

Homeless Shelter Flows in Calgary and the Potential Impact of COVID-19

ALI JADIDZADEH

Faculty of Economics, University of Tehran, Tehran, Iran, and School of Public Policy, University of Calgary, Calgary, Alberta

RON KNEEBONE

School of Public Policy, University of Calgary, Calgary, Alberta

La distanciation physique et le confinement sont deux des principaux comportements que l'on demande aux citoyens d'adopter en temps de pandémie. Pour les sans-abri, ce conseil est relativement plus difficile à suivre. Les auteurs utilisent des données quotidiennes décrivant les mouvements de 36 855 personnes différentes ayant eu recours aux refuges d'urgence pour sans-abri à Calgary entre le 1^{er} janvier 2014 et le 31 décembre 2019. Ils montrent que le recours aux refuges d'urgence se caractérise par d'importants mouvements d'usagers en provenance et à destination de la collectivité en général et des mouvements plus modestes d'usagers entre les différents refuges. Pour établir un parallèle entre les admissions de nouveaux clients dans le système des refuges et les multiples réadmissions de clients existants, ils notent que la moyenne mensuelle des mouvements entre la collectivité et les refuges et entre les refuges eux-mêmes s'établit à 43 613. L'envergure de ces mouvements fournit un indicateur de la mesure dans laquelle les personnes qui comptent sur les refuges pour sans-abri sont exposées au risque de transmission de la maladie du coronavirus 2019 (COVID-19). En définissant l'ampleur et la nature de ces mouvements, les auteurs souhaitent faciliter, grâce à leur analyse, l'élaboration de solutions pour minimiser le risque d'exposition de cette population.

Mots clés : COVID-19, refuges d'urgence, sans-abri

Social distancing and self-isolation are two of the key responses asked of citizens during a pandemic. For people without a home, this advice is rather more difficult to follow. In this article, we use daily data describing the movements of 36,855 unique individuals who used emergency homeless shelters in Calgary over the period 1 January 2014–31 December 2019. We show that the use of emergency shelters is characterized by large flows from and into the broader community and smaller flows between individual shelters. Between admissions of new people into the shelter system and multiple re-admissions of current clients, there were an average of 43,613 movements between the community and between shelters each month. The size of these flows provide a measure of the extent to which people reliant on homeless shelters are exposed to the risk of transmission of coronavirus disease 2019 (COVID-19). By identifying the size and nature of these flows, we hope our analysis helps identify responses that may minimize this population's risk of exposure.

Keywords: COVID-19, emergency shelters, homelessness

Introduction

Social distancing and self-isolation are two of the key responses asked of citizens during a pandemic. For people without a home or people with insecure or crowded housing, this advice is rather more difficult to follow. For individuals and families forced into homeless shelters, the risk is compounded by the fact shelter populations are not static. In ways we describe in this article, a

significant number of people using an emergency homeless shelter one night will not be using it the next. They will be replaced by new people arriving from the broader community and from other shelters in the area and will themselves move back into the community or to other shelters. The shelter population is therefore a dynamic one characterized by flows from and into the broader community and between shelters. These movements

provide a measure of the extent to which people reliant on the use of homeless shelters are exposed to the risk of transmission of coronavirus disease 2019 (COVID-19) and other viruses. Our goal in this article is to identify the size of these daily flows and in so doing provide information that is useful for system planners considering how best to respond to future pandemics.

These measures are important because they contribute to understanding the extent to which people experiencing homelessness are more exposed to pandemics than people who are housed. The risk is greater not only because of the inability of people experiencing homelessness to self-isolate but also because shelter clients live in an institutional arrangement that increases the likelihood of transmitting an infection. Shelter clients are provided sleeping accommodations that are generally crowded, they share sanitation facilities, and they are provided meals that they consume in close quarters. The opportunity for social distancing is minimal.

As well as being more exposed to infection, clients of homeless shelters are also at greater danger of suffering the most serious consequences of infection because they typically have considerably worse health with more comorbidities than people of the same age in the general population (see, e.g., Roncarati et al. (2018)). For those with long-term exposure to homelessness, higher rates of cardiovascular disease are a key reason for their having an estimated biological age 15–20 years greater than their chronological age (Culhane et al. 2020). Thus, someone aged between 50 and 60 years experiencing long-term homelessness is in as great a danger of the worst consequences of infection as someone drawn from the general population aged 75 to 80 years, the age group of those in the general population who have experienced the highest death rates due to COVID-19. Compounding the problem is that people experiencing homelessness also have less access to health care (Khandor et al. 2011), and some studies have shown that many shelter clients do not seek care until they are very sick (Rogers et al. 2019).

Understanding the dynamics of shelter use and what these dynamics mean for heightened risks of exposure is also important because of the limited number of ways shelter operators can respond during a pandemic. Closing shelters in response to a pandemic is not an option. Increasing opportunities for greater social distancing in those shelters by making temporary use of hotels and by providing people with the sanitation facilities and security to make camping outside possible are some possible short-term solutions. However, these responses are not consistent with the needs of all shelter clients. Some people experiencing homelessness have addiction and mental illness that cause them to have problems following advice. Anxiety, confusion, and stress may be increased when daily living routines are disrupted, especially for those who have relied on shelters for a long period (Alberta

Health Services 2009). Opportunities for changing the day-to-day operation of a homeless shelter are therefore limited. Mitigating the risk of the virus entering a shelter, moving to another shelter, and moving to and from the broader community must therefore be the focus of the pandemic response. Controlling these risks requires awareness of the size and direction of shelter flows.

Finally, our results are also of importance for understanding the risk of exposure experienced by employees at shelters, employees who may deal with the same risk of exposure as health care workers but for whom the receipt of personal protection equipment has not been similarly emphasized.

Calgary's Homeless Shelter System

Calgary currently has seven operators of emergency homeless shelters.¹ Some operators maintain more than one shelter, and so there are currently 10 separate emergency shelter locations. These shelters are located in the downtown area of the city within approximately 4 kilometres of one another. One of these shelters is open only to women, and three are open only to families. In 2019, approximately 1,271 people stayed in emergency shelters each night.² In addition, some people without a home make the choice to sleep out of doors. The number of these “rough sleepers” is sensitive to weather condition and is not observed directly except during annual point-in-time counts. The number of rough sleepers in Calgary has been estimated to be between 100 and 300 people per night, although this estimate varies by outdoor temperature and precipitation (Jadidzadeh and Kneebone 2015).

Patterns of Shelter Use

Understanding the potential for the spread of a virus in a shelter system requires understanding how shelters are used by people with unstable housing or no access to housing at all. The literature has described the patterns and intensity of use of homeless shelters by means of an empirical approach known as k-mean clustering. In this approach, data describing individuals' daily movements into and out of a community's system of emergency shelters are clustered into groups in such a way that the shelter use of people allocated to each of the groups is clearly different in terms of length of stay and frequency of use. The approach has been widely used to describe shelter use by single adults in large urban centres such as New York and Philadelphia (Kuhn and Culhane 1998); in Toronto, Guelph, and Ottawa (Aubry et al. 2013); and in Calgary (Kneebone et al. 2015). Recently, Jadidzadeh and Kneebone (2018) extended the approach to describe shelter use in Toronto by single adults, families, and youth.

Table 1 shows how this literature has categorized users of homeless shelters. A transitional user of shelters uses them infrequently and only for relatively short stays. Describing client use over a five-year period (2009–2014),

Table 1: Patterns of Shelter Stays

Stay	Few Episodes	Many Episodes
Short	Transitional	Episodic
Long	Chronic	—

Note: Dash indicates no possibility of this combination.

Kneebone et al. (2015) show that in Calgary, 86 percent of shelter users can be classified as transitional shelter clients who stayed at an emergency shelter an average of just 1.7 times for 8.4 days per stay. Over that same five-year period, 12 percent of clients could be described as episodic users who stayed at an emergency shelter an average of 8.3 times for 15.9 days per stay. Finally, less than 2 percent of shelter users could be described as chronic users. These clients averaged only 3.5 separate stays in the shelter system but stayed each time for an average of 484.9 days.

The finding that the great majority of clients use shelters infrequently and for short periods is common to all studies of shelter use in large urban centres.³ An implication of these patterns of stay is that on any given night, about one-third of shelter beds will be used by transitional users of shelters. They will stay for a short period to be replaced by another transitional user. The shelter client most at risk of the consequences of exposure is the chronic user. Although relatively few in number, they experience long stays in an environment conducive to the spread of a virus. What is more, as noted earlier, chronic shelter users are those most likely to have poor physical and mental health.

Data

We employ secondary use of anonymized administrative data to describe the flow of people to and from emergency shelters established by four providers: Mustard Seed, Salvation Army, Alpha House, and the DI. The data span the period 1 January 2014 to 31 December 2019.⁴ The data describe the use of emergency shelters by 36,855 unique individuals over this period.

Table 2 reports the average number of people staying each day in each shelter over our sample period. This is equivalent to the average number of beds filled. Over our sample period, an average of 44,311 bed-nights were available per month.

The data enable us to identify the number of times a day a client checks into and out of a shelter. The intervening period is spent in the broader community. These intra-day movements are not often studied because the usual focus is on simply recording the number of individuals using shelters. To understand the frequency of opportunities for a virus to enter or exit a shelter, they become important.

Because a goal is to measure flows between shelters (as well as between shelters and the community), we limit our attention to shelters established for adults. Flows between these shelters and those limited to families would obviously be zero.

Table 2: Average Monthly Census by Shelter, 1 January 2014–31 December 2019

Shelter	No. of Persons, Mean (SD)	% of System Total
DI	790 (138.0)	58
Alpha House	180 (16.1)	13
Mustard Seed	311 (44.9)	23
Salvation Army	83 (9.7)	6
All	1,340 (171)	

Note: DI = Drop-In & Rehabilitation Centre Society.

Source: Calgary Homeless Foundation and authors' calculations.

Analysis

The focus of the literature on shelter use has been on enumerating the number of people using shelters. The movements of people between shelters and the broader community has not drawn the same attention. An exception is the study by Culhane et al. (1994), which study analyzed the flow of people between emergency homeless shelters and the broader community in New York City and Philadelphia. Our analysis follows their approach. We extend the approach introduced by Culhane et al. by measuring the size of the flow of people between shelters as well as the size of the flow of people between shelters and the community. Our data also allow us to extend the approach by measuring intra-day movements between shelters and the broader community.

Table 3 reports calculations of average monthly first admissions, readmissions, and readmission events by shelter over the period 1 January 2014–31 December 2019. A first admission is recorded when an individual makes use of an emergency shelter in Calgary for the first time. Over the period of analysis, an average of 359 individuals per month entered the shelter system for the first time. Dividing this value by the average census reported in Table 2 gives the fraction of shelter beds filled each month by people newly admitted to the shelter system. For the emergency shelter system, this value is 0.27, indicating that 27 percent of shelter beds were emptied and filled again each month by people completely new to the system. This calculation ranges from a high of 0.73 for Alpha House to a low of 0.17 for the DI.

A readmission is recorded when an individual who has previously been admitted to the shelter system re-enters an emergency shelter. Over the period of analysis, an average of 3,154 individuals per month were readmitted one or more times into an emergency shelter. Because there were multiple re-entries by each person each month, there were on average 43,613 of what we refer to as readmission events recorded each month. This represents a remarkably large number of movements between emergency shelters and the broader community each month.

Table 4 measures the size of movements between emergency shelters. The values in the table represent the

Table 3: Average Monthly Admissions and Readmissions, 2014–2019

Shelter	First Admissions, Mean (SD)	Readmissions, Mean (SD)	Readmission Events, Mean (SD)
DI	136 (24)	1,743 (216)	23,891 (4,029)
Alpha House	131 (22)	1,002 (56)	6,624 (325)
Mustard Seed	62 (16)	767 (46)	10,590 (1,395)
Salvation Army	29 (7)	202 (17)	2,508 (267)
Total	359 (52)	3,154 (200)	43,613 (5,198)

Note: DI = Drop-In & Rehabilitation Centre Society.

Source: Authors' calculations.

Table 4: Movement Between Shelters

Shelter	Movements to Other Shelters, Mean (SD)
DI	936 (131)
Alpha House	695 (104)
Mustard Seed	688 (109)
Salvation Army	126 (27)
Total	2,444 (307)

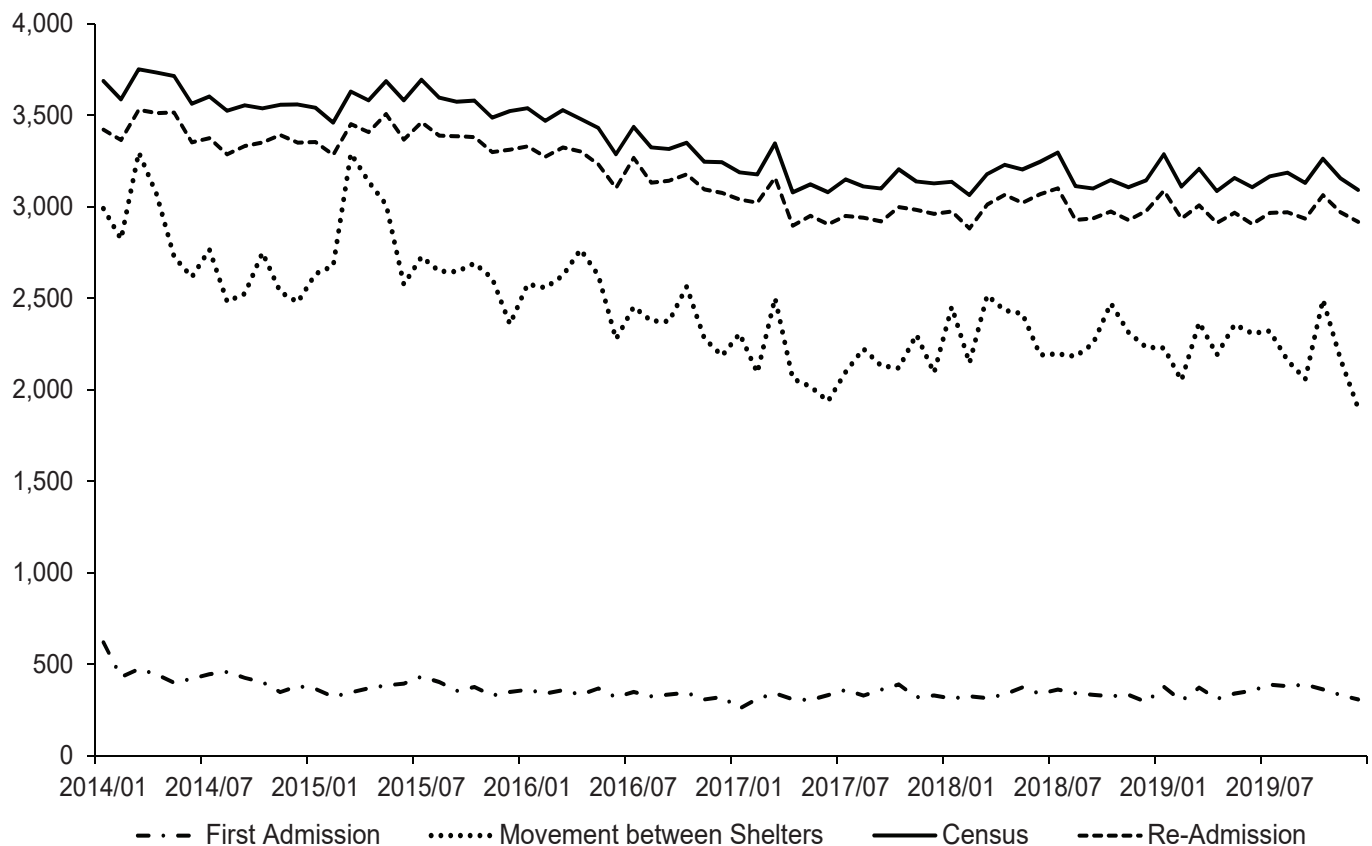
Note: DI = Drop-In & Rehabilitation Centre Society.

number of times during an average month that someone who slept in the identified shelter one night slept in a different shelter the next. On average over our period of analysis, there were 2,444 movements between shelters. This is a small number in comparison to the average number of readmission events (43,613), suggesting a great deal of shelter loyalty by emergency shelter clients.

Figure 1 shows how these flows changed over the period of our analysis. Although it is hard to see, first admissions declined slowly during 2014–2016 but have been more or less constant since then. This is also true, as can be clearly seen in the figure, of readmissions and movements between shelters. This is suggestive of an emergency shelter system that decreased in size (in terms of clients served) in the first half of our sample period but not since. The large shelter–community and shelter–shelter flows show little change.

Implications and Conclusions

It is estimated that in 2016, an average of 14,000 Canadians slept in an emergency homeless shelter each night. They relied on approximately 400 emergency shelters offering 15,400 beds per night. In 2016, 129,000 Canadians made use of an emergency shelter bed (ESDC 2019). Although

**Figure 1:** Monthly Flow Rates, January 2014 to December 2019

Source: Authors' calculations.

interesting, these simple enumerations of the number of people experiencing homelessness at a point in time tell us little about the magnitude of turnover in the shelter population. The rate of turnover is key to understanding the risks from a virus, whether in the form of a seasonal flu or in the form of a pandemic such as COVID-19, to the population of people experiencing homelessness.

There are widespread concerns that, should COVID-19 reach the homeless population, which tends to have poor health, it will spread quickly throughout that population. The US Centers for Disease Control and Prevention recently provided a summary of studies in shelters in different US cities that showed infection rates for those tested over the period 27 March–15 April 2020 that ranged from 4 percent in Atlanta to 66 percent in San Francisco (Mosites et al. 2020). The infection rate among staff members was 16 percent in San Francisco shelters and 30 percent in Boston shelters. In Toronto, systematic testing recently found 110 COVID-19 infections in a single shelter (Knope 2020).

People experiencing homelessness have limited opportunities to isolate themselves from others. Early studies of the transmission of COVID-19 suggests that it spreads easily within households. A homeless shelter is in many ways a giant household filled with people in crowded conditions using shared sanitation and eating facilities. In addition, the population forced to make use of emergency homeless shelters is constantly changing. We have provided estimates of the size of movements of people between emergency homeless shelters and the community and between individual shelters. Our results show that people already using the shelter system frequently move in and out of the community and move between shelters. We have also shown that a significant fraction of shelter capacity serves people moving from the broader community into the shelter system for the first time.

We purposely restricted our data to describing shelter movements over a period ending 31 December 2019. The effect of the COVID-19 pandemic was not apparent in Calgary until early in March 2020.⁵ The impact of COVID-19 has not affected our measures of these movements and of course cannot be fully described until we can be sure the full impact of the pandemic has been experienced. A follow-up study will identify how these flows changed as a result of the responses of people experiencing homelessness and changes in policies introduced by Calgary's homeless-serving sector. That analysis will be key to identifying the success of those policy changes in protecting people experiencing homelessness from infection.

While we wait for that future analysis, our current findings have some implications that provide immediate lessons for policy-makers. We find that before the pandemic, relatively little movement occurred between shelters, so any policy to limit such movements would have little impact on slowing the spread of a virus. We also find that some shelters have significantly more beds

filled by first admissions than others. Thus, if resources are constrained, testing done in an effort to prevent the virus from entering the shelter system should be concentrated at those shelters. Finally, the size of the shelter flows we have identified suggests the need for public health authorities to move more quickly to focus their testing efforts on clients of homeless shelters. In Calgary, such testing did not begin until six weeks after cases started to appear in the general population (Hudes 2020).

The focus of this article is homeless shelter flows in Calgary, where a rich data set is available that makes a fine measure of these flows possible. Previous research (Jadidzadeh and Kneebone 2018; Kneebone et al. 2015) shows that the nature of homelessness is different in Calgary than in other large urban centres. We recognize this may also be true with respect to homeless shelter flows. It is important to understand how shelter flows differ across communities. To this point, no Canadian data have been published that would allow for a comparison of rates of COVID-19 infection in shelters either within or across communities. We are hopeful this information will be forthcoming. Infection rates will be determined by public policy responses to the pandemic, including the actions taken to test shelter clients and the speed with which the shelter system enables the population of people experiencing homelessness to be isolated. We suspect infection rates will also be determined by the size of the pre-COVID-19 shelter flows we have identified. A contribution of future studies comparing pre-COVID-19 shelter flow rates by community will therefore be to help identify the source of differences in infection rates across shelter systems. Useful future work in this area will identify shelter flows by subpopulation to better identify targets for pandemic responses. Shelter movements may, for example, be higher for youth than for adults.

Finally, the pandemic is drawing attention to the serious implications of what we consider to be failures of public policy that have caused homeless shelters to become permanent homes for seriously ill people. Milaney, Williams and Dutton (2018) show that many long-term users of homeless shelters have serious mental health challenges, many of which stem from adverse childhood experiences. Our results show that they are living in an institution that significantly increases their exposure not only to seasonal flus but now COVID-19 and similar viruses. The parallel to older adults in long-term care facilities is worth noting.

Acknowledgements

This study is based in part on data provided by Alberta Human Services and the Calgary Homeless Foundation. The interpretation and conclusions contained herein are those of the researchers and do not necessarily represent the views of the Government of Alberta or the Calgary Homeless Foundation. None of the Government of

Alberta, Alberta Human Services, or the Calgary Homeless Foundation express any opinion in relation to this study. We thank an anonymous guest editor for suggestions that have improved the article. We remain solely responsible for any errors, misinterpretations, or omissions.

Notes

- 1 The Salvation Army, Drop-In & Rehabilitation Centre Society (DI), Alpha House, Mustard Seed, YWCA, Inn From the Cold, and Brenda's House.
- 2 Calculated from Alberta (2019), using observations for 15 July 2019. Of these 1,271 people, 13 stayed in emergency shelters restricted to women, 91 stayed in a family shelter, and the remaining 1,167 stayed in shelters for single adults.
- 3 See Table 6 in Jadidzadeh and Kneebone (2018) for a summary and comparison of results for Calgary, Toronto, New York, and Philadelphia.
- 4 We deliberately truncated our data to the end of 2019 to avoid any potential impacts of COVID-19 on shelter movements. This is discussed further later in the article.
- 5 Data on COVID-19 cases in Calgary are available from Alberta (2020).

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