical
210 health and wellness of the unstably housed individual, studies show Housing First reduces
211 hospitalizations and emergency department visits, thereby decreasing the economic costs
212 associated with homelessness (Gaetz et al. 2013b).

213 As Magwood et al. (2020) purport, homeless individuals with substance use issues
214 benefit from harm reduction strategies, including Housing First, by improving access to care,
215 reducing opioid overdoses, and preventing or limiting the spread of infectious disease and other
216 chronic conditions. Housing First is particularly important for individuals who are using opioids
217 as they are high risk for overdose. Results from a study of people who use opioids who accessed
218 a Housing First program showed a 93% housing retention rate and 100% of participants accessed
219 overdose prevention education and naloxone while in the program (Katzenstein et al, 2019).
220 Future studies could explore the difference in hospitalizations and emergency department visits
221 for individuals who use opioids and are unstably housed and those in Housing First programs to
222 determine if there is a significant difference between the two groups.

223 Although the Government of Canada has advocated and approved of harm reduction
224 strategies and over 40 supervised consumption sites nationwide, the current Government of
225 Alberta has halted funding for new supervised consumption sites as of summer 2019, citing
226 socio-economic concerns. Supervised consumption sites provide a monitored environment for
227 individuals who use substances and offer support services such as counselling, social work, and
228 other opioid-dependency treatment options while reducing the transmission of infections and
229 diseases and lowering the risk of overdose (AHS, 2016). The Calgary supervised consumption
230 site responded to over 1,800 overdoses between October 30, 2017 and May 31, 2020 and

231 received over 151,000 client visits during this time (AHS, 2020). A recent study by Jackson
232 showed that each overdose managed at the Calgary supervised consumption clinic saved
233 approximately \$1,600 per overdose or over \$2.3 million in total emergency health costs since the
234 site opened. Future studies could examine if moving from a harm reduction approach to an
235 abstinence-based approach has resulted in a change in hospitalization and emergency department
236 visits and subsequent costs.

237 Interestingly, results revealed a significant interaction between sex and having a mental
238 health and/or addiction diagnosis with regard to hospital use. Females who had a mental health
239 and/or addiction diagnosis were 28 times more likely to use the hospital than undiagnosed
240 females, a relationship 22 times higher than the same one in males, suggesting that males and
241 females vary in their likelihood of hospital usage based on if they have received a diagnosis. This
242 indicates that among opioid users who use hospital services, there is an important interplay
243 between females and status of professional diagnoses for addiction and/or mental health. Future
244 research could examine the sex differences associated with opioid use, hospital use and mental
245 health and/or addiction diagnoses to determine how to best to support varied subpopulations.

246 **Limitations**

247 This analysis had several limitations that should be taken into consideration. Self-report
248 measures are subject to bias and open to interpretation by participants. Since the Alberta Health
249 and Drug Use Survey focused on collecting survey data from individuals actively accessing
250 services and agencies, individuals that were not actively accessing services were not captured
251 within this analysis resulting in a potentially non-representative sample. Similarly, previous
252 research suggests homelessness has been associated with a lower likelihood of seeking treatment,
253 which could also indicate a nuanced subset not covered within this analysis (Galea et al., 2004).

254 The analytic sample may not be generalizable because participants were excluded from the
255 analytic sample if they: 1) did not identify as either male or female due to low representation of
256 non-binary participants among the collected surveys; 2) only used non-opioid drugs, in order to
257 focus specifically on opioid drug use; and/or 3) could not provide clear answers to the questions,
258 or did not know or refused to answer questions. Finally, while many variables and potential
259 explanatory factors were controlled for or assessed as confounders it is possible that there are
260 additional unobserved explanatory factors not contained within this analysis.

261 **Conclusion**

262 Opioid overdoses in Canada continue to be a significant public health crisis and
263 individuals who are unstably housed are extremely susceptible to overdose. Unstably housed
264 individuals who use opioids are more likely to utilize hospital services, which impacts both their
265 individual health and wellness while having significant economic costs on society. These
266 findings highlight the importance of considering Housing First in conjunction with supervised
267 consumption services as an important part of harm reduction for populations made vulnerable
268 through structural inequities as part of the response to the overdose epidemic.

269

270 **Declarations**

271 **Ethics approval and consent to participate**

272 Ethics approvals were given by the University of Calgary Conjoint Health Research Ethics
273 Board REB# REB19-2156. Signed and Informed consent was obtained from all individual
274 participants included in the study.

275 **Consent for publication**

276 Not Applicable

277 **Availability of data and materials**

278 The datasets generated and/or analyzed during the current study are not publicly available due to
279 share ownership with not for profit community-based organizations but may be available from
280 the corresponding author on reasonable request.

281 **Competing interests**

282 The authors declare that they have no competing interests.

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285 Community Council on HIV) and Canadian Institutes for Health Research.

286 **Authors' contributions**

287 All authors contributed to the study conception and design. Material preparation, data collection
288 and analysis were performed by Jenna Passi, Lisa Zaretsky, Tong Liu and Daniel Dutton. The
289 first draft of the manuscript was written by Jenna Passi and all authors commented on previous
290 versions of the manuscript. All authors read and approved the final manuscript.

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296 wellness.

297

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Table 1. Variable Definition and Coding

Variable of Interest	Characteristic/Experience Absent or Infrequent (0)	Characteristic/Experience Present or Frequent (1)
<i>Outcome Variable</i>		
Hospital Use	No – hospital care (overnight or longer) was not used within the last 12 months due to problems with emotions, mental health, or alcohol/ drug use	Yes – hospital care (overnight or longer) was used within the last 12 months due to problems with emotions, mental health, or alcohol/ drug use
<i>Demographics</i>		
Housing Unstable	No – did not identify as housing unstable	Yes – identified as housing unstable
Sex	Male participants	Female participants
Indigenous Status	Non-Indigenous participants	Indigenous participants (First Nations, Metis, Inuit)
Age (real age)	Participants entered age in years	
Location	Calgary	Medicine Hat or Red Deer
<i>Characteristics of Drug Use</i>		
Had an overdose	No – did not overdose within past 6 months	Yes – did overdose within past 6 months
How often: polydrug use	Used more than 1 type of drug on the same occasion 2 to 4 times a month or less	Used more than 1 type of drug on the same occasion 2 to 3 times a week or more
How often: heavily influenced by drugs	Over the past year, are influenced heavily by drugs other than alcohol on a monthly basis or less	Over the past year, are influenced heavily by drugs other than alcohol on a weekly basis or more
How often: irresistible longing to use	Over the past year, you felt you had a longing to use drugs so strong that you could not resist on a monthly basis or less	Over the past year, you felt you had a longing to use drugs so strong that you could not resist on a weekly basis or more
How often: unable to stop use	Over the past year, you have not been able to stop taking drugs once you started on a monthly basis or less	Over the past year, you have not been able to stop taking drugs once you started on a weekly basis or more
How often: neglected tasks due to use	Over the past year, you have neglected to do something you should have due to having used drugs on a monthly basis or less	Over the past year, you have neglected to do something you should have due to having used drugs on a weekly basis or more
How often: need to use in morning	Over the past year, you have needed to use in the morning after heavy drug use the day before on a monthly basis or less	Over the past year, you have needed to use in the morning after heavy drug use the day before on a weekly basis or more

Table 1. Variable Definition and Coding

Variable of Interest	Characteristic/Experience Absent or Infrequent (0)	Characteristic/Experience Present or Frequent (1)
How often: feel guilty due to drug use	Over the past year, you have had guilty feelings or a bad conscience because you used drugs on a monthly basis or less	Over the past year, you have had guilty feelings or a bad conscience because you used drugs on a weekly basis or more
Hurt due to use	No – you or others have not been hurt (mentally or physically) due to your drug use	Yes – you or others have been hurt (mentally or physically) due to your drug use
Others worry due to use	No – relatives, friends, or medical professionals have not been worried about your drug use or said you should stop using	Yes – relatives, friends, or medical professionals have been worried about your drug use or said you should stop using
<i>Health Characteristics</i>		
Diagnosed with addiction or mental health disorder	No – health professional has not diagnosed you with an addiction or mental health disorder	Yes – health professional has diagnosed you with an addiction or mental health disorder
<i>Adequacy of Non-Hospital Services</i>		
Inadequate: Could not access	Reported no problem accessing health care services that were perceived as needed. Services include: information about medical treatment, medication or tablets, counselling outside of a hospital, social interventions, skills training, harm reduction services, and medical care for physical health.	Reported needing a service but was unable to access the service.
Inadequate: Did not receive enough	Reported no problem with accessing enough of the health care services listed above, either due to adequate amounts or not requiring them. .	Reported needing more of a service but was unable to access the amount required.

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400 Table 2. Sample Characteristics by Hospital Use with Pearson Chi-Squared Results (n=432)

Characteristic	Total n (%)	Hospital Use		p-value
		Yes 183 (42.4%)	No 249 (57.6%)	
Housing Unstable				

Characteristic	Total n (%)	Hospital Use		p-value
		Yes 183 (42.4%)	No 249 (57.6%)	
Yes	240 (55.6)	124 (67.8)	116 (46.6)	<0.001
No	192 (44.4)	59 (32.2)	133 (53.4)	
Sex				
Female	150 (34.7)	62 (33.9)	88 (35.3)	0.753
Male	282 (65.3)	121 (66.1)	161 (64.7)	
Indigenous Status				
Indigenous	141 (32.6)	66 (36.1)	75 (30.1)	0.193
Non-Indigenous	291 (67.4)	117 (63.9)	174 (69.9)	
Age, in years (range)*	37.4 (16-68)	36.3	38.2	0.117
Location				
Medicine Hat or Red Deer	224 (51.9)	98 (53.6)	139 (55.8)	0.054
Calgary	208 (48.1)	85 (46.4)	110 (44.2)	
Drug Use Characteristics				
Had an overdose				
Yes	137 (31.7)	89 (48.6)	48 (19.3)	<0.001
No	295 (68.3)	94 (51.4)	201 (80.7)	
How often: polydrug use				
2-3x/Week or More	233 (53.9)	114 (62.3)	119 (47.8)	0.003
2-4x/ Month or Less	199 (46.1)	69 (37.7)	130 (52.2)	
How often: heavily influenced by drugs				
Weekly or Daily	333 (77.1)	152 (83.1)	181 (72.7)	0.011

Characteristic	Total n (%)	Hospital Use		p-value
		Yes 183 (42.4%)	No 249 (57.6%)	
Monthly or Less	99 (22.9)	31 (16.9)	68 (27.3)	
How often: irresistible longing to use				
Weekly or Daily	261 (60.4)	121 (66.1)	140 (56.2)	0.038
Monthly or Less	171 (39.6)	62 (33.9)	109 (43.8)	
How often: unable to stop use				
Weekly or Daily	248 (57.4)	113 (61.7)	135 (54.2)	0.118
Monthly or Less	184 (42.6)	70 (38.3)	114 (45.8)	
How often: neglected tasks due to use				
Weekly or Daily	273 (63.2)	140 (76.5)	133 (53.4)	<0.001
Monthly or Less	159 (36.8)	43 (23.5)	116 (46.6)	
How often: need to use in morning				
Weekly or Daily	291 (67.4)	137 (74.9)	154 (61.8)	0.004
Monthly or Less	141 (32.6)	46 (25.1)	95 (38.2)	
How often: feel guilty due to drug use				
Weekly or Daily	313 (72.5)	143 (78.1)	170 (68.3)	0.023
Monthly or Less	119 (27.5)	40 (21.9)	79 (31.7)	
Hurt due to use				
Yes	359 (83.1)	160 (87.4)	199 (79.9)	0.040
No	73 (16.9)	23 (12.6)	50 (20.1)	
Others worry due to use				
Yes	370 (85.6)	167 (91.3)	203 (81.5)	0.040

Characteristic	Total n (%)	Hospital Use		p-value
		Yes 183 (42.4%)	No 249 (57.6%)	
No	62 (14.4)	16 (8.7)	46 (18.5)	
Health Characteristics				
Diagnosed with addiction or mental health disorder				
Yes	351 (81.2)	162 (88.5)	189 (75.9)	0.001
No	81 (18.8)	21 (11.5)	60 (24.1)	
Experience of Receiving Services				
Inadequate Access				
Yes	238 (55.1)	113 (61.7)	125 (50.2)	0.017
No	194 (44.9)	70 (38.3)	124 (49.8)	
Inadequate Amount				
Yes	246 (56.9)	109 (59.6)	137 (55.0)	0.346
No	186 (43.1)	74 (40.4)	112 (45.0)	

401 *p-value for age is a two-tailed t-test.

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403 Table 3. Logistic Regression onto Hospital Use (N=432)

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	Unadjusted			Adjusted		
	OR	95% CI	p-value	OR	95% CI	p-value
Housing Unstable (1 = Yes)	2.409	1.619- 3.586	0.000	2.035	1.289- 3.214	0.002
Sex (1 = Female)	0.937	0.627- 1.400	0.753	0.055	0.006- 0.474	0.008
Indigenous Status (1 = Indigenous)	1.319	0.873- 1.963	0.193	1.221	0.757- 1.968	0.413
Location (1 = Medicine Hat or Red Deer)	0.686	0.468- 1.007	0.054	0.669	0.429- 1.046	0.078
Had an overdose (1 = Yes)	3.965	2.584- 6.083	<0.001	3.586	2.206- 5.829	<0.001
How often: polydrug use (1= 2-3 times/week or more)	1.801	1.223- 2.663	0.003	1.108	0.675- 1.819	0.684
How often: heavily influenced by drugs (1= Weekly or Daily)	1.842	1.144- 2.966	0.012	1.298	0.722- 2.330	0.383
How often: irresistible longing to use (1= Weekly or Daily)	1.519	1.023- 2.257	0.038	0.753	0.418- 1.359	0.347
How often: unable to stop use (1= Weekly or Daily)	1.363	0.924- 2.011	0.118	0.767	0.439- 1.338	0.350
How often: neglected tasks due to use (1= Weekly or Daily)	2.839	1.861- 4.334	<0.001	2.187	1.284- 3.726	0.004
How often: feel guilty due to drug use (1= Weekly or Daily)	1.661	1.069- 2.581	0.024	1.094	0.637- 1.878	0.745
Others worry due to use	2.365	1.292- 4.329	0.005	1.728	0.850- 3.511	0.131

(1=Yes)

Diagnosed addiction or mental health concern	2.449	1.428-4.200	0.001	1.262	0.634-2.513	0.508
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(1= Weekly or Daily)

Inadequate Access	1.601	1.086-2.361	0.017	1.283	0.815-2.021	0.282
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(1=Yes)

Inadequate Amount	1.204	0.818-1.773	0.346	1.000	0.638-1.569	0.999
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(1=Yes)

Sex*Diagnosed	1.331	0.879-2.015	0.177	22.433	2.466-204.064	0.006
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Constant				0.001		<0.001
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