Canadian Studies in Population (2019) 46:161–171
https://doi.org/10.1007/s42650-019-00013-8

The Incidence of Homelessness in Canada is a Population-Level Phenomenon: a Comparison of Toronto and Calgary Shelter Use over Time

Daniel J. Dutton[1] · Ali Jadidzadeh[2]

Received: 7 November 2017 / Accepted: 12 April 2018 / Published online: 16 December 2019
© Springer Nature Switzerland AG 2019

Abstract

We combined administrative data on shelter stays from Calgary (2008–2014) and Toronto (2011–2015) with census metropolitan area population estimates publicly available from Statistics Canada to compute incidence of shelter use per 1000 person-years in these two cities. We found that Calgary faces a higher overall risk of shelter use than Toronto (3.58 versus 1.18 per 1000 person-years), and that risk of shelter use for those aged 16–20 is nine times higher in Calgary than in Toronto. Calgary's employment rate is correlated with the incidence of homelessness ($r = 0.88$) but not Toronto's ($r = -0.28$). Individual-level characteristics associated with shelter use could not explain the yearly fluctuations in risk of homelessness in Calgary, but macroeconomic indicators are correlated with them.

Résumé

Les données administratives des villes de Calgary (2008-2014) et de Toronto (2011-2015) ont été combinées avec des estimations démographiques de la région de recensement accessibles via Statistique Canada, afin de calculer l'incidence par 1000 personnes-année des séjours en refuge pour personnes itinérantes. Le risque de fréquenter un refuge à Calgary s'avère plus élevé qu'à Toronto (3,58 contre 1,18 par 1000 années-personnes), et neuf fois plus élevé chez les 16-20 ans. Le taux d'emploi est corrélé à l'incidence de la fréquentation des refuges à Calgary (r = 0,88), mais non à Toronto (r = -0,28). Les indicateurs macroéconomiques plutôt que les caractéristiques individuelles associées à la fréquentation des refuges expliquent les fluctuations annuelles du risque à Calgary.

Keywords Homelessness · Cities · Incidence · Calgary · Toronto

Mots-clé sans-abri · incidence · ville · Calgary · Toronto

✉ Daniel J. Dutton
daniel.dutton@dal.ca

Extended author information available on the last page of the article

1 Background

Prevention has been identified as a key element of eliminating homelessness, by reducing new cases and decreasing the institutionalization of this phenomenon (Burt et al. 2007; Lindblom 1991). Homelessness has extreme health consequences: mental and physical health problems (e.g., affective disorders, substance abuse, chronic obstructive pulmonary disease) are far more prevalent among those who are homeless than in the general population, rare health issues (e.g., tuberculosis, parasites) are relatively more commonplace among those homeless, and the depth of their issues are often exacerbated by the nature of their living conditions (e.g., frostbite resulting in autoamputation) (Frankish et al. 2005; Hwang 2001; Levy and O'Connell 2004; Turnbull et al. 2007). The prevention of homelessness will decrease the number of individuals exposed to this state of extreme poverty and concurrent health risks. Since shelter users represent a significant and varied proportion of people experiencing homelessness, the prevention of homelessness is, in part, the prevention of emergency shelter use. Strategies to end homelessness in Canada indeed acknowledge that prevention is a key aspect (Aubry et al. 2003; Calgary Homeless Foundation 2015).

In order to prevent shelter use, decision-makers need information on its incidence. Little is known about the incidence of homelessness in Canada, that is, how many new people experience homelessness each year. The federal government produces estimates based on nationwide shelter reporting about occupancy rates, and this information is useful for system planning, notably about the number of shelter beds needed (Employment and Social Development Canada 2017), but information regarding new contacts is not reported. Since chronic shelter users use approximately one-third of shelter beds (Kneebone et al. 2015), the prevalence of homelessness in Canada is not necessarily informative of its incidence.

Further, federal government reports on emergency shelter bed use are aggregated across the country, but city-level information is valuable for studying the macro forces that can impact the risk of homelessness. The cost of the most affordable housing has been shown to be unaffordable in certain cities in Canada for people on social assistance, so being on social assistance might appear to be a risk factor for homelessness in some cities even though the actual risk factor is the level of income rather than source (Kneebone and Wilkins 2016a; Kneebone and Wilkins 2016b). It is likely that different areas have different drivers of emergency shelter use, since homelessness is driven by factors beyond individual-level characteristics like the generosity of public benefits or housing availability, and thus homelessness incidence is necessarily different across regions (Nooe and Patterson 2010). It seems population-level exposures could differentially impact emergency shelter use across cities, for example, it is possible that fluctuations in the employment rate might only matter in cities with "tight" housing markets. Therefore, only by studying different cities we can determine what the relevant exposures are, since these exposures are homogeneous within cities (Rose 2001).

Comprehensive city-level data on emergency shelter use is difficult to obtain in Canada for a number of reasons related to confidentiality and funding concerns. Consequently, individual shelters house their own data, and city-level analyses are often challenging. Two large municipalities where shelters report their information to a central data repository are Calgary (a census metropolitan area, or CMA, with a

population of approximately 1.2 million) and Toronto (a CMA with a population of approximately 6.2 million).

Taking advantage of these data, our objective is to provide estimates of the incidence of homelessness in Toronto and Calgary. Using large administrative datasets from different homeless-serving organizations and population data from Statistics Canada, we are able to estimate incidence by sex, year, city, cluster (transitional, episodic, chronic), and age per 1000 person-years. Then, we use employment data from Statistics Canada to show that macroeconomic trends could be important city-specific drivers of the incidence of shelter use.. We show that the incidence of homelessness is not generalizable across cities, and we conclude that disaggregated data is important for addressing homelessness.

2 Methods

We use data from the Calgary Homeless Foundation (CHF) and Toronto's Shelter, Support & Housing Administration (SSHA). The CHF is a central authority that gathers statistics from local emergency shelters, including basic demographics on those using the shelters every day. The sample of data we have access to represents about 90% of the emergency shelter beds in Calgary and the largest shelters. The SSHA is the service manager for housing and homelessness services in Toronto, including emergency shelters, social housing, and a range of housing stability options. All shelters funded by the city of Toronto report their daily utilization through a web-based information system that the SSHA oversees. All participants used in this study are from single adult programs (no families, no youth-specific programs) and are 16 to 75 years old.

The data we have access to from shelters is de-identified longitudinal microdata. All individuals in the sample have unique alphanumeric identifiers that allow us to determine their first entrance into shelters during the observed period. The Calgary data allows us to observe daily shelter contacts, while the Toronto data reports start and end dates to consecutive strings of shelter use days, strings that can last multiple days. In both cases, we determine a first visit to emergency shelters as the first time each unique alphanumeric code appears in the dataset.

Incidence calculations require that we only select new shelter users, but the administrative data we use is relatively new itself. For example, the first day observed for CHF data is July 1, 2007. Every person using a shelter that day is a new user in the dataset but probably not in reality. We allow for a lead time of 6 months to increase the likelihood that our observations reflected new contacts with the emergency shelter rather than new episodes of established shelter users, so the analytical period starts January 1, 2008. The Toronto data begins on January 1, 2011 but we are able to observe episodes rather than daily contacts with the shelters so we have episode start dates prior to the first day of data collection. We exclude those who begin their episode before January 1, 2011. The Calgary data refers to the period from 2008 to 2014, and the Toronto data from 2011 to 2015. We have 24,760 unique individuals in our Calgary dataset and 27,019 in our Toronto dataset.

Shelter users represent the vast majority of the homelessness population in both cities. The total homeless population is often defined to include the "hidden homeless," that is, individuals who do not have their own shelter and are precariously housed

(referred to as "couch surfers") or living in cars (Rodrigue 2016). We do not observe this group as we only observe shelter users. The concept of "shelter beds" is sometimes invoked when discussing system utilization but it is more accurate to consider shelter contacts. Beds are not always furniture with hardware, and on high-demand nights temporary measures like sleeping mats are deployed. In other words, supplier-induced demand is not an issue in these cities over this time period; the service providers will react to fluctuations in demand.

We retrieve demographic and economic data from Statistics Canada's Canadian Socioeconomic Database (CANSIM), specifically Table 051-0056, which provides the age and sex breakdowns of the population by census metropolitan area, and Table 282-0129 for the employment rate. All tables were retrieved for Calgary and Toronto CMAs.

We use *k-means* clustering to estimate shelter user clusters of transitional, episodic, or chronic homelessness (we refer to these groups as "clusters" to avoid "populations", which we use for cities). This is a technique used throughout the literature on homelessness to identify groups and assign members to groups based on their observable characteristics (Aubry et al. 2013; Kneebone et al. 2015; Kuhn and Culhane 1998). For example, the three clusters estimated from our data (transitional, episodic, and chronic) group together observations based on number of shelter stays, or "episodes" (separated by at least 30 days), and number of days spent in shelters. Transitional shelter users tend to stay for a small number of days (less than 30) and have few episodes (often one). Episodic shelter users have a higher number of episodes and a moderate number of days, while chronic users tend to have a low number of episodes and high number of days. This finding is consistent with other studies using this technique. When calculating the incidence of shelter use for these clusters, we are able to sort someone into their cluster based on their eventual shelter use, not upon entrance characteristics. So, while cluster type is a prevalence data characteristic, we are able to study the cross-city differences in incidence of these types of shelter user due to the longitudinal nature of our data.

We calculate incidence as:

$$\left(\frac{Number\ of\ \text{new}\ shelter\ users}{Number\ of\ individuals\ \text{at}\ risk}\right) \times 1000$$

The number of individuals at risk depends on the population. For example, if we are estimating the incidence for females in Toronto, a number of individuals at risk are the females in Toronto aged 16 to 75.

We compare incidence by sex, year, city, cluster (transitional, episodic, chronic), and age.

3 Results

Table 1 displays our main results about the incidence of emergency shelter use in Toronto and Calgary.

Table 1 Incidence of shelter use in Toronto and Calgary (per 1000 person-years)

Calgary		Toronto	
Overall	3.58	Overall	1.18
Males	5.76	Males	1.76
Females	1.30	Females	0.63
Cluster		Cluster	
Transitional	3.18	Transitional	0.99
Episodic	0.33	Episodic	0.10
Chronic	0.06	Chronic	0.09
Per calendar year		Per calendar year	
2008	5.86		
2009	4.49		
2010	1.84		
2011	1.92	2011	1.93
2012	3.60	2012	1.12
2013	4.17	2013	1.03
2014	3.28	2014	0.94
		2015	0.93

The overall incidence of shelter use in Calgary is three times higher than in Toronto, and males are at a higher risk of homelessness than females in both cities. In Calgary , there is a much starker difference between males and females than in Toronto. In Calgary, males have 4.4 times the risk of shelter use than females, and in Toronto, that ratio is under 3. Further, males in Calgary have more than 3 times the risk of homelessness than in Toronto; females in Calgary have about twice the risk of homelessness than in Toronto.

The incidence rates for different clusters of shelter users illustrate the relative probability of shelter use for different types of users. For instance, the incidence rate for transitional users is 3.18 per 1000 person-years, which is 89% of the overall incidence This means that a random new shelter user in Calgary has an 89% chance of being a transitional user. Similarly, a new user has an approximately 9% chance of being an episodic user, and a nearly 2% chance of being a chronic user. In Toronto, transitional users make up the largest share of users (about 84%) but the remainder is split between episodic and chronic users (8.8% and 7.6%7.6%, respectively). Not only there is thus a larger absolute probability that a new shelter user in Toronto will be a chronic user, but that probability is nearly the same as the probability of being an episodic user.

The incidence rates per calendar year show different patterns between the two cities. Calgary appears to have a consistently higher incidence than Toronto, except for 2011 where the incidence was nearly identical in the two cases. Toronto's incidence appears somewhat steady over time while Calgary's exhibits a decrease in 2010 by approximately 60%, which persists until 2011 before returning to a more typically high level in 2012.

Table 2 Incidence of shelter use by age

Age groups	Calgary	Toronto	Relative risk Calgary/Toronto
16 to 20	2.61	0.28	9.35
21 to 25	4.50	1.14	3.94
26 to 30	4.38	1.71	2.57
31 to 35	4.14	1.61	2.57
36 to 40	4.27	1.50	2.84
41 to 45	4.48	1.54	2.91
46 to 50	4.23	1.51	2.81
51 to 55	3.36	1.28	2.63
56 to 60	2.48	1.00	2.48
61 to 65	1.53	0.69	2.20
66 to 70	0.88	0.44	1.99
71 to 75	0.49	0.31	1.61

Figure 1 and Table 2 show the incidence of shelter use by age in the two cities.

Figure 1 reports the incidence of shelter use for both cities and the relative risk of shelter use in Calgary compared to Toronto for each age group. The two graphs have similar shapes but reflect different magnitudes of shelter use. In both cities, the risk of emergency shelter use is relatively low in the youngest age groups, then increases to a plateau between ages 20 to 30 years, which persists to approximately age 50 and then declines to the lowest levels for those over age 70. In both cities, the risk of emergency shelter use is under one person per 1000 person-years at risk in the age group 66 to 70 and above; however, the magnitudes are more dramatically different for younger ages. The risk in Calgary is approximately 2 to 3 times higher than the risk in Toronto beginning with the 26 to 30 age group and continuing to the 61 to 65 age group. In the

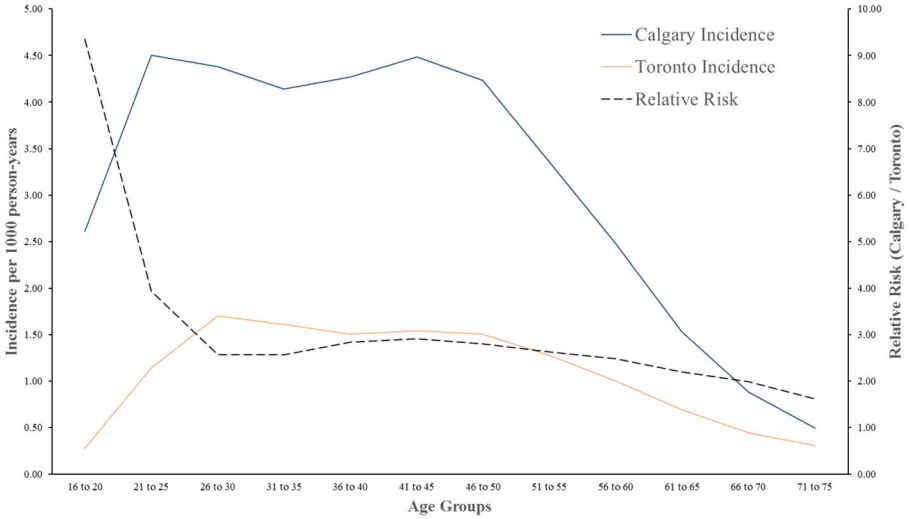

Fig. 1 Risk of emergency shelter use for all age groups, Calgary and Toronto

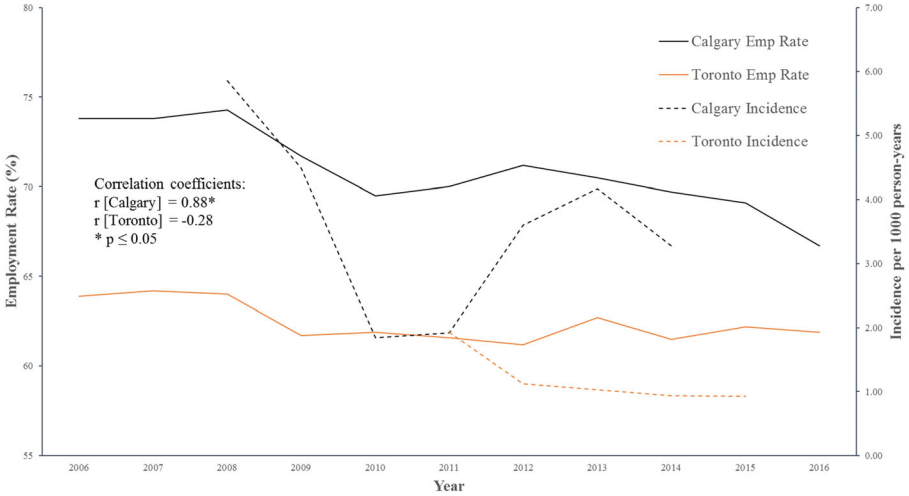

Fig. 2 Employment rate and emergency shelter incidence, Calgary and Toronto

youngest age group, the risk of emergency shelter use in Calgary is over 9 times larger than in Toronto.

In Fig. 2, we overlay the pattern of the employment rate over time in Calgary and Toronto with the incidence of emergency shelter use.

The calculated correlation coefficients between incidence of shelter use and the employment rate for both cities are presented on the figure. While we do not observe many time periods, visually there is a similar pattern of the incidence of shelter use and the employment rate in Calgary is not found in Toronto. The correlation between Calgary's incidence of shelter use and the employment rate is consequently higher and positive (0.88), compared to Toronto (− 0.28).

4 Discussion

The risk of emergency shelter use in Canada is not typically reported by city, but city-specific results can be remarkably different from one another. The risk of homelessness is three times higher in Calgary than Toronto. Calgary males are at an extremely high risk of homelessness compared with all other city-and-sex combinations estimated here, as they are three times at higher risk than their Toronto counterparts. All of this is true despite Calgary having a much higher median income than Toronto, a smaller immigrant population, and lower market-based housing prices, factors that are all typically identified as individual-level correlates of homelessness (Statistics Canada 2016; Chui and Flanders 2011; Kneebone and Wilkins 2016b; Nooe and Patterson 2010; Preston et al. 2009).The differences in the incidence of shelter use we estimate in this paper cannot be inferred from prevalence data currently reported by government organizations. Our this study thus gives a portrait of the relative homelessness problem beyond its individual-level correlated factors.

Two results stand out as warranting specific attention from policy-makers: Toronto's higher probability of chronic shelter user, and Calgary's higher probability of shelter

use in the youngest age group. Chronic shelter users are often those with the most complicated health needs and who have the most difficulty finding permanent housing (Caton et al. 2007). The fact that Toronto has nearly four times the risk of a new shelter contact becoming a chronic shelter user compared with Calgary means either that those experiencing chronic homelessness migrate to Toronto or that Toronto needs better supports for those who become homeless to shorten their spell. With only two cities to compare, it is also possible that Calgary is simply an outlier with respect to chronic homelessness, but Calgary has a higher risk of homelessness overall so it would be difficult to point to Calgary as an exemplar case of chronic homelessness management. Chronic shelter users in supportive housing programs (such as the Housing First programs (Tsemberis and Eisenberg 2000) require more intensive intervention, so it is important to identify cities that might have a higher incidence of chronic shelter use as justification for different funding formulae across cities.

Calgary's incidence of shelter use in the youngest group accessing adult single shelters is over nine times higher than Toronto's. Whether this represents a higher risk among youths or a lack of supply in youth-specific program spaces (which were excluded from our analysis) is unknown. Youth homelessness is a serious issue; homeless youths are at increased risk of physical and sexual violence, and are more likely to be from already marginalized groups like visible minorities or LGBT (The Homeless Hub 2017). Further, homelessness is compounded by the stigma youths face, which in turn leads to further health risks like suicidal ideation and low self-esteem While the majority of them will eventually leave homelessness, they are at risk of social disengagement and poor outcomes such as never completing high school (Kidd 2007; Burt 2007; Hyman et al. 2011). Addressing this increased risk of homelessness for youths now is important for decreasing associated future social costs.

The employment rate has been shown to indicate employment recessions, and those recessions are regional across Canada (Kneebone and Gres 2013). Over our short time period, movements in Calgary's employment rate correlate with shelter use and the relatively flat employment rate in Toronto does not correlate with shelter use. This indicates that homelessness could move in the same direction as economic activity: during periods of high employment, shelter utilization increases. This relationship could exist for a number of reasons. For instance, increased employment opportunities in Calgary, particularly closely tied to the price of oil, has led to labor immigration from across Canada and internationally. The housing stock cannot respond quickly so the price on available housing rises. This creates a situation where currently housed individuals or new arrivals might have to rely on emergency shelters until they find new housing arrangements; Calgary has an extreme need for affordable housing and reports suggest that the pool of units available for rent over our study time period had been shrinking over time (Calgary Homeless Foundation 2014; Kneebone et al. 2011).

The correlation between the employment rate and the incidence of shelter use in Calgary, and the decrease in both for 2010 and 2011, is supportive of the idea that there are population-level factors influencing the rate at which individuals become homeless. That is to say, homogeneous exposures like "city of residence" do not appear to be influential risks until we undertake cross-city comparisons. Individual characteristics associated with the risk of homelessness, like affective disorders, schizophrenia, or childhood abuse, could not have decreased in 2010 and 2011, only to return in 2012. Population-level factors that do not register as individual-level risks, other than the

employment rate, would include the ratio of social assistance to rental prices (Kneebone and Wilkins 2016b), the comprehensiveness of public benefits, and trends towards deinstitutionalization in mental health care (Nooe and Patterson 2010). Comparing the population risk over time and between cities is the only way to identify that population-level factors could be driving homelessness, which is consistent with Rose's observation that homogeneous exposures will not register as risks when studying individuals (Rose 2001). This information is important for service planners; if an economy is sensitive to resource prices, then it could be that social services that have higher utilization with increased economic activity, including emergency shelters, would require more funding when resource prices are high.

These results are unique in Canada. Emergency shelter use in Canada is not reported in a regular, standardized fashion like many other health or social indicators. This means that general statements on what is required to end homelessness are, at best, guesses about the need for capacity in the future based on the number of individuals using a shelter now. Our results show that the risk of becoming homeless is a city-specific risk; if Toronto's risk of homelessness increased to Calgary's level, that would result in approximately 54,750 more emergency shelter contacts over the 5 observed years, which would overwhelm existing facilities. Within Calgary, such fluctuations are possible and observed in our data, meaning that city-specific management strategies of emergency shelters are prudent.

Our study has at least few limitations. The difference in lead times between cities has likely resulted in an over-estimation of the risk of shelter use in 2011 for Toronto. However, since Toronto's risk is relatively stable in the remaining years and much lower than in Calgary, the conclusions regarding relative risk are probably not sensitive to this overestimate; if the risks are sensitive to this over-estimate, then we have underestimated the relative risk of emergency shelter use in Calgary over Toronto.

A second limitation is that the CMA is perhaps more appropriate to Calgary than Toronto in terms of identifying the population at risk of homelessness. It is possible that the CMA for Toronto is too large (it includes a number of surrounding towns, such as Newmarket, which might not have the same risks as Toronto itself), which would result in the incidence estimates for Toronto to be too low. On the other hand, it is possible that people experiencing homelessness migrate to Toronto from a wider catchment area than Calgary, which would cause our Toronto estimates to be too high. CMAs are used for a number of Canadian city demographics; we use them here for consistency. Further, we do not observe hidden homelessness (e.g., those staying with friends or family), homelessness in institutions like prisons or hospitals, Toronto shelters dedicated specifically to violence against women, or rough sleepers; therefore, our incidence may be too low in both cities.

Emergency shelter incidence estimates do not exist for Canadian cities and this study shows that such numbers can be dramatically different across large municipalities. This study shows that these differences in risks could be partly attributable to population-level factors. Cities do not cause these factors, but they could take action to mitigate the increase in risk of homelessness than they represent. Therefore, making such information available should be a priority of national-level bodies that collect such information, like Employment and Skills Development Canada. That would allow for prevention resources to be

effectively transferred to cities poorly controlling these risks, since small fluctuations in risk could lead to high numbers of emergency shelter users.

References

Aubry T, Klodawsky F, Hay E, et al. (2003) *Panel study: phase 1 panel study on persons who are homeless in Ottawa: phase 1 results final report*. Available from: http://www.evaluationcanada.ca/distribution/200312_aubry_tim_klodawsky_fran_hay_elizabeth_birnie_sarah.pdf ().

Aubry, T., Farrell, S., Hwang, S. W., et al. (2013). Identifying the patterns of emergency shelter stays of single individuals in Canadian cities of different sizes. *Housing Studies, TF, 28*(6), 910–927. Available from:. https://doi.org/10.1080/02673037.2013.773585 .

Burt MR (2007) Understanding homeless youth: numbers, characteristics, multisystem involvement, and intervention options. Available from: http://www.urban.org/sites/default/files/publication/47046/901087-Understanding-Homeless-Youth-Numbers-Characteristics-Multisystem-Involvement-and-Intervention-Options.PDF ().

Burt, M. R., Pearson, C., & Montgomery, A. E. (2007). Community-wide strategies for preventing homelessness: recent evidence. *The Journal of Primary Prevention, Springer US, 28*(3–4), 213–228. Available from:. https://doi.org/10.1007/s10935-007-0094-8 .

Calgary Homeless Foundation (2014) *Point-in-time count report*. Available from: http://calgaryhomeless.com/content/uploads/Winter-2014-PIT-Count-Report.pdf ().

Calgary Homeless Foundation (2015) *Calgary's updated plan to end homelessness*. Available from: http://www.ihearthomeyyc.com/wp-content/uploads/2015/03/Update_to_Calgary_Plan_March_4.pdf ().

Caton CL, Wilkins C and Anderson J (2007) *People who experience long-term homelessness: characteristics and interventions*. *The 2007 National Symposium on Homelessness Research*. Washington, DC: US Department of Health and Human Services and Department of Housing and Urban Development. Available from: https://www.huduser.gov/portal/publications/homeless/p4.html ().

Chui T and Flanders J (2011) *Immigration and ethnocultural diversity in Canada*. Available from: http://www12.statcan.gc.ca/nhs-enm/2011/as-sa/99-010-x/99-010-x2011001-eng.pdf ().

Employment and Social Development Canada (2017) *2016 coordinated point-in-time count of homelessness in Canadian communities*. Available from: https://www.canada.ca/content/dam/canada/employment-social-development/programs/communities/homelessness/reports/highlights/PiT-Doc.pdf ().

Frankish, C. J., Hwang, S. W., & Quantz, D. (2005). Homelessness and health in Canada: research lessons and priorities. *Canadian Journal of Public Health / Revue Canadienne de Santé Publique, Canadian Public Health Association, 96*, S23–S29. Available from: http://www.jstor.org/stable/41994457 .

Hwang, S. W. (2001). Homelessness and health. *Canadian Medical Association journal / journal de l'Association medicale canadienne, 164*(1), 229–233. Available from: http://www.cmaj.ca/content/164/2/229.full.pdf .

Hyman, S., Aubry, T., & Klodawsky, F. (2011). Resilient educational outcomes: participation in school by youth with histories of homelessness. *Youth & Society, SAGE PublicationsSage CA: Los Angeles, CA, 43*(1), 253–273. Available from:. https://doi.org/10.1177/0044118X10365354 .

Kidd, S. A. (2007). Youth homelessness and social stigma. *Journal of Youth and Adolescence, Kluwer Academic Publishers-Plenum Publishers, 36*(3), 291–299. Available from:. https://doi.org/10.1007/s10964-006-9100-3 .

Kneebone, R., & Gres, M. (2013). Trends, peaks, and troughs: national and regional employment cycles in Canada. *SPP Research Papers, 6*(21), 26. Available from: http://www.policyschool.ca .

Kneebone, R., & Wilkins, M. (2016a). Shrinking the need for homeless shelter spaces. *SPP Research Papers, 9*(21). Available from: http://www.policyschool.ca/wp-content/uploads/2016/06/homeless-shelter-spaces-kneebone-wilkins.pdf) .

Kneebone, R., & Wilkins, M. (2016b). The very poor and the affordability of housing. *SPP Research Papers, 9*(27), 18. Available from: http://www.policyschool.ca/wp-content/uploads/2016/09/Affordability-of-Housing-Kneebone-Wilkins.pdf .

Kneebone, R., Emery, J. C. H., & Grynishak, O. (2011). Homelessness in Alberta: the demand for spaces in Alberta's homeless shelters. *SPP Research Papers, 4*(13), 11. Available from: https://www.policyschool.ca/wp-content/uploads/2016/03/homelessness-alberta_0.pdf .

Kneebone R, Bell M, Jackson N, et al. (2015) Who are the homeless? Numbers, trends and characteristics of those without homes in Calgary.*SPP Research Papers* 8(11): 16. Available from: http://www.policyschool.ca/wp-content/uploads/2016/03/who-are-homeless-kneebone-bell-jackson-jadidzadeh.pdf ().

Kuhn, R., & Culhane, D. P. (1998). Applying cluster analysis to test a typology of homelessness by pattern of shelter utilization: results from the analysis of administrative data. *American Journal of Community Psychology, Kluwer Academic Publishers-Plenum Publishers, 26*(2), 207–232. Available from:. https://doi.org/10.1023/A:1022176402357 .

Levy, B. D., & O'Connell, J. J. (2004). Health care for homeless persons. *New England Journal of Medicine, Massachusetts Medical Society, 350*(23), 2329–2332. Available from:. https://doi.org/10.1056/NEJMp038222 .

Lindblom, E. N. (1991). Toward a comprehensive homelessness?prevention strategy. *Housing Policy Debate, Taylor & Francis Group, 2*(3), 957–1025. Available from:. https://doi.org/10.1080/10511482.1991.9521079 .

Nooe, R. M., & Patterson, D. A. (2010). The ecology of homelessness. *Journal of Human Behavior in the Social Environment, Taylor & Francis Group, 20*(2), 105–152. Available from:. https://doi.org/10.1080/10911350903269757 .

Preston, V., Murdie, R., Wedlock, J., et al. (2009). Immigrants and homelessness-at risk in Canada's outer suburbs. *The Canadian Geographer/Le Géographe canadien, Blackwell Publishing Inc, 53*(3), 288–304. Available from:. https://doi.org/10.1111/j.1541-0064.2009.00264.x .

Rodrigue, S. (2016). *Hidden homelessness in Canada*. Statistics Canada. Available from: http://www.statcan.gc.ca/pub/75-006-x/2016001/article/14678-eng.pdf: *Insights on Canadian Society* .

Rose, G. (2001). Sick individuals and sick populations. *International Journal of Epidemiology, Oxford University Press, 30*(3), 427–432. Available from:. https://doi.org/10.1093/ije/30.3.427 .

Statistics Canada. (2016) CANSIM Table 111-0009. *CANSIM*. Available from: http://www5.statcan.gc.ca/cansim/a26?lang=eng&id=1110009 ().

The Homeless Hub. (2017) Youth. Available from: http://www.homelesshub.ca/about-homelessness/population-specific/youth (accessed 14 June 2017).

Tsemberis, S., & Eisenberg, R. F. (2000). Pathways to housing: supported housing for street-dwelling homeless individuals with psychiatric disabilities. *Psychiatric Services, American Psychiatric Publishing, 51*(4), 487–493. Available from:. http://www.psychiatryonline.org/doi/abs/10.1176/appi.ps.51.4.487 .

Turnbull J, Muckle W and Masters C (2007) Homelessness and health. *Canadian Medical Association journal / journal de l'Association medicale canadienne*, Canadian Medical Association 177(9): 1065–6. Available from: http://www.ncbi.nlm.nih.gov/pubmed/17954899 ().

Affiliations

Daniel J. Dutton[1] · **Ali Jadidzadeh**[2]

[1] Department of Community Health and Epidemiology, Dalhousie University, Halifax, Canada

[2] School of Public Policy, University of Calgary, Calgary, Canada