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Introduction

The COVID-19 pandemic has caused extensive social and economic upheaval, affecting the lives of Canadians and introducing various sources of stress. In addition to the increase in mortality from communicable diseases, the long-lasting socioeconomic uncertainty during the COVID-19 pandemic continues to reveal its effects on public health. Many pandemic-related stressors led to increases in substance use among Canadians since March 2020 (Canadian Centre on Substance Use and Addiction, 2022; Imitiaz *et al.,* 2021). Coupled with this is a noticeable difficulty in accessing housing, especially for individuals with substance use disorders and those experiencing homelessness (Galarneau, 2021). Substance use entails the recurrent consumption of alcohol or illicit substances and the improper use of over-the-counter or prescription medications. The use of these substances, whether illicit or not, has become a pressing concern for public health and sociology, representing a significant risk factor for various health issues and premature mortality (Henderson *et al*.; 2021; Rehm & Probst, 2018).

Similar to other social phenomena, substance use varies with socioeconomic status (SES) which encompasses social and economic measures, including employment, education, income, resource access, and relative social position (Baker, 2014). In addition, housing is a crucial yet often under-researched component of SES, where a disproportionate percentage of people with substance use disorder (SUD) also experience homelessness to varying degrees (Henderson *et al*., 2021). SES and substance use patterns share significant correlations, although directionality remains unclear (Nicholson, 2020). This project investigates the following questions: What is the relationship between access to housing, income, and the rise in current trends of illicit drug use

within Edmonton's inner city, and how have general trends in illicit substance use changed with the COVID-19 global pandemic?

My goals for this project are to understand how and to what extent is substance use linked to housing accessibility at the intersection of the COVID-19 pandemic and opioid epidemic. Additionally, what are some of the consequences of not having housing or adequate income for people who use drugs? The project aims to bridge the gap between theoretical frameworks and applied research to address the needs of vulnerable populations disproportionately affected by the pandemic.

To achieve these goals, I will analyze survey data provided by the Canadian Research Initiative in Substance Misuse (CRISM) and Inner City Health and Wellness Program (ICHWP), collected by Dr. Elaine Hyshka and her team at the University of Alberta. The dataset comprises approximately 500 participants, most recruited from Edmonton's inner city. The survey predominantly covers sociodemographic factors like housing, income, substance use, and access to safe supplies. For methods, I will use bivariate models and descriptive statistics to examine the relationships between housing, homelessness, and accessing healthcare services for people who use drugs (PWUD). The main theoretical frameworks guiding this research project will be Social Determinants of Health (SDOH) and its connection to Diseases of Despair.

2. Background Research

2.1: Understanding the role of theory: Social Determinants of Health & Deaths of Despair

The Social Determinants of Health (SDOH) are the social and economic conditions that affect the health status of individuals and groups (Marmot, 2005). The World Health Organization (WHO) has highlighted that the social conditions in the settings where individuals are born, live, learn, and work, have an impact on a variety of health, functional, and quality-of-life outcomes (World Health Organization, 2008).

Braveman (2011) identified two broad categories of SDOH: upstream and downstream social determinants. Downstream SDOHs are factors that are proximally close to health effects and, thus, more likely to be apparent. Upstream SDOHs, on the other hand, are broad fundamental causes that establish causal pathways that lead to health outcomes via downstream SDOH. Upstream SDOHs are more complicated to affirm as they are less readily apparent and, as a result, are considerably more complex. The WHO (2008) and Braveman (2011) highlight a few trends concerning upstream SDOH. First, they demonstrate that health-related behaviours and recommended medical care do not occur in a vacuum and are shaped by upstream SDOH related to living and working conditions. Furthermore, health is also shaped by social and economic resources that impact access to ideal living and working conditions and choices (World Health Organization, 2008).

Certain social factors can function as SDOH because they are connected to a wide range of resources that can be leveraged to enhance health directly and indirectly (Braveman, 2011). In the Canadian context, Bryant *et al.* (2011) identified specific social factors such as income,

education, housing, and Aboriginal status as SDOH in need of addressing health inequity, stating that housing is of "special importance in Canada as a social determinant of health" because Canada has undergone "significant policy shifts" that have led to a housing crisis and rising rate of people experiencing homelessness within Canada (Bryant *et al.,* 2011, p. 47). In addition, income has also been identified as a "key determinant of health" because it directly affects health-related inequalities and indirectly impacts the "material and social deprivation associated with lack of income" which contributes to health-related inequalities (Bryant *et al.,* 2011, p. 47). The effects of housing and income inequality have become increasingly apparent since the initial publication of this study. With the rise of two major health crises, the COVID-19 pandemic and the opioid epidemic, Social Determinants of health are essential in addressing and alleviating the burden of disease caused at the intersection of both health crises.

Within the context of the current opioid crisis in Canada and the United States, Dasgupta *et al.* (2018) argue that while the availability of drugs is undoubtedly a significant contributing component, the opioid crisis is currently a consequence of social and economic factors comprising socioeconomic status (SES) with opioids playing a crucial role in providing relief from "psychological and physical trauma, concentrated disadvantage, isolation, and hopelessness" (Dasgupta *et al.,* 2018, p. 182). The study also found that poverty and substance use issues "operate synergistically," which at the extreme ends of the spectrum are "reinforced by psychiatric disorders and unstable housing" (Dasgupta *et al.,* 2018, p. 183). This study's authors concluded that for any improvements to be made in the current drug crisis, the SDOH dynamics must be addressed.

For this project, the focus will primarily be on SES as a social determinant of health and especially on its impact on current trends of illicit substance use among people experiencing homelessness in Edmonton's inner city. Specifically, my project aims to investigate the link between SES as an SDOH and illicit substance use within the context of the COVID-19 pandemic. More broadly, the project will also examine the link between SES and diseases of despair by using the social determinants of health as the main theoretical framework guiding this research project.

The classification of diseases of despair encompasses a wide range of mortality causes, reflecting accidental deaths from poor mental health, often associated with economic stagnation. Deaths of despair often include suicide, drug overdoses, or liver failure (Case & Deaton, 2017). Deaths of despair, such as morbidities in the context of the opioid epidemic and illicit polysubstance use, are on the rise in populations where they were previously less common (Case & Deaton, 2017; Addorisio *et al.,* 2021). In Edmonton specifically, many who live in precarious conditions due to unstable housing or homelessness often report having problems with mental health in addition to or as a cause for illicit substance use (Addorisio *et al.,* 2021). Coupled with this, and as a pre-condition for SES as SDOH is the concurrence of other comorbidities such as Human Immunodeficiency Virus (HIV) and Hepatitis C (Jenkins *et al.,* 2021), which often stem from unsafe drug administration due to lack of access to clean supplies and environment (Addorisio *et al.,* 2021; Jenkins *et al.,*2021).

In essence, socioeconomic status (SES) can influence individuals' health through pathways connected to mental well-being and access to resources needed to treat or, better yet,

prevent morbidities and early mortality. As a result, while there have been substantial evolutions in healthcare, these advances have done little to reduce healthcare disparities because the social determinants of health that have influenced the current rise in illicit substance use, like housing and income, have yet to be addressed. Unfortunately, current interventions for the opioid epidemic have failed to address the current etiological realities of the epidemic, which have historically marginalized the voices of those with lived experiences. Every instance of death of despair has been a consequence of a long and prevailing series of policy failures and missed opportunities for harm reduction (Park *et al.,* 2020).

2.2: Housing as a Social Determinant of Health

Housing is a physical manifestation of one's socioeconomic status and is crucial in explaining health disparities' social origins (Braveman, 2011; Bryant, 2011; Nicholson, 2020). Lack of housing, or homelessness, can be viewed as a continuum of unstable housing, from people sleeping in tents, parks, and temporary shelters to living in poor housing and couch surfing (Addorisio *et al.,* 2022). Understanding that homelessness is a complex social issue outside of simply owning or renting property, it is also essential to consider that the majority of people experiencing homelessness within Alberta are also vulnerable to a host of other issues outside of SUD, including increased likelihood of criminalization (Gehring *et al.,* 2022) and other mental illnesses (Addorisio *et al.,* 2022). Without access to stable housing, finding resources for treating illnesses like SUD becomes incredibly difficult. For instance, a study by Huntley (2015) compared substance abuse severity among unhoused and housed adults in the Baltimore area and found that homelessness and mental health status are significant predictors of substance abuse in adults. In addition to homelessness, the mental health condition of adults is a strong predictor of

the intensity of substance abuse (Huntley, 2015). In this case, intervening mechanisms due to SES affect disease outcomes.

The trend is also consistent within the Albertan context, where Alberta has the highest unhoused population per capita in Canada (Addorisio *et al.,* 2022) while also experiencing some of the highest rates of opioid-related deaths, emergency room visits, and hospitalizations in Canada (Milaney *et al.,* 2021). A study by Milaney *et al*. (2021) surveyed 813 residents in Calgary, Red Deer, and Medicine Hat, where most residents reported being unstably housed. Results of the study found that individuals experiencing unstable housing were twice as likely to seek hospital care. Participants were more inclined to utilize hospital services if they reported unstable housing, experienced overdoses, or frequently neglected tasks due to drug use. Milaney *et al.,* (2021) argue that housing, rather than requiring compliance or sobriety, serves as the foundation for enhancing one's health and overall well-being. Once housing is established, individuals can effectively tackle other facets of their lives, including physical health, mental health, substance use, employment, and education. The study also clarifies that housing should "not [be treated as] a panacea" (Milaney *et al.,* 2021, p.8) but should be used in conjunction with other harm-reduction initiatives.

Furthermore, Addorisio *et al*. (2021) used a cross-sectional survey with 150 participants in Edmonton experiencing absolute homelessness to assess the unique unmet needs like counseling, skills training services, and harm reduction. From this study, the authors concluded that the participants experiencing homelessness had complex needs that were failing to be met, which often led to high rates of morbidity and lower life expectancy. Many participants reported

not knowing where to receive healthcare or being apprehensive about receiving healthcare due to prior treatment from healthcare staff. The authors found consistent trends in hospitalizations and emergency room visits, a similar trend by Milaney *et al*. (2021). The conclusion of this study found that the first step to recovery and access to health care resources for participants experiencing absolute homelessness was first to get them "indoors and into contact with primary and mental health care providers and housing staff" (Addorisio *et al*.,2021, p. 393). In other words, housing and other harm reduction techniques are crucial to serving the unmet and complex needs of participants and possibly others experiencing homelessness.

Magwood *et al*. (2019) reported similar findings in a systematic review, where individuals experiencing homelessness and those with SUD encounter significant social exclusion, numerous physical and mental health issues, and increased rates of premature illness and mortality. Given that homelessness and precarious housing are factors still linked to public injection, infection risks, and restricted healthcare access, it underscores the significance of providing easily accessible services near homeless communities. Additionally, it emphasizes the need for incorporating housing support services for individuals who are homeless and concurrently dealing with substance use disorders without pretenses of abstinence or other barriers to access.

While reflecting on previous studies on housing and substance use, it can be concluded that housing, as a condition of SES, needs to be addressed in future policy going forward. Unstable housing can lead to multiple disease outcomes, including both communicable and non-communicable diseases. Homelessness also introduces a variety of risk factors that can

affect the outcome of disease, including the fact that many individuals experiencing homelessness are also restricted from accessing primary health care to acquire complex and often unique needs required for recovery and stability, which is usually due to increased marginalization and social exclusion or lack of knowledge on where to seek help. Homelessness also provides multiple mechanisms for disease that can be produced over time. Housing as a SDOH continues to have both direct and indirect effects on healthcare disparities.

2.3: Housing as Harm Reduction

As previously stated, SES is a fundamental cause of healthcare disparities. As such, it is unsurprising that individuals experiencing homelessness are confronted with heightened rates of illicit substance use (Magwood *et al.,* 2019). During times of significant social and economic uncertainty like the pandemic, rates of substance use become increasingly exacerbated. While individuals may resort to substance use as a means of coping with inadequate living conditions, stress, and trauma associated with homelessness, it is also likely that the absence of stable housing impedes access to and adherence to treatment recommendations for SUD. For this reason, harm reduction becomes essential in mitigating and preventing morbidities caused by SUD and deaths of despair (Henderson *et al.*, 2021; Galarneau *et al.,* 2023). Harm reduction is a framework designed to mitigate the negative consequences of substance use and the associated social exclusion. Within harm reduction, specific interventions encompass responding to opioid overdoses with naloxone, establishing supervised consumption sites, and implementing clinics for safe supply and temporary shelters (Magwood *et al.,* 2019; Vakharia & Little, 2017).

With the advent of public health measures during the COVID-19 pandemic, PWUD experiencing homelessness reported a decrease in access to safe consumption sites (SCS), social

support, and healthcare staff due to limited hours of operation, building closures, and social distancing protocols (Galarneau *et al.,* 2021). Due to this, PWUD detailed taking risks they usually would not, such as using alternative drugs or using alone. More importantly, with mass closures of social support centres and funding for SCS during the pandemic, PWUD also reported heightened barriers to housing and steady income, necessities for safeguarding against substance-related morbidity and deaths of despair (Galarneau *et al.,* 2021). This trend is particularly alarming since housing and income are essential to accessing healthcare, especially during public health emergencies. Furthermore, restrictions to housing and safe supply situate many PWUDs in a vulnerable position of not only at risk of overdoses but also at a heightened risk of contracting COVID (Galarneau *et al.,* 2023). Many studies have recommended expanding access to harm reduction methods during public health crises, which continue to adhere to prior COVID-19 public health recommendations while not putting vulnerable populations at more risk (Galarneau *et al.,* 2023; Addorisio *et al*., 2021). These recommendations could include initiatives like temporary shelters, safer delivery methods including vending machines, and greater access to mental health care networks during periods of high anxiety and uncertainty marked by the pandemic (Galarneau *et al.,* 2021).

To address the unique issues of PWUD experiencing homelessness in Edmonton, specifically between February and March of 2022, Boyle Street Community Services operated an overdose prevention site (OPS) intending to alleviate COVID-19 transmission and other health risks for people experiencing homelessness (Galarneau *et al.,* 2023). People used the shelter-based OPS to use illicit substances (orally, intranasally, or by injection), receive medical attention, acquire sterile drug use equipment, and connect to extra health and social support

without leaving the shelter (Galarneau *et al.,* 2023). Most visits to the OPS included a consumption event, with the most common substances being Fentanyl, Heroin, and Methamphetamine. The shelter-based OPS also had a few advantages over previous service models in other provinces like Ontario and Saskatchewan, including the ability for users to consume legal or illegal drugs, accessibility to a larger population of people who were not subject to isolation orders, and the provision of a stable, secure space inside the shelter. However, when asked for feedback, many of the visitors to the OPS commented on the absence of inhalation services as a significant service need, which is in line with other research showing a strong propensity among users of illegal drugs to seek supervised inhalation services (Galarneau *et al.,* 2023). A significant portion of the population of PWUD who are homeless were left out due to the lack of supervised inhalation services, even though this OPS may have served a greater spectrum of service users than other shelters. Nevertheless, the inclusion of a temporary shelter offered much needed relief to visitors of the OPS.

Thus, having temporary and permanent housing is essential in preventing further morbidities and mortality among people experiencing homelessness, especially for those with SUD amidst the pandemic. Housing becomes an emergent need during public health emergencies in conjunction with other specific needs for PWUD, including alternative public health measures that protect against both COVID-19 but also substance use-related complications.

3. Proposed Methods

3.1 Data Review

Within the research project I participated in, data collection took place over several months in the form of interview surveys with participants, which concluded at the beginning of September. The tool for collecting participant data was called the Survey of People Who Use Drugs, created and distributed by ICHWP. The goal for the survey was to recruit at least 500 participants who self-identified as people who use drugs (PWUD) within Edmonton's inner city to understand their unique experiences and, more importantly, address any persistent or urgent unmet needs. Currently, ICHWP has successfully recruited participants for this study through a snowball sampling method. Most participants were interviewed at some of Edmonton's largest SCSs. These primarily included George Spady Society, Boyle Street Community Services, and Boyle Street McCauley (Radius) Health Centre. All participants were adults aged 18 or older and had been living in inner-city Edmonton for at least two weeks prior to their interviews. Currently, response rates for the survey are unknown because we are still inputting the dataset using RedCap, so there is no concrete information on the exact response rate. Since it is rare to ever have a survey with a perfect response rate, I plan to address missing data points through imputation or deletion methods, which will depend on the survey questions that I ultimately end up using. Currently, I have a general idea of which survey questions I will be using as proxies for the variables I plan on studying, which, in this case, include housing, income, and substance us

3.2 Measures

The two independent variables in this study will be housing and income. As of now, I have not recoded any of the variables, and depending on the questions asked, each of the questions

corresponding to a variable is either expressed as ordinal or nominal data. The first independent variable, housing, will be defined as a "permanent or semi-permanent place where [participants] live, either independently or with other people (e.g., transitional/bridge housing, social housing, formal or informal rental, home ownership)" (Hyshka, 2023, p. 3). Housing is hard to define as a singular state or phenomenon because, as the data collection has taken place, there have been many different ways that participants have understood the concept of housing. For this project, I will use Questions 8-12 from *Part 1: Sociodemographic Information* from the *Survey on People Who Use Drugs*. Questions 10 and 12, which ask participants to describe their current housing situation and differences in accessing housing since the COVID-19 pandemic, can be potentially interesting to consider because they are designed to ask about participants' perceived experiences on housing during the pandemic. Since the primary purpose of this study is to examine the link between socioeconomic issues like lack of housing and substance use faced by PWUD, these questions are essential to consider because they can give some insight, however slightly, into the lived experiences of the participants in the project. Using Questions 8 and 10, I would also like to compare participants who do have current housing and are stable to other groups of participants in their substance use patterns.

Additionally, for participants who answered "yes" to Question 11, it would also be helpful to examine their responses to Question 11.2. However, I am unsure how many participants this situation would apply to. Nevertheless, it will also give insight into any perceived issues with housing they may have, especially since one of the limitations of doing a survey like this would be to illustrate the whole picture and positionality of the participants in

this study, which is why currently, I am considering these questions as potential measures for housing.

Along with housing, income will also be addressed as these two variables have been previously studied together in the literature. Income is a relatively straightforward concept compared to housing and is measured using an ordinal scale on the survey, ranging from "Less than $20,000" to "Over 100,000". In this case, I plan to use Questions 6 to measure income and 13, 14, 15, and 16 to investigate changes in income and income sources amidst the pandemic. These are all in *Part 1: Sociodemographic Information* as well. Question 6 asks to report the total combined income from all sources from last year. Since income might not be a steady measure for some participants, and especially for participants who are relying on unstable employment or government assistance programs, I also wanted to consider questions 13-16, which ask about income sources before and since the pandemic as well as if there has been a change in the monthly income of participants since the start of the pandemic. Again, these questions are important to consider as income for many Canadians has been precarious since the start of the pandemic, and for PWUD experiencing homelessness, this issue may be even more pronounced (Addorisio *et al.,* 2022). A reflexive approach is again necessary because housing and income disruptions might affect different groups of people unequally. The effects of these two variables, housing and income, might be more devastating for PWUD, so comparing their situations before and after the pandemic is important to provide more purposeful aid in the future.

The dependent variable in this study will be substance use. Like housing, substance use exists on a spectrum. Some forms of substance use are casual and not of any particular concern, while others might be veering on the side of a substance use disorder or addiction. For some PWUD, substance use could be using licit or illicit substances or a combination of the two. Since there are a lot of considerations to address, it is also important to consider how I will measure substance use, including considering when substance use is perceived to be problematic or harmful. First, I narrowed down the collection of potential questions, ranging from Questions 22-28, 30, 31, 33, and 34, taken from *Part 2: Substance Use*. For now, I want to examine perceived problematic substance use in general, which is why I am leaving out questions that pertain to specific classes of substances, like opioids, amphetamines, or benzodiazepines, exclusively. However, if there is an indication from the preliminary data brief that there is an overwhelming number of participants that use one or two specific classes of substances, I would like to delve a bit deeper and perhaps modify my research questions to focus on opioid or amphetamine substance use. As of now, these questions are more general and focus mainly on general trends of substance use patterns before and during the pandemic, whether participants' substance use has increased since the pandemic, and whether participants feel like their substance use is a problem. In particular, Questions 33 and 34 would be interesting to examine further because they would give some further indication into whether participants themselves believe their substance use patterns have changed and whether they believe their substance use to be a problem. This is important to consider because, ultimately, this study aims to better attend to their needs and include them in the process by directly asking them these questions rather than inferring from other questions on the survey. Questions 33 and 34 are also worded so that there is no ambiguity in interpreting participants' answers. All of the questions for all three variables of

interest are either measured through a nominal or ordinal scale. I will not be recoding any data until later in the project.

As is the case with previous research, the needs of PWUD experiencing homelessness, regardless of location, are complex. Unsurprisingly, housing and income are a significant part of the equation but not the only factors to consider for PWUD experiencing homelessness. For instance, if the timeline allows for it, or future research projects, some other variables I would be interested in would be health and accessibility to basic amenities, including safe supply. These factors are important, especially when designing or implementing harm reduction initiatives.

3.3 Analytic Strategy

It is rare that one predictor variable suffices to explain a social phenomenon that we are interested in understanding using an outcome variable. Although we may believe that a particular predictor variable is the most significant, it is unlikely to be the only one that matters (Fogarty, 2019). Since I am studying the link between multiple variables, I expect to use multivariate regression models as part of my analytic strategy. The reason is that regression models allow for some flexibility to study individual and collective effects by multiple independent variables of varying levels on the dependent variable. This also includes variables besides housing and income because while these two variables are important, there might be other variables that might also play a notable role in substance use patterns among PWUD in Edmonton's inner city. Bivariate models may also be used to look at the relationship between housing and income and between one of the two independent variables, housing or income, and their link to substance use. A multiple regression model will allow my analysis to avoid accounts of spurious

correlations between variables. Additionally, regression is better suited for this type of study than other analysis methods like ANOVA since I am studying subject variables that are not randomly assigned.

Based on the survey questions, I mainly plan on using a multinomial logistic regression as an analytic strategy because all the questions I plan on studying can be grouped into ordinal or nominal data rather than interval ratios. In this case, I am considering using multinomial logistic regression to determine the link between variables like housing and income under SES and their collective and individual effects on substance use during the COVID-19 pandemic while controlling for other variables that may not be relevant to my research goals. Graphically, regression models are also helpful because they provide a straightforward scatter plot with a line of best fit that can also be used to infer the strength of the relationship between variables.

4. Research Plan and Timelines

For this project, the data that will be used will be collected and obtained from ICHWP. This data should be ready for analysis by the beginning of next semester for the second stage of this research project. Currently, the data is being inputted into RedCap and final adjustments are being made, so while it is unclear what the total sample size will be as of now and whether or not ICHWP will have met their goal of 500 participants, I should have a clearer idea by the end of this semester and into next semester on what the overall data set will look like.

4.1 Data Brief 1

Data analysis will primarily be next semester's focus, broken down into two major sections. The first data brief will be a preliminary analysis of the data set to look at the overall distribution,

size, and measures of central tendency of the sample size. That is, for each of the variables of interest— housing, income, and substance use— I will be organizing the data to independently understand the overall patterns of each of the three variables. The written part of this data set will incorporate a discussion on why I chose specific questions to incorporate into my research project and a brief discussion on the variables themselves. I am also interested in analyzing some further data on topics like substance use programs, mental and physical health, and harm reduction to have a clearer picture of overall trends of substance use patterns in inner-city Edmonton. The inclusion of other potential factors, such as accessibility and overall health of participants, is because I do not want to run the risk of ignoring certain variables that perhaps might be more important, as it has been established through the literature review that the needs and etiology of PWUD are complex, especially if they are also experiencing unstable housing or homelessness. The majority of the data analysis will be done in R, as an R markdown file, and I expect to use graphs and tables in addition to the descriptive statistics. The current timeline for the first data brief is expected to be complete by roughly Week 6 of the winter semester.

4.2 Data Brief 2

As for the second data brief, this will take a more robust approach to understanding the relationships between different variables, both bivariate and multivariate models. This data brief is expected to use inferential statistics, including regression models and other statistical tests for significance and correlation between the variables of interest. As mentioned, the relationship between the different variables of interest is expected to be complex based on previous research, making regression analysis the most appropriate statistical measure to use. Because I do not currently have access to the completed data set, I do not know if I will be using other inferential statistics to include in the second data brief; however, if need be, I will be sure to include them.

Graphs, tables, and interpretations of the output will focus on remaining clear and organized so that people with limited knowledge of statistics can understand the key results of the statistical analysis. As with the first data brief, this section will also be done in R using an R markdown file. The second data brief is expected to be completed at the end of Week 10 for the winter semester.

5. Conclusion

In conclusion, the research goals for this study will be to look at the links between housing and income as indicators of socioeconomic status with substance use among the population in Edmonton's inner city. The research questions, specifically, are: What is the relationship between access to housing, income, and the rise in current trends of illicit drug use within Edmonton's inner city, and how have general trends in illicit substance use changed with the COVID-19 global pandemic? This study will be guided by a previously established framework of social determinants of health (SDOH), which states that individual and group health outcomes are greatly influenced by the social and physical environment, including housing and income, which are components of socioeconomic status. SDOHs can be divided into downstream and upstream social determinants of health. For this study, I will mainly focus on the upstream social determinants of health. From prior research, it is expected that the needs of PWUD experiencing homelessness are considerably complex and often require a targeted approach to provide effective harm reduction. This is especially pronounced for PWUD during the COVID-19 global pandemic, where there has been a reported uptick in problematic substance use and overdose deaths and other deaths of despair. Since the onslaught of the pandemic, housing and safe supply have become increasingly more challenging to access, putting PWUD at considerable risk of turning towards laced substances or experiencing overdoses. While observing consistent patterns

of substance-related morbidities and mortalities, it is of vital importance to use principles of positionality and reflexivity that are invaluable in conducting meaningful research that causes the least amount of harm possible to marginalized communities. Furthermore, positionality and reflexivity are invaluable when considering the variables and individual survey questions used for this study.

As for the methods, I plan on studying the link between housing, income, and substance use to get a better understanding of how income and housing affect substance use patterns among participants of the Survey of People Who Use Drugs questionnaire, with a particular focus on questions that pertain to the three variables of interest, using multinomial logistic regression to do so. I do not have the completed data set, so many of the potential questions I am considering are not concrete. I plan on trimming the array of questions depending on the quality of the data collected for those questions. I will be breaking down the data analysis into two main data briefs. The first data brief will mainly focus on descriptive statistics, and the second will focus on inferential statistics. I expect the second data brief to include the main analytic models used to answer my research questions and to hopefully get a comprehensive insight into substance use among PWUD experiencing homelessness in Edmonton's inner city and to ultimately gain an appreciation for the importance of housing as a form of harm reduction that can hopefully help to alleviate the burden of disease caused at the intersection of the COVID-19 pandemic and the opioid epidemic.

6. Appendices and Research Materials

For this project, the *Survey of People Who Use Drugs* will be attached. Other than the survey, instruments such as RedCap and R will be used to digitize and conduct further data collection and analysis, respectively.

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