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Examining the prevalence of chronic homelessness among single adults according to national definitions in Canada

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Abstract
This article examines the prevalence of chronic homelessness when applying definitions used in Canada to a sample of homeless and vulnerably housed single adults enrolled in a multi-city longitudinal study. The federal government's current definition, Reaching Home, identified the highest proportion of homeless single adults (31 percent; 95% CI = 27.2 – 34.1) as "chronically homeless." Our findings suggest that the federal definitions of chronic homelessness, which are based on both shelter stays and periods of homelessness outside the shelter system, are double the size of this sub-population when compared to definitions based on shelter stays alone. Participants who were male, identified as Indigenous, and reported problematic drug use, were more likely to be chronically homeless for definitions based on any-kind of homelessness. The findings highlight the importance of counting unsheltered and hidden homelessness to estimate the number of single adults who are chronically homeless.

Keywords: chronic homelessness, definitions, prevalence

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Résumé
Cet article examine la prévalence de l'itinérance chronique lors de l'application de définitions utilisées au Canada à un échantillon d'adultes célibataires sans abri et logés de façon vulnérable, inscrits dans une étude longitudinale multi-villes. La définition actuelle du gouvernement fédéral, Reaching Home, a identifié la plus grande proportion d'adultes célibataires sans abri (31 pour cent ; 95 % CI = 27,2 - 34,1) comme «sans abri chronique». Nos résultats suggèrent que les définitions de l'itinérance chronique, qui sont basées à la fois sur les séjours en refuge et les périodes d'itinérance en dehors du système de refuge, représentent le double de la taille de cette sous-population par rapport aux définitions basées uniquement sur les séjours en refuge. Les participants qui étaient de sexe masculin, s'identifiaient comme indigènes et déclaraient avoir fait un usage problématique de drogues, étaient plus susceptibles d'être associés à l'itinérance chronique pour les définitions basées sur tout type d'itinérance. Les résultats soulignent l'importance de compter l'itinérance non abritée et cachée pour estimer le nombre d'adultes célibataires qui sont chroniquement sans abri.

Mots-clés : sans-abri chronique, définitions, prévalence

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Introduction

The Canadian definition of Homelessness, developed by the Canadian Observatory of Homelessness (COH), defines homelessness as "the living situation of an individual or family who does not have stable, permanent, appropriate housing without immediate prospect, or the means or ability to acquire it" (Gaetz et al. 2012, 1). Under this definition homelessness is conceptualized as involving a range of possible living situations that include individuals or families who are; (1) "unsheltered" (living in public or private places without consent), (2) "emergency sheltered" (staying at over-night homeless shelters), (3) "provisionally accommodated" (temporary housing with no security of tenure; e.g., hotels, rooming houses, or institutional care), or (4) "at risk of homelessness" (precarious housing situations, such as living in housing fails to meet public health and safety standards) (Gaetz et al. 2012).

To better understand the needs of people experiencing homelessness, past research has identified group differences within the population by assessing patterns in emergency shelter utilization (Aubry et al. 2013; Jadidzadeh and Kneebone 2018; Rabinovich, Pauly, and Zhao 2016). Specifically, using cluster analysis methods based on the number of episodes and duration of shelter stays examined over a period of several years, this line of research has found three distinct typologies of shelter users; (1) a group that use shelters temporarily and for short durations, (2) a group that experiences repeated episodes of shelter use but of relatively short duration, and (3) a group that stay in shelters for relatively long periods of time (Aubry et al. 2013; Echenberg and Munn-Rivard 2020; Kuhn and Culhane 1998).

Based on this research, single adults who experience repeated and long-term episodes of homelessness have received considerable attention from researchers, policymakers, and service providers (Byrne and Culhane 2015). This focus is due to the evidence that they have significantly more physical and mental health problems, utilize significant resources, and take up a majority of shelter beds (Aubry et al. 2013). Moreover, they represent the group of individuals who are most unlikely to exit homelessness without assistance and ongoing support (Aubry, Nelson, and Tsemberis 2015).

In efforts to better address the needs of this population, governments in Canada and the United States have provided definitions of "chronic homelessness." (Gaetz et al. 2012; HUD 2015). In these definitions, individuals who experience repeated episodes and long-term homelessness are grouped together as being "chronically homeless" based on a minimum number of days and episodes of shelter use within a given period.

However, there have been challenges in defining and measuring chronic homelessness. Namely, national estimates of chronic homelessness are either based on typology studies that focus on analyzing shelter data, or point-in-time counts that provide a snapshot of homelessness on a single day or night, making it difficult to observe trends over time. Additionally, it has been difficult to capture those that are experiencing "hidden homelessness" and those that are vulnerably housed. The hidden homeless are individuals who are provisionally accommodated or are tempo-

rarily staying with friends, family or strangers for short-term durations. In these cases, they are not paying rent, have no guarantee of continued residency, and lack the means to access and secure long-term housing in the near future (Gaetz et al. 2012). The hidden homeless have been a difficult population to study (Smith and Castañeda-Tinoco 2019). As result, there is a need for estimates of the prevalence of chronic homelessness to account for individuals who are homeless outside of shelters, experiencing hidden homelessness, or are vulnerably housed and at risk of homelessness.

Background

In Canada, Jadidzadeh and Kneebone (2018) conducted the most recent study on patterns and intensity of emergency shelters. They performed a cluster analysis of 2011–2016 administrative shelter data on single adults from Toronto, Ontario. Approximately 20% were experiencing chronic homelessness, with 9% that had repeated episodes of shelter use, while 8% were long-stay shelter users. Long-stay users utilized more than 40% of shelter capacity. Authors raised concerns over the growing number of long-stay shelter users and the impact it will have on the shelter systems' capacity to accommodate those seeking temporary support (Jadidzadeh and Kneebone 2018).

The trend toward long-stay shelter users in Canada is also evident in the 2019 Canadian National Shelter Study. Analysis of shelter use between 2005–2016 found that there has been a significant rise in the percentage of long-stay or chronic shelter users, increasing the demand for shelter beds (Duchesne, Cooper, and Baker 2021). Occupancy rates at emergency overnight shelters increased by more than 10% between 2005-2014, with an increase in periods of stays longer than 30 days (Segaert 2017).

In 2014, the Federal Government of Canada's *Homelessness Partnering Strategy* (HPS) defined individuals who are "chronically homeless" as those who have been homeless in a shelter or place not fit for human habitation for six months or more in the past year, and/or have experienced three or more episodes of homelessness in the past year (ESDC 2018). Using this definition, the provincial and federal governments have adopted survey strategies in the community to estimate the prevalence of chronic homelessness in Canada. In particular, they have routinely conducted point-in-time (PiT) counts to provide a snapshot of homelessness in a community over a 24-hour period (Echenberg and Munn-Rivard 2020; Segaert 2017).

In 2018, the Canadian government conducted a nationally coordinated PiT count of homelessness between March and April with over sixty cities and rural communities across Canada (ESDC 2019). The survey was done with people experiencing homelessness who were spending the night in a shelter, transitional housing, observed sleeping on the street on a single night, and in health and correctional institutions. People experiencing chronic homelessness according to the HPS definition accounted for 60% of all respondents (ESDC 2019).

Few studies have examined definitions of chronic homelessness. Messier, Tutty, and John (2021) used the number of days and episodes of homelessness to develop rapid thresholds for chronic homelessness using shelter stay records from the Calgary Drop-In Centre between July 2007 and January 2020. Findings indicated that the proposed rapid threshold (81 days and/or two or more episodes of shelter access over 90 days) identified a larger proportion of shelter users who were chronically homeless (30%) than the Government of Alberta (13.3%) and Reaching home (8.4%) definitions. Messier and co-authors (2021) suggested that rapid thresholds should be used for the early identification of shelter users who are chronically homeless for housing services.

Only one study to date has conducted research to directly examine the impact of changing definitions on the prevalence of homelessness. Byrne and Culhane (2015) used administrative data from emergency shelters in a large U.S. city between 2010 and 2012 to estimate the number of shelter users who were chronically homeless under the 2003 and 2015 U.S. Department of Housing and Urban Development (HUD) definitions of chronic homelessness. Roughly 6% of shelter users in the study met the HUD (2015) definition of chronic homelessness. The HUD (2015) defines a "chronically homeless" person as an individual who is homeless and living or residing in a place not meant for human habitation or in an emergency shelter continuously for at least one year, or on at least four separate occasions in the last three years, where the cumulative total of the four occasions is at least one year (Byrne and Culhane 2015). The proportion of shelter users who were chronically homeless under the HUD (2015) was almost half of the previous HUD (2003) which identified 14% of shelter users who are chronically homeless. Under the HUD (2003) an individual is experiencing chronic homelessness if they have been continuously homeless for one year or more or have had at least four episodes of homelessness over three years (Byrne and Culhane 2015). Despite being a smaller proportion, those who met the HUD (2015) definition of chronic homelessness were found to use shelter

far more frequently. Authors concluded that the HUD (2015) criterion was more appropriate for classifying those who are homeless for an extended period of time (Byrne and Culhane 2015). However, a major limitation of previous estimates of chronic homelessness is they either focus on the analysis of shelter utilization data, excluding individuals experiencing homelessness outside of shelters or provide data at single points in time that do not capture the cyclical nature of homelessness.

In 2019, the Government of Canada replaced the *Homeless Partnering Strategy* with a new strategy to address homelessness known as *Reaching Home*. As part of this strategy, a central goal of *Reaching Home* is to reduce chronic homelessness in Canada by 50% by 2028 (ESDC 2022). To accomplish this objective, broader and more accurate estimates of the prevalence of chronic homelessness are needed to most effectively target resources. *Reaching Home* presented a new definition of chronic homelessness that included those experiencing homelessness outside of emergency shelters.

In particular, *Reaching Home's* definition operationalizes homelessness to include time spent in the following situations: (1) unsheltered locations; places not intended for permanent human habitation such as public or private spaces without consent or contract, (2) emergency overnight shelters, and (3) temporarily with others without immediate prospects for accessing permanent housing (e.g., couch surfing), or short-term rental accommodations without the security of tenure. Under this definition, chronic homelessness is defined as experiencing long-term and/or recurrent homelessness, with a total of at least six months in one year or 18 months in three years (ESDC 2022).

Moreover, because national estimates still rely on administrative shelter data, *Reaching Home* also developed a new shelter-based indicator of chronic homelessness. Under the *Reaching Home* Indicator, individuals are considered to be "chronically homeless" if they meet at least one of the following criteria; (1) having a cumulative total of at least 180 days of shelter use over the past year, or, (2) experiencing repeated episodes of shelter use over a three-year period, with at least one episode per year (ESDC 2022).

The Current Study

Using longitudinal data collected in three Canadian cities, the primary objective of the current study is to compare the estimated prevalence of chronic homelessness that include any-kind of homelessness (i.e., unsheltered, emergency sheltered, living with others temporarily) with shelter-based measures according to government definitions of chronic homelessness in Canada. In addition, a goal of this study is to examine the demographic and health characteristics of individuals who are chronically homeless including those that experience any-kind of homelessness.

Data from the Health and Housing in Transition Study (HHiT) are used to estimate the size of the chronically homeless population. The HHiT study was a prospective cohort longitudinal study that tracked the health and housing status of a representative sample of homeless and vulnerably housed single youth and adults in three Canadian cities (Toronto, Ottawa, and Vancouver) (Hwang et al. 2011).

To estimate the prevalence of chronic homelessness based on any kind of homelessness, the following governmental definitions were examined: (1) *Homelessness Partnering Strategy* (HPS-D [2014]), (2) *Reaching Home* Definition (RH-D [2019]), and (3) Government of Alberta's definition of chronic homelessness (AB-D [Snyder et al. 2008]). To estimate the prevalence of chronic homelessness based on stays in shelters, shelter-based indicators developed for HPS and Reaching Home (RH-S [2019]) were used. Additionally, the demographic characteristics and health functioning of individuals identified as chronically homeless in the HhiT study were compared to those individuals who were not chronically homeless.

Methods

Description of Sample

In the HHiT study, single adults who were either absolutely homeless or vulnerably housed were randomly selected from shelters, meal programs, community health centers, drop-in centers, rooming houses, and single-room occupancy hotels in Toronto, Ottawa, and Vancouver between January to December of 2009. Participants were eligible for the study if they were age 18 years or older and did not live with a partner or dependent child (i.e., were single adults).

Recruitment

Homeless participants were recruited from shelters and meal programs in each city. Participants recruited in shelters were randomly selected using bed numbers. Homeless participants who did not use shelters were recruited at meal programs proportionally to the estimated number of homeless persons who slept on the street in each respective city. Vulnerably housed participants were recruited from randomly selected rooming houses in Ottawa and Toronto and from SRO hotels in Vancouver. However, due to limitations in accessing some of these locations, the recruitment strategy was modified for vulnerably housed individuals to include meal programs, drop-in centers, and community health centers.

At baseline, housing status was determined by current place of residence at the time of being recruited in the study. Participants were considered "homeless" if they were currently living in a shelter, public place, vehicle, abandoned building or temporarily staying with someone because they did not have a permanent place of their own. Participants were considered "vulnerably housed" if they reported living in their own room, apartment, or place, and had been homeless in the past 12 months and/or had at least two moves in the past 12 months. Participants who were living temporarily with friends and/or family and were paying rent were considered vulnerably housed, while those who were not paying rent were considered homeless.

Interview and follow-up procedures

At baseline, 1,190 participants completed in-depth, in-person interviews, that also included an assessment of their housing history in the past two years. Participants were interviewed at baseline, and 12 months intervals, over four years (2009–2013). Follow-up interviews were primarily completed in person, with some interviews being conducted via telephone for those individuals no longer living in the same city. At follow-up, housing history was evaluated from the date of the last interview to the date of current residence. Participants provided written informed consent and were compensated $20 CDN for completing the interview. The methodology used in the HhiT study was approved by the Research Ethics Boards at St. Michael's Hospital in Toronto, the University of Ottawa, and the University of British Columbia in Vancouver. In order to ensure a sufficient sample size and sufficient amount of time to capture chronic homelessness according to the different definitions, the current study utilizes data from baseline to the third follow-up, covering a three-year period.

Measures

Housing history

Housing history was assessed using the Housing Timeline Follow-Back Calendar (HTFBC), a validated method that allows for the collection of detailed information on housing history (Tsemberis et al. 2007). Working backwards from their current place of residence at each interview point, participants were asked to list all living situations over the one year since their previous interview, including the date of entry and data of exit into the living situations. Each residence in a participants' housing history was classified into one of 25 types of residence (Figure 1). These types of residence were further classified into one of three mutually exclusive residence categories: housed, institution, or homeless.

Definitions of chronic homelessness

Because definitions of chronic homelessness were based on time periods varying from one to three years in duration, three HHiT study periods were selected to operationalize the chronic homelessness criteria: Baseline – Follow-up 1 (Year 1), Follow-up 1 – Follow-up 2 (Year 2), Follow-up 2 – Follow-up 3 (Year 3). A participant was defined as homeless for every night they were without permanent housing, staying in a shelter, homeless on the street, and living on a campground or experiencing "hidden homelessness". Hidden homelessness was operationalized in line with the Canadian definition of homelessness (2012), whereby a participant was temporarily staying with friends/family without paying rent (e.g., couch surfing) (Figure 1).

The prevalence of chronic homelessness was estimated as the proportion of individuals who met the criteria of chronic homelessness for each definition. Table 1 presents the definitions and their corresponding criteria. Criteria were developed using the number of homeless days and homeless episodes over a one-year and three-year period. Analysis of any-kind of homelessness was conducted for definitions of chronic homelessness outlined by

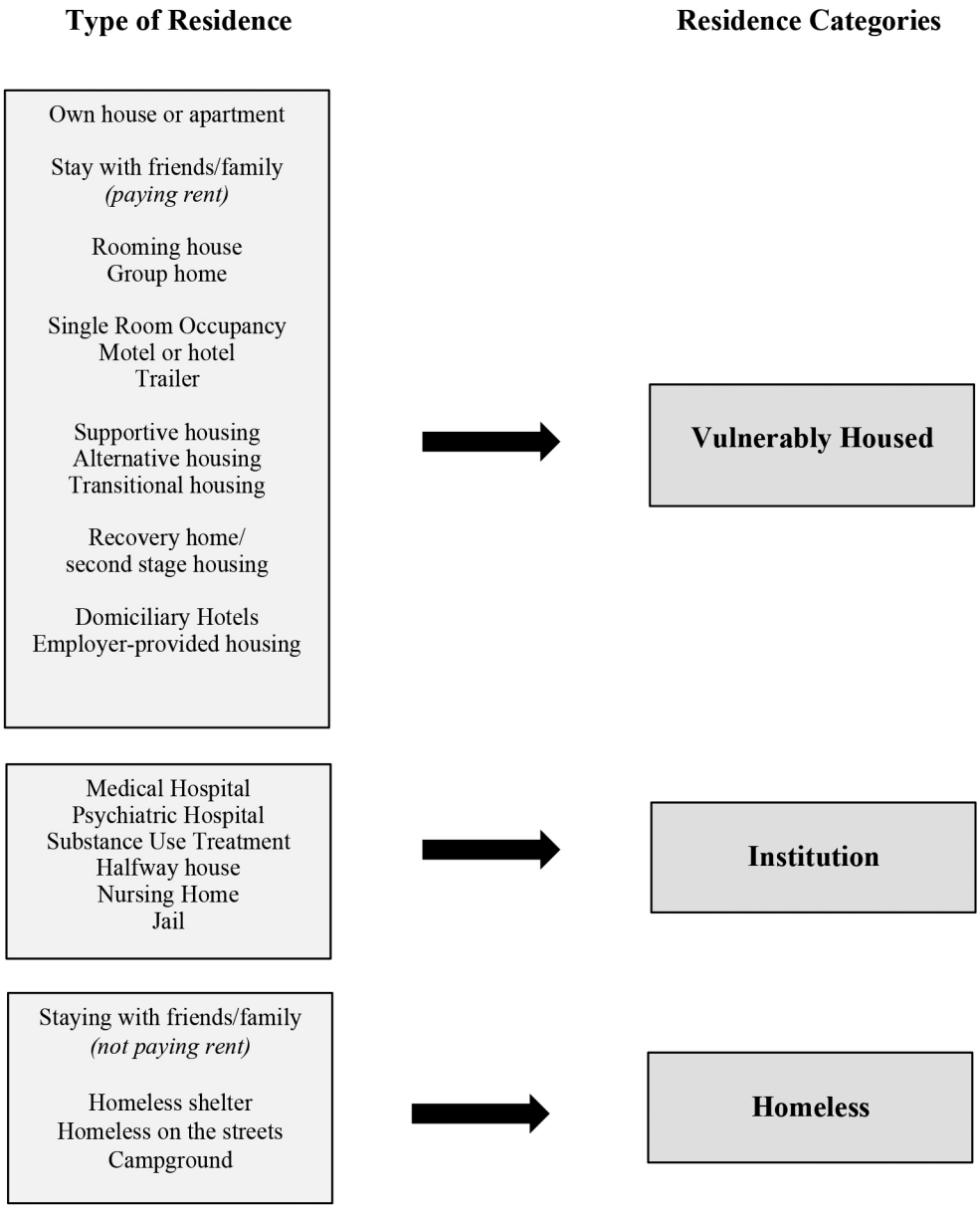

Figure 1
Types of residence and residence categories

HPS (HPS-D), RH (RH-D), and the government of Alberta (AB-D). Analysis based on shelter use was conducted as it has been operationalized for indicators developed for HPS (HPS-S) and *Reaching Home* (RH-S).

For consistency with the methodology used to assess shelter data, the number of homeless days was derived working backwards from the participant's last day of homelessness at the third follow-up period (Year 3) (Figure 2). A count of the number of days homeless was conducted over a one-year and three-year period going back to the baseline survey interview date. Days spent in institutions (e.g., prisons, jail, hospitals, etc.) were not counted as homeless days in line with HPS and RH definitions.

The following measures were developed to identify participants who met the criteria of chronic homelessness for the different definitions based on the number of homeless days: (1) homeless for 180 or more cumulative days in one year (365 days) working backwards from the last day of homelessness in Year 3 (2) homeless for at least 18

Table 1
Government definitions of homelessness in Canada and operationalization of corresponding criteria

	Definition	Criteria	
Any-kind of Homelessness		*Homeless Days*	*Homeless Episodes*
HPS-D Homelessness Partnering Strategy (2014)	Individuals who are currently homeless and have been homeless for a total of six months or more in the past year, and/or have experienced three or more episodes of homelessness	Homeless for 180 cumulative days or more in the past 365 days	Three or more episodes of homelessness in the last 365 days
RH-D Reaching Home (2019)	Individuals who are currently homeless and have been homeless for six months or more in the past year, and/or have recurrent experiences of homelessness over the past three years with a cumulative duration of at least 18 months	Homeless for 180 cumulative days or more in the past 365 days	Homeless for 546 cumulative days or more over three years
AB-D Alberta Chronic Homelessness (2019)	Individuals who are currently homeless and have been continuously homeless for a year or more, or have had at least four episodes of homelessness in the past three years.	Homeless for 365 continuous days	Four or more episodes of homelessness over the past 3 years
Homeless in a Shelter		*Homeless Days*	*Homeless Episodes*
HPS-S Homelessness Partnering Strategy Indicator (2014)	Individuals who are currently homeless and have been in a **homeless shelter** for a total of six months or more in the past year, and/or have experienced three or more episodes of shelter use, separated by 30 days, in the past year	180 or more cumulative days in a shelter in the last 365 days	Three or more episodes of shelter use in the last 365 days
RH -S Reaching Home Chronic Indicator (2019)	Individuals who are currently homeless and have been in a **homeless shelter** for a total of six months or more in the past year, and/or have recurrent stays in a homeless shelter such that they have stayed at least once between one and two years (365 - 730 days) back from their current stay and at least once between two and three years (730 – 1,095 days) back.	180 cumulative days or more in a homeless shelter the past 365 days	At least one or more episodes of shelter use per year over the last 3 years

months (546 or more cumulative days) over the three years: (3) continuously homeless for one-year (365 days) since the last day of homelessness in Year 3. For HPS-S and RH-S, the number of homeless days only included stays in homeless shelters.

A homeless episode was defined as a transition from being housed to being homeless. A transition from "homeless to an institution to homeless," was not considered a new episode whereas a transition from "housed to an institution to homeless" was considered a new episode. Transitions were separated by 30 days. (i.e, time spent houses and homeless ≥ 30 days) (Figure 3). The number of homeless episodes was derived working backwards from the participant's last day of homelessness in Year 3. For different definitions, three indicators were calculated based on the number of homeless episodes: (1) at least three episodes of homelessness in one year, since the last day of homelessness in Year 3; (2) at least four episodes of homelessness over three years; and (3) at least one episode of homelessness per year over three years.

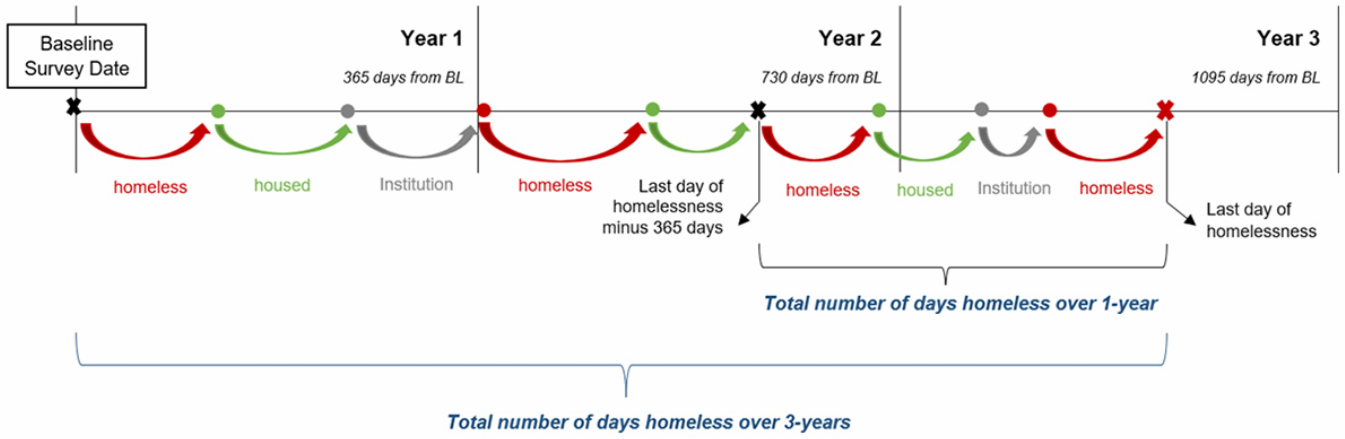

Figure 2
Calculation of homeless days
Note: Number of homeless days was derived working backwards from the participant's last day of homelessness in Year 3. HPS-D: cumulative days homeless over the past year. RH-D: cumulative days homeless over 3-years, from last day of homelessness in year 3 until baseline survey date. AB-D: continuous days homeless over the past year. Days. HPS-S and RH-S only included homeless days in shelters. Days in institutions are not included in the count. Prisons and jails are considered institutions.

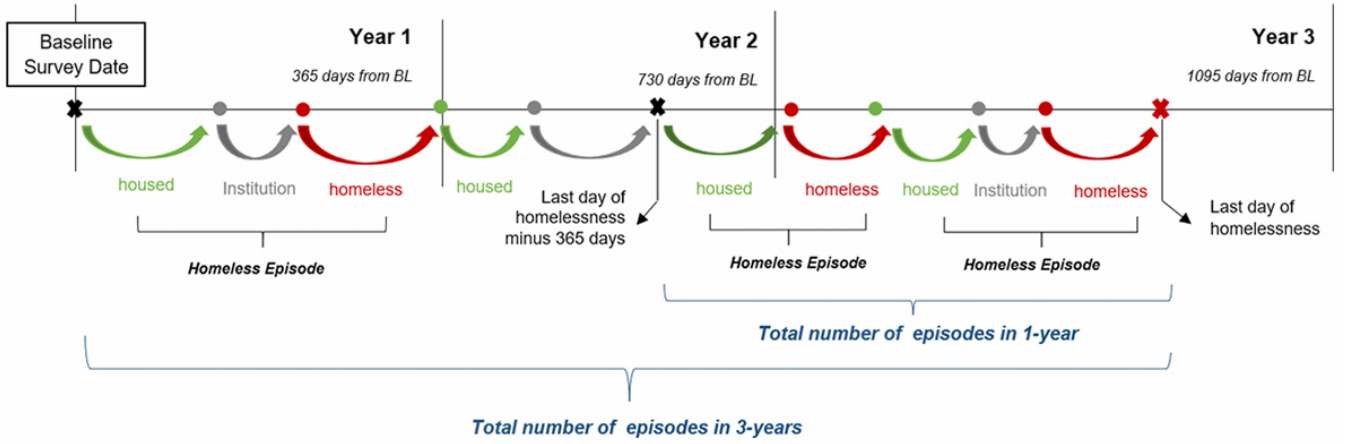

Figure 3
Calculation of homeless episodes
Note: Working backwards from the last day of homelessness in Year 3, the number of homeless episodes over 1-3years. An episode is considered as a transition from being housed to being homeless. Transitions must be separated by 30 days (i.e., number of days housed/homeless>30 days). Stays in institutions were considered if the individual had been housed prior to entering an institution and was homeless upon release.

Demographic and health characteristics

Demographic characteristics included gender, age, and ethnicity/race. Participants reported the presence of chronic physical health conditions as part of the baseline interview (Burt et al. 1999). Self-reported health status was assessed at each interview using the Short Form 12-item health survey (SF-12), which provided separate measures of physical health (Physical Component Summary Score [PCS]) and mental health (Mental Component Summary Scores [MCS]) (Kosinski et al. 2007; Larson 2002). Alcohol use was screened using the Alcohol Use Disorders Identification Test (AUDIT), which is used to identify hazardous drinking (Babor et al. 2001; Higgins-Biddle, and Babor 2018). Drug use was screened using the 10-item version of the Drug Abuse Screening Test (DAST-10; Yudko, Lozhkina, and Fouts 2007).

Data Analysis

For the different definitions, the number and proportion of participants meeting the criteria of chronic homelessness were calculated. Expectation-maximization single imputation was conducted to estimate a small number of missing

values (3.7 %) in the health status and substance use variables. The number of chronic physical health conditions was dichotomized into either having no conditions or having one or more conditions. Physical and mental component summary scores (SF – 12) reported at the third follow-up (Year 3) were included in the analysis. As well, threshold scores of AUDIT (score ≥ 20) and DAST (score ≥ 8) reported at the third follow-up, were used to dichotomize scores into either normal use or problematic use.

Hierarchical logistic regressions were conducted for each of the different definitions to investigate differences between individuals who were chronically homeless versus those who were non-chronically homeless. The first step in regressions included the city with Vancouver serving as the reference city, the second step entered demographic characteristics after controlling for the city, and the third and final step included health status and substance use characteristics, after controlling for the city and demographic characteristics. All analyses were conducted using SPSS v.26.

Results

A total of 713 of 1190 participants in the HHiT study were included. Participants with less than three years of data (n = 137) as well as those with zero days homeless over in the last three years of the study period were not included in the analysis (n = 330). There were no significant differences in demographic characteristics between the final sample (N = 713) and those who were not included in the study (N = 477).

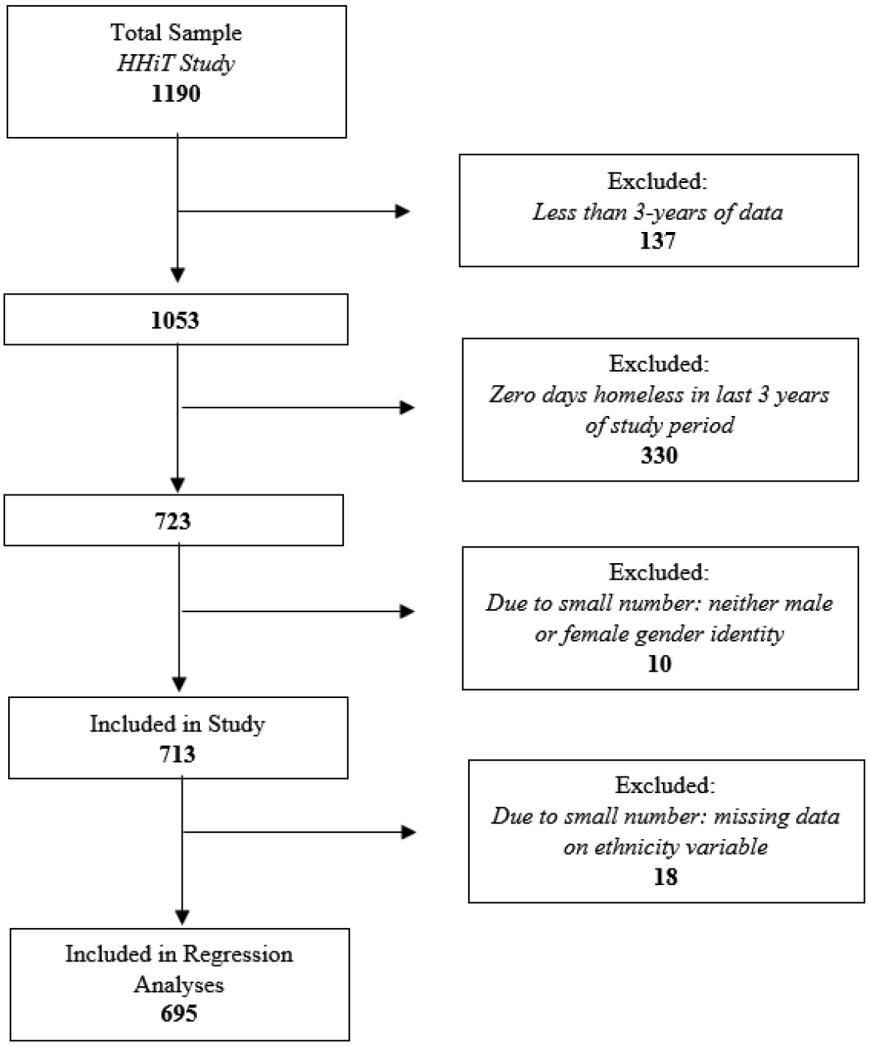

Figure 4
Consort diagram

Table 2
Number and proportion of participants that met criteria for chronic homelessness for each definitions (N = 713)

		Proportion of Sample			*Homeless Days M (SD)*			
Definition	N	(%)	(95% CI)		Past Year		Over 3 Years	
Any-kind of Homelessness								
HPS-D	189	(26.5)	(23.3	29.9)	307.1	(64.2)	672.2	(283.9)
RH-D	218	(30.6)	(27.2	34.1)	270.8	(112.6)	667.8	(265.5)
AB-D	100	(14.0)	(11.6	16.8)	329.3	(85.2)	760.2	(270.5)
Homeless in a Shelter								
HPS-S	95	(13.3)	(10.9	16.0)	312.4	(63.7)	707.6	(283.0)
RH-S	111	(15.6)	(13.0	18.4)	291.7	(89.0)	677.4	(285.5)

Table 2 presents the number of HHiT participants who met the criteria of chronic homelessness for each of the definitions. As shown in Table 2, the new *Reaching Home* definition of chronic homelessness (RH-D) identified the highest proportion of the sample as experiencing chronic homelessness (30.6%). Of all the definitions, AB-D (i.e., homeless for 365 continuous days and/or had four or more homeless episodes in three years) identified the smallest proportion of participants (14.0 %). Proportions of participants meeting definitions of chronic homelessness that included any- kind of homelessness were nearly double the proportions identified definitions based on shelter stays (i.e., HPS-D = 26.5% vs. HPS-S = 13.3 %; RH-D = 30.6% vs. RH-S = 15.6%).

Demographics and health characteristics

Table 3 presents a breakdown of the demographic characteristic of participants who were chronically homeless according to the different definitions. The Toronto sample (n = 227) had the highest proportions of individuals who were chronically homeless for definitions based on any kind of homelessness (RH-D = 37%), while Ottawa (n = 250) had the highest proportion based on exclusively shelter stays (RH-S = 19%). Of the total number of males included in the study (n = 476), the highest proportion (33%) were chronically homeless according to RH-D, while only 16% met the criteria outlined by AB-D. Additionally, for participants over the age of 50 (n =159), RH-D had the highest proportion with 37% that met the criteria of chronic homelessness. Of the total number of First Nation/Indigenous individuals included in the sample (n = 116), 38% met RH-D, while 33% met HPS-D. These proportions dropped to 11% and 16% for HPS-S and RH-S that relied on stays in homeless shelters.

Table 4 presents a breakdown of health status and substance use characteristics for participants who were chronically homeless according to the different definitions. Of participants reporting one or more chronic health conditions, the highest proportions met the definitions of chronic homelessness outlined by HPS-D (24%) and RH-D (28%). These proportions dropped by nearly 50% when based exclusively on stays in shelters (HSP-S = 12% and RH-S = 14%). All of the definitions, whether based on any kind of homelessness or limited to shelter-based homelessness, showed similar scores on measures of physical health (PSC SF-12 range = 43 - 46) and mental health (MCS SF-12 range = 41- 42). Of participants above threshold scores for drug use (DAST score ≥ 6) approximately one-third (29-33%) met the HPS-D and RH-D definitions of chronic homelessness. Finally, of definitions, RH-D had the highest proportion (44%) of participants above threshold scores for alcohol use (AUDIT score ≥ 20) who were chronically homeless.

Regression analyses

A total of 695 individuals were included in the regression analyses. Due to the small sample size, individuals that identified as transgender (n = 10) were not included. Additionally, a small number of participants (n = 18) were excluded due to missing data on the ethnicity variable (Figure 4). Five hierarchical logistic regressions were conducted to determine the association between chronic homelessness and city (Model 1), demographic characteristics (Model

Table 3

Breakdown of demographic characteristics of participants who were chronically homeless according to definitions of chronic homelessness in Canada (N=713)

		Any-kind of Homelessness						*Homeless in a Shelter*			
	Total	**HPS-D**		**RH-D**		**AB-D**		**HPS-S**		**RH-S**	
	N = 713	189	(27%)	218	(31%)	100	(14%)	95	13%	111	(16%)
City (n, %)											
Vancouver	236	48	(20%)	53	(23%)	27	(11%)	23	(10%)	28	(12%)
Toronto	227	72	(32%)	84	(37%)	40	(18%)	33	(15%)	35	(15%)
Ottawa	250	69	(28%)	81	(32%)	33	(13%)	39	(16%)	48	(19%)
Gender (n, %)											
Female	237	51	(22%)	62	(26%)	23	(10%)	28	(12%)	32	(14%)
Male	476	138	(29%)	156	(33%)	77	(16%)	67	(14%)	79	(17%)
Age groups (n, %)											
18 to 24	42	9	(21%)	12	(29%)	5	(12%)	3	(7%)	4	(10%)
25 to 49	512	131	(26%)	147	(29%)	71	(14%)	66	(13%)	77	(15%)
over 50	159	49	(31%)	59	(37%)	24	(15%)	26	(16%)	30	(19%)
Ethnicity (n, %)	N = 695	184	(26%)	212	(30%)	97	(14%)	92	(13%)	108	(15%)
White	439	103	(23%)	120	(27%)	53	(12%)	50	(11%)	61	(14%)
Black/African-Canadian	64	20	(31%)	22	(34%)	13	(20%)	12	(19%)	12	(19%)
First Nations	116	38	(33%)	44	(38%)	17	(15%)	13	(11%)	18	(16%)
Mixed/ Other ethnicity	45	23	(26%)	26	(34%)	14	(18%)	17	(22%)	17	(22%)

Note: Estimated proportions represent the number of participants who were chronically homeless for each demographic category. Demographic Characteristics are reported at baseline. Homeless Partnering Strategy (HPS), Reaching Home (RH), Alberta (AB), Homeless Partnering Strategy Indicator – Shelter (HPS-S), Reaching Home Indicator - Shelter (RH-S)

Table 4

Breakdown of health status and substance characteristics of participants who were chronically homeless according to definitions of chronic homelessness in Canada (N=713)

			Any-kind of Homelessness						*Homeless in a Shelter*			
	Total		**HPS-D**		**RH-D**		**AB-D**		**HPS-S**		**RH-S**	
	N = 713		189	(27%)	218	(31%)	100	(14%)	95	(13%)	111	(16%)
Chronic Health Conditions [a]												
Zero, n (%)	92		40	(43%)	45	(49%)	21	(22%)	21	(23%)	23	(25%)
One or more, n (%)	621		149	(24%)	173	(28%)	79	(12%)	74	(12%)	88	(14%)
Physical Health functioning [b]												
PCS SF-12, mean (sd)	43.6	(11.2)	44.2	(11.0)	43.9	(10.9)	45.6	(10.3)	43.5	(11.0)	43.9	(11.0)
Mental Health functioning [b]												
MCS SF-12, mean (sd)	42.6	(12.3)	40.9	(12.1)	41.5	(12.2)	41.7	(13.1)	40.7	(12.1)	41.2	(12)
Problematic Drug Use [c]: n (%)												
Below threshold	565		145	(26%)	169	(30%)	80	(14%)	76	(13%)	88	(16%)
Above threshold (DAST ≥ 6)	148		44	(29%)	49	(33%)	20	(14%)	19	(13%)	23	(16%)
Problematic Alcohol Use [c]: n (%)												
Below threshold	615		151	(25%)	175	(28%)	81	(13%)	78	(13%)	94	(15%)
Above threshold (AUDIT ≥ 20)	98		38	(39%)	43	(44%)	19	(19%)	17	(17%)	17	(17%)

Note: Estimated proportions represent the number of participants who were chronically homeless for each health status and substance use category. Homeless Partnering Strategy (HPS), Reaching Home (RH), Alberta (AB), Homeless Partnering Strategy Indicator – Shelter (HPS-S), Reaching Home Indicator - Shelter (RH-S)

a) Chronic health conditions (reported at baseline) include high blood pressure; heart disease; asthma; COPD (includes emphysema and chronic bronchitis); cirrhosis; Hepatitis B or C; intestinal or stomach ulcers; urinary incontinence; bowel disorders; arthritis; problems walking, lost limb, or other physical handicap; HIV/AIDS; epilepsy; fetal alcohol syndrome or fetal alcohol spectrum disorder; head injury; glaucoma; cataracts; cancer, diabetes; or anemia.

b) Physical Health Component Score (PSC) and Mental Health Component Score (MSC) reported at follow-up 3

c) Problematic drug use (DAST) and alcohol use (AUDIT) reported at follow-up 3

Table 5
Results of hierarchal logistic regressions comparing chronically and non-chronically homeless groups according to the definitions of chronic homelessness in Canada (N = 695)

	Any-Kind of Homelessness									*Homeless in a Shelter*					
	HPS -D			**RH-D**			**AB-D**			**HPS-S**			**RH-S**		
	OR	(95% CI)		OR	(95% CI)		OR	(95% CI)		OR	(95% CI)		OR	(95% CI)	
Model 1: City															
City (ref: Vancouver)															
Toronto	**1.81**	(1.18	2.79)	**1.99**	(1.31	3.01)	**1.75**	(1.02	3.01)	1.68	(0.94	3.01)	1.42	(0.82	2.46)
Ottawa	1.51	(0.98	2.31)	**1.66**	(1.11	2.51)	1.23	(0.71	2.15)	**1.82**	(1.04	3.20)	**1.85**	(1.10	3.09)
Model 2: Demographics															
Gender (ref: female)															
Male	**1.73**	(1.17	2.56)	**1.58**	(1.09	2.28)	**2.12**	(1.25	3.59)	1.30	(0.79	2.14)	1.36	(0.85	2.18)
Age (ref: 25 to 49)															
18 to 24	1.15	(0.52	2.52)	0.90	(0.44	1.86)	1.04	(0.38	2.81)	2.20	(0.64	7.54)	1.89	(0.64	5.58)
over 50	1.61	(0.70	3.73)	1.46	(0.67	3.16)	1.27	(0.44	3.68)	3.28	(0.91	11.77)	2.79	(0.90	8.64)
Ethnicity (ref: White)															
Black/African Canadian	1.49	(0.82	2.71)	1.34	(0.75	2.39)	1.91	(0.95	3.84)	1.95	(0.95	4.01)	1.61	(0.79	3.27)
First Nations/ Indigenous	**2.03**	(1.27	3.25)	**2.11**	(1.33	3.33)	1.55	(0.84	2.86)	1.20	(0.61	2.34)	1.41	(0.78	2.55)
Mixed/ Other ethnicity	1.54	(0.88	2.68)	1.52	(0.88	2.60)	1.68	(0.86	3.26)	**2.72**	(1.43	5.17)	**2.20**	(1.17	4.12)
Model 3: Health & Substance Use															
Chron. Health Condition (≥1)	**0.41**	(0.25	0.67)	**0.39**	(0.24	0.64)	0.59	(0.33	1.05)	**0.49**	(0.27	0.88)	**0.50**	(0.28	0.89)
Health Status															
Physical Health (PSC SF-12)	1.00	(0.98	1.02)	1.00	(0.98	1.02)	1.01	(0.99	1.03)	0.99	(0.97	1.02)	1.00	(0.98	1.02)
Mental Health (MSC SF-12)	**0.98**	(0.97	0.99)	0.99	(0.98	1.00)	0.99	(0.97	1.01)	0.98	(0.97	1.00)	0.99	(0.97	1.00)
Substance Use															
Problematic Alcohol Use (AUDIT)	1.15	(0.73	1.81)	1.17	(0.76	1.82)	0.79	(0.43	1.45)	0.80	(0.43	1.49)	0.91	(0.51	1.59)
Problematic Drug Use (DAST)	**1.65**	(1.01	2.69)	**1.76**	(1.09	2.84)	1.45	(0.79	2.66)	1.45	(0.77	2.74)	1.07	(0.57	1.98)

Note: Health Status and Substance Use reported at Year 3; City, Demographic Characteristics and Chronic Health Conditions reported at Baseline. Homeless Partnering Strategy (HPS-D), Reaching Home (RH-D), Alberta (AB-D), Homeless Partnering Strategy Indicator – Shelter (HPS-S), Reaching Home Indicator - Shelter (RH-S). Physical Health Component Score (PSC), Mental Health Component Score (MSC).

2) and health status and substance use characteristics (Model 3) for each of the different definitions. Table 5 presents odds ratios and 95% confidence intervals estimates for each definition separately.

Across definitions, significant differences were found based on city. For definitions based on any-kind of homelessness, participants who were chronically homeless had significantly higher odds of living in Toronto compared to Vancouver. Additionally, compared to those living in Vancouver, participants living in Ottawa were more likely to meet the criteria for chronic homelessness according to RH-D (OR = 1.66, 95% CI = 1.11 – 2.51) as well as for HPS-S (OR = 1.82, 95% CI = 1.04 – 3.20) and RH-S (OR = 1.85, 95 CI = 1.10 – 3.09).

Compared to females, males were more likely to meet criteria for chronic homelessness for definitions based on any-kind of homelessness HPS-D (OR =1.73, 95% CI = 1.17 – 2.56), RH-D (OR = 1.58, 95% CI = 1.09 – 2.28) and AB-D (OR = 2.12, 95% CI – 1.25 – 3.56). However, these gender differences were not found for definitions based on stays in shelters. No differences were found between the chronically homeless group and the non-chronically homeless group by age category.

Significant differences were found were different ethnic/racial backgrounds. In particular, differences were present in the case of Indigenous identity and those that reported mixed/other ethnicity. Those identifying as Indigenous were significantly more likely to meet the criteria of chronic homelessness compared to the White ethnic group for HPS-D (OR = 2.03, 95% CI = 1.27 – 3.25) and RH-D (OR = 2.11, 95% CI = 1.33 – 3.33). These differences were no longer significant for definitions based on shelter stays. However, significant differences were found for those identifying as being of a mixed/other ethnic background, namely in the direction of more likely being chronically homeless compared to those in the White ethnic group in the case of definitions based on shelter stays (HPS-S: OR = 2.72, 95% CI = 1.43 – 5.17 and RH-S: OR = 2.20, 95% CI = 1.17 – 4.12).

Significant differences were found in the number of chronic conditions reported by participants for several definitions in the direction of the non-chronically homeless group reporting more chronic health conditions than the chronically homeless group. Specifically, those reporting one or more were less likely to be chronically homeless across four of the five definitions, HSP-D (OR = 0.41, 95% CI = 0.25 – 0.67), RH-D (OR = 0.39, 95% CI = 0.24 – 0.64), HPS-S (OR = 0.49, 95% CI = 0.27 – 0.88) and RH-S (OR = 0.50, 95% CI = 0.28 – 0.89).

No associations were found between measures of physical health (PSC SF-12) and chronic homelessness for any of the definitions. In terms of mental health, differences were found with the chronically homeless group reporting lower levels of mental health (PSC SF-12) in comparison to the non-chronically homeless group in the case of HPS-D (OR = 0.98, CI = 0.97 – 0.99). Finally, differences emerged between the chronically homeless and non-chronically homeless groups in terms of substance use, with those above the threshold for problematic substance use (DAST>8) more likely to meet criteria outlined by HPS-D (OR = 1.65, 95% CI = 1.01 – 2.69) and RH-D (OR = 1.76, 95% CI = 1.09 – 2.84).

Discussion

The objective of the current research was to estimate the prevalence of chronic homelessness according to Canadian government definitions and to examine the demographic characteristics and the health status of participants who were chronically homeless for each of these definitions.

Of the definitions that were examined, the 2019 *Reaching Home* definition (RH-D) identified the highest proportion of individuals (30.6%) who were considered "chronically homeless" if they had at least 180 days or more of homeless in one year and/or 546 days or more over three years. It is important to note that in line with the Canadian definition of homelessness (Gaetz et al. 2012), RH-D comprises all individuals who are experiencing any kind of homelessness other than being at risk of homelessness.

The prevalence of chronic homelessness based on the Alberta definition (AB-D) of chronic homelessness from the HHiT study was the lowest when considering any kind of homelessness. The main reason for the smaller proportion of individuals is the more stringent operationalization of chronically homeless associated with this definition. The AB-D is similar to the HUD definition of homeless, with the requirement of at least 365 continuous days of homelessness or four or more episodes in three years. Only 14% of the total sample met this criterion.

A goal of the current study is to estimate the size of the chronically homeless population of single adults who experience homelessness outside of shelters. In this study, estimates of chronic homelessness based exclusively on shelter use are comparable to those found in previous cluster analyses of shelter stays conducted in Canada. In these studies, episodic and long-stay shelter users combined range from approximately 5 to 23% (Aubry et al. 2013; Jadidzadeh and Kneebone 2018). Our study found that estimates of HPS-S (13.5%) and RH-S (15.6%) based exclusively on shelter use resulted in a prevalence rate that is approximately 50% of the HPS-D and RH-D rates that included any-kind of homelessness.

Recent research has noted the limitations of cluster analyses that rely on shelter data while neglecting the less visibly homeless (Smith and Castañeda-Tinoco 2019). Our findings suggest that previous studies that rely on patterns of shelter use may be missing a significant proportion of those who experience chronic homelessness exclusively or mostly outside of emergency shelters.

The prevalence of chronic homelessness in this study was lower than those found in PiT counts. In the most recent PiT count in Canada, people experiencing chronic homelessness according to the HPS definition accounted for 60% of all respondents (ESDC 2019). A major reason for this difference is that PiT count censuses are based on a 24-hour period only. On any given day, individuals who are chronically homeless are more likely to be over-represented in PiT counts compared to their number over a period of several years.

Using a longitudinal data set of single adults who are homeless, our findings highlight the limitations of both shelter data as well as PiT counts in accurately estimating the prevalence of chronic homelessness. Additionally, this study finds that there are differences in estimates based on how definitions of chronic homelessness are operationalized. Accurate estimates of the prevalence of chronic homelessness have policy implications in terms of the allocation of resources and provision of services for individuals who are homeless.

Hierarchal logistic regressions found some differences in associations between chronic homelessness and demographic characteristics, health status, and substance use for the different definitions. Compared to those living in Vancouver, individuals living in Ontario (Toronto and Ottawa) were more likely to meet the criteria of chronic homelessness. It is possible variations in services available for people who are homeless including access to housing among the three Canadian cities could explain these differences, however, further exploration is needed.

Study participants, who were male, had higher odds of being in the chronically homeless groups compared to those who were female. These differences were statistically significant for definitions based on any-kind of homelessness (HPS-D, RH-D, AB-D) but not for definitions based on shelter stays. These findings are consistent with

previous literature that shows single male adults are more likely to be rough sleepers experiencing chronic homelessness than single female adults (Montgomery et al. 2016).

In the case of the ethnicity/race variable, significant differences emerged in comparing Indigenous study participants to White study participants. Specifically, compared to those identifying as White, a greater proportion of individuals identifying themselves as Indigenous met the criteria of chronic homelessness for both HPS-D and RH-D. However, these differences were not significant for definitions based more narrowly on shelter stays. While previous research has shown that Indigenous individuals are overrepresented in Canada's emergency shelters, the recent national PiT survey found a high percentage of respondents identifying as Indigenous who were sleeping outside (37%) or who were staying with others (43%) (EDSC 2019). These findings suggest that there are high rates of Indigenous individuals experiencing chronic homelessness outside of homeless shelters. Past research in Canada has shown that Indigenous people may avoid homeless shelters as well as healthcare services due to experiences of stigma and discrimination (Goodman et al. 2017).

Previous research has found that those who experience chronic homelessness experience higher rates of physical and mental health problems (Kuhn and Culhane 1998; Patterson, Somers, and Moniruzzaman 2012). Contrary to what was expected, there were no differences between the chronically homeless group and the non-chronically homeless group in terms of physical health functioning for all the definitions. However, differences were evident between the two groups in terms of the number of reported chronic physical health conditions. In particular, the non-chronically homeless group was associated with having more chronic health conditions compared to the chronically homeless group for all the definitions, with the exception of AB-D. It is possible that the prioritization of single individual adults with chronic physical health conditions for housing programs, disability pensions, and health care, plays a role in these differences.

Past research has shown substance and alcohol use as a risk factor for prolonged homelessness (McQuistion et al. 2014). Our results found no differences between the chronically homeless group and the non-chronically homeless group associated with the presence of alcohol use problems for any of the definitions. However, those reporting problematic drug use were more likely to meet the criteria of chronic homelessness according to HPS-D and RH-D. These findings are in line with previous research reporting that single adults experiencing unsheltered homelessness were more likely to have problematic substance use compared to individuals who used emergency shelters (Montgomery et al. 2016). Low barrier policies, the adoption of harm reduction strategies in homeless shelters, and outreach services can facilitate access to services and supports for unsheltered individuals with substance use problems who are chronically homeless.

The use of the longitudinal HHiT data has some notable limitations that need to be taken into account in interpreting the study's findings. Firstly, although significant efforts were made to recruit a representative sample of single adults who were homeless or vulnerably housed in each of the cities, several sampling challenges arose that made it difficult to fully achieve this objective. While this study included individuals who experience "hidden homelessness", their recruitment was done at meal programs, drop-in centers, or community health centers resulting in missing unsheltered individuals who do not access any services. Additionally, vulnerably housed individuals who lived in inaccessible, unidentified SROs or rooming houses and did not frequent community services may have also been missed. In other words, our sampling may have missed extremely marginalized or hard-to-reach populations who are homeless but are not linked in any way to the service system (Hwang et al. 2011). Moreover, sampling procedures in shelters and conducted at community services will naturally select a greater proportion of individuals who are chronically homeless since these individuals are over-represented at any single point in time among the homeless population (Aubry et al. 2013).

In this study, self-reported interview data was used to estimate the duration of homelessness. While the use of the Housing Timeline Follow-Back Calendar (Tsemberis et al. 2007) allowed for the collection of detailed housing history information, estimations of the number of day's homeless may be imprecise. Additionally, measures for chronic homelessness definitions included were operationalized based on the number of days and episodes in the past year and the previous three years. To be consistent with the national estimates of chronic homelessness, the number of homeless days and episodes were calculated starting from the last day of homelessness in the third year and going back to the baseline interview. As a result, for some participants, this did not have the full three years (1095 days) of data. Consequently, the number of days and number of episodes over three years may have been underestimated for some study participants, since a full three-year period would extend past the initial interview.

Overall, this study shows that the new *Reaching Home* definition had the highest prevalence of chronic home-

lessness based on the number of days homeless over one-year and three-year periods. Additionally, the large differences in prevalence among Canadian definitions measuring any-kind of homeless versus stays in homeless shelters only highlight the limitation associated with reliance on shelter data to estimate the size of the chronic homeless population. As well, our findings emphasize the importance of developing outreach services that target those who experience homelessness outside of shelters given the size of this underserved subgroup of individuals and the greater health issues and higher mortality rate that they experience (Roncarati et al. 2018). This is particularly important for those unsheltered chronically homeless individuals identifying as Indigenous and reporting problematic substance use.

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