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COURT FILE NUMBER	2303 15571
COURT	COURT OF KING'S BENCH OF ALBERTA
JUDICIAL CENTRE	EDMONTON
PLAINTIFF	COALITION FOR JUSTICE AND HUMAN RIGHTS LTD.
DEFENDANT	CITY OF EDMONTON
DOCUMENT	**AFFIDAVIT**
ADDRESS FOR SERVICE AND CONTACT INFORMATION OF PARTY FILING THIS DOCUMENT	**ENGEL LAW OFFICE** ATTN: Chris Wiebe #200 - 10209 97 Street NW Edmonton, AB T5J 0L6 Telephone: 780-448-3639 Facsimile: 780-448-4924 Email: chris@engellaw.ca File No. 7872 CRW **NANDA & COMPANY** ATTN: Avnish Nanda 10007 80 Avenue NW Edmonton, AB T6E 1T4 Tel: 780-801-5324 Fax: 587-318-1391 Email: avnish@nandalaw.ca File No. 56.00003

AFFIDAVIT OF DR. SANDY DONG

AFFIRMED SEPTEMBER 15 , 2023

I, Doctor Sandy Dong, of the City of Edmonton in the Province of Alberta, SOLEMNLY AFFIRM AND STATE:

1. The Plaintiff has retained me in this lawsuit to provide an expert opinion on the effects of the City of Edmonton's encampment displacement policy on rates of injury and death among unsheltered Edmontonians. Because of my education, training, credentials, and work experience described below, I have personal knowledge of the information to which I attest in this affidavit. I have stated where the information I attest to below is based on belief or on information from others that I believe to be credible and true.

2. I certify that I am aware of my duty as an expert witness to assist the court, and not be an advocate for any party. I have made this affidavit and have given this written testimony in

conformity with that duty. If I am called on to give further testimony, it will be in conformity with that duty.

Credentials and Nature of Work

3. I am a Clinical Professor in the Department of Emergency Medicine at the University of Alberta. I graduated with a Doctor of Medicine from the University of Toronto in 1997 and with a Master of Science in Public Health Sciences from the University of Alberta in 2005. A copy of my *Curriculum Vitae* is attached hereto as **Exhibit "A"**, which describes my education, work experience, academic publications, and academic and clinical leadership positions.

4. I am also an Emergency Physician. From 2002 to present, I have practiced emergency medicine in Edmonton, Alberta, including at Royal Alexandra Hospital ("RAH") and University of Alberta Hospital ("UAH"). Because of their locations in central and south-central Edmonton, the RAH's and UAH's Emergency Services departments treat many unhoused Edmontonians who need emergency care. In my over twenty years of practicing emergency medicine in Edmonton, I have treated many unhoused patients.

Do encampment displacements cause greater injury and death from exposure to cold?

5. In winter 2021-22, I personally observed a dramatic increase in the number of injuries from exposure to cold, especially frostbite, among people whom I treated in Edmonton. Almost all the people who suffered such injuries were unhoused. I spoke to CBC journalists Andrea Huncar and Taylor Lambert about my observations, and they recorded my comments in media articles attached as **Exhibit "B"**. I believe the comments that I made to those journalists, which they recorded in those articles, are true and I adopt them in this affidavit.

6. In winter 2022-23, I personally observed noticeably fewer frostbite diagnoses and amputations among unhoused patients than in winter 2021-22. Based on my personal experience, the Homeward Trust Edmonton shelter capacity and usage data attached as **Exhibit "C"**, and the Government of Canada historical weather data attached as **Exhibit "D"**, I believe there were fewer frostbite diagnoses and amputations in winter 2022-23 than in winter 2021-22, because there were at least seven fewer days of extreme cold (-20 degrees celsius or colder) and approximately 200 more shelter beds available in winter 2022-23 than in winter 2021-22.

7. Houselessness increases the risk of cold-related injuries and death. Unhoused people are much more likely to visit emergency departments for cold-related injuries than housed people. Several studies have demonstrated these facts. For examples, I have attached:

i) **Exhibit "E"**, a report on injuries suffered by unhoused Albertans in 2019 - 2020, which found, at page 17, "exposure to cold weather accounted for 73% of the natural-related emergency department visits of those experiencing houselessness, with an average of 307 visits each year.";[1]

ii) **Exhibit "F"**, a study published in 2023 by researchers from Toronto,[2] and

iii) **Exhibit "G"**, a study published in 2022 by researchers from Minnesota.[3]

8. It is difficult to know with certainty the extent to which encampment displacements contributed to frostbite injuries in winter 2021-22 and winter 2022-23, because:

i) Our health care teams did not routinely ask and record whether patients were displaced, or whether they had their propane tanks or stoves taken;

ii) Amputations of frostbitten limbs and digits can happen days or weeks after the exposure. It often takes days to know the extent of the injury and how much it will heal. So it can be difficult to attribute the injury and subsequent surgery to a specific exposure or encampment displacement event;

iii) I do not have access to Alberta Health Services' data on the number of frostbite amputations and diagnoses, aside from the data that journalist Taylor Lambert obtained in his article attached at Exhibit "B"; and

iv) I do not know the specific dates when encampment displacements have happened, so it is impossible for me to correlate the increase in frostbite amputations and diagnoses with encampment displacements in Edmonton.

9. I have reviewed the Affidavit of Dr. Andrea Sereda, affirmed September 5, 2023. Based on her affidavit and my personal experience and expertise, I believe that many of Dr. Sereda's findings on the effects of encampment displacements on the health of unsheltered people likely also apply to Edmonton, including:

i) creating more acute illness;

ii) mental health impacts; and

iii) environmental/weather related ailments like frostbite.

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[1] *Homelessness and Injuries in Alberta.* Edmonton, AB: Injury Prevention Centre, 2022.
[2] Richard, L., Golding, H., Saskin, R., Jenkinson, J., Francombe Pridham, K. Gogosis, E., Snider, C., Hwang, S. "Cold-related injuries among patients experiencing homelessness in Toronto: a descriptive analysis of emergency department visits." Canadian Journal of Emergency Medicine (2023) 25:695-703. https://doi.org/10.1007/s 43678-023-00546-7.
[3] Endorf FW, Alapati D, Xiong Y, Digiandomenico C, Rasimas CS, Rasimas JJ, Nygaard RM. "Biopsychosocial factors associated with complications in patients with frostbite." Medicine 2022;101:34 (e30211).

10. I have reviewed the following six affidavits from Edmontonians who have experienced encampment displacements:

    i) Affidavit of Lauren Rivard, affirmed July 13, 2023;

    ii) Affidavit of Tristan Scott, affirmed August 18, 2023;

    iii) Affidavit of Tristan Seneca, affirmed August 18, 2023;

    iv) Affidavit of Asia Rivard, affirmed August 18, 2023;

    v) Affidavit of Pamela Souter, affirmed August 25, 2023; and

    vi) Affidavit of Dean Gladue, affirmed August 25, 2023.

    I believe that these affiants' accounts of suffering exposure injuries like frostbite, pneumonia, and hypothermia because of encampment displacements or because of having no shelter are probably true. I also believe that these affiants' accounts are consistent with the effects of encampment displacements that Dr. Sereda described in her affidavit.

11. I have also reviewed:

    i) Homeward Trust Edmonton shelter capacity and usage data (Exhibit "C"),

    ii) Historical weather data from the Government of Canada from Edmonton – Blatchford station during November 2021 – March 2022 and November 2022 – March 2023 (Exhibit "D"); and

    iii) Publicly available findings from the Edmonton Coalition on Housing and Homelessness ("ECOHH") on the numbers of deaths among unhoused Edmontonians from 2005 – 2021, and an Edmonton Journal article from journalist Lauren Boothby based on ECOHH's 2022 findings, which show a significant increase in death among unhoused Edmontonians in 2021 and 2022 (**Exhibit "H"**).

12. Based on my personal experience and expertise and the affidavits and other information I have reviewed, I believe it is likely the City of Edmonton's encampment displacement policy causes increased risk of injury and death from exposure to cold among unsheltered Edmontonians when there is inadequate, accessible shelter and housing available in Edmonton.

Do encampment displacements cause greater overdose deaths?

13. Attached as **Exhibit "I"** is a simulation modeling study, published in the Journal of the American Medical Association (JAMA) in April 2023,[4] researchers say that practices that forcibly relocate people staying in encampments who inject drugs (ex. encampment sweeps, bans, move-along-orders, and cleanups) will lead to substantial increases in overdose deaths, life-threatening infections, and hospitalizations. This study suggests that "continual involuntary displacement may contribute to between 15.6% and 24.4% of additional deaths among unsheltered people experiencing homelessness who inject drugs over a 10-year period."[5]

14. Based on my personal experience, people who use drugs in Edmonton are more likely to inhale than inject drugs in the last few years, so the increased risk of infections from injection substance use is likely less in Edmonton than what the researchers projected in the April 2023 JAMA study. However, I have no reason to believe that the increase in overdose deaths in Edmonton would be different than what the researchers projected. Therefore, I believe that the City of Edmonton's encampment displacement policy, if continued, would contribute to less than 24.4% but greater than 0% of additional deaths among unsheltered Edmontonians living in encampments who use drugs over a 10-year period. I cannot be more specific than that with the information available to me, but I believe that the encampment displacement policy likely causes some additional death among unsheltered Edmontonians who stay in encampments and use drugs.

AFFIRMED BEFORE ME at Edmonton,
Alberta, this 15th day of September, 2023.

Christopher Wiebe
Lawyer and Commissioner for Oaths in and for the Province of Alberta

Dr. Sandy Dong

[4] Barocas JA, Nall SK, Axelrath S, Pladsen C, Boyer A, Kral AH, Meehan AA, Savinkina A, Peery D, Bien M, Agnew-Brune C, Goldshear J, Chiang J, Linas BP, Gonsalves G, Bluthenthal RN, Mosites E; NHBS Study Group. "Population-Level Health Effects of Involuntary Displacement of People Experiencing Unsheltered Homelessness Who Inject Drugs in US Cities." ("**Population-Level Health Effects**") JAMA. 2023 May 2;329(17):1478-1486.
[5] Population-Level Health Effects, at page 1.

This is Exhibit "A" referred to in the Affidavit of Dr. Sandy Dong, affirmed this 15th day of September, 2023

CHRISTOPHER WIEBE
LAWYER

Sandy L. Dong
MD, MSc, FRCPC, DRCPSC, DABEM

[redacted]

Education

2005 Master of Science – Medical Sciences (Public Health Sciences)
Department of Public Health Sciences
Faculty of Medicine & Dentistry
University of Alberta

1997 Doctor of Medicine
Faculty of Medicine
University of Toronto

Professional Certifications

2021 Diplomate, Clinician Educator
Royal College of Physicians and Surgeons of Canada

2003 Dilplomate
American Board of Emergency Medicine

2002 Fellow, Emergency Medicine
Royal College of Physicians and Surgeons of Canada

Academic Appointments

2019 - Clinical Professor of Emergency Medicine
Department of Emergency Medicine
Faculty of Medicine & Dentistry
University of Alberta

2009 - 2019 Associate Clinical Professor of Emergency Medicine
Department of Emergency Medicine
Faculty of Medicine & Dentistry
University of Alberta

2004 - 2009 Assistant Clinical Professor of Emergency Medicine
Department of Emergency Medicine
Faculty of Medicine & Denstitry
University of Alberta

2002 – 2004 Clinical Lecturer, Emergency Medicine
Division of Emergency Medicine
Faculty of Medicine & Dentistry
University of Alberta

Clinical Appointments

2002 - Emergency Physician
Royal Alexandra Hospital & Northeast Community Health Centre
University of Alberta Hospital
Alberta Health Services (Edmonton, AB)

2000 - 2008 Flight Physician, Edmonton Referral Emergency Physicians
Shock Trauma Air Rescue Society (Edmonton, AB)

Academic Leadership – Departmental

2022 - Co-Lead, Health Equity Curriculum
RCPS Emergency Medicine Residency Program

2010 - 2022 Residency Program Director
RCPS Emergency Medicine Residency Program

2003 - 2010 Assistant Residency Program Director
RCPSC Emergency Medicine Residency Program

2002 - 2003 Journal Club Co-ordinator
Division of Emergency Medicine

2002 - 2022 Department of Emergency Medicine Research Committee

Academic Leadership – University

2022 - Clinical Faculty Promotions Committee
Faculty of Medicine & Dentistry
University of Alberta (Edmonton, AB)

2022 - Director, Core Curriculum
Postgraduate Medical Education
Faculty of Medicine & Dentistry
University of Alberta (Edmonton, AB)

2018 - 2019 Competency Based Medical Education Committee
Postgraduate Medical Education

2014 - Academic Review Board
Postgraduate Medical Education

2011 - Internal Review Committee
Postgraduate Medical Education

2010 - 2022 Postgraduate Medical Education Council

2010 - 2022 Postgraduate Medical Education Executive Committee

Academic Leadership – External

2017 - 2018 External Committee Member
Residency Program Committee, RCPS Emergency Medicine
University of Saskatchewan (Saskatoon, SK)

2015 - Acccreditation Surveyor
Royal College of Physicians and Surgeons of Canada (Ottawa, ON)

2015 - Education Working Group, Academic Section
Canadian Association of Emergency Physicians

2015 Emergency Medicine Medical Education Track Chair. Canadian Association of Emergency Physicians Annual Scientific Conference 2015: Lighting the Way. May 30 – June 3, 2015. Edmonton, AB.

2011 In-Training Assessment Working Group
Royal College of Physicians and Surgeons of Canada

2009 - 2013 RCPS Emergency Medicine Canadian In-training Exam Working Group
Dr. Graham Bullock (Chair), Dalhousie University

2002 - 2006 Research Committee Member
Canadian Association of Emergency Physicians

Clinical Leadership

2023 - Designate, Pool of Hearing Committee
Edmonton Zone, Alberta Health Services

2022 - Physician Collaborator
Well Doc Alberta
welldocalberta.org

2021 - Assessment Program Advisory Committee
College of Physicians and Surgeons of Alberta

2011 - 2020 Emergency Department Point of Care Ultrasound preceptor
Canadian Emergency Ultrasound Society

2009 - 2013 Royal Alexandra Hospital Ethics Committee

2004 - 2007 Physician Resource Committee
Kingsway Emergency Agency
Royal Alexandra Hospital

2002 - 2009 Kingsway Emergency Agency Research Fund Allocation Committee
Royal Alexandra Hospital

2001 - 2015 Pediatric Advanced Life Support
Instructor

2000 - 2015 Advanced Trauma Life Support
Instructor

2000 - 2004 Basic Trauma Life Support
Medical Director

1999 - Advanced Cardiac Life Support
Medical Director

Selected Invited Presentations – Local

"Personal Directives: A Physician's Perspective." Canadian Bar Association, Wills, Estates, and Trusts Section. Edmonton, AB. December 11, 2018.

"Consent in the ED." Department of Emergency Medicine Grand Rounds. November 22, 2016.

"Handover." Seminar, Department of Emergency Medicine City Wide Rounds. August 9, 2016.

"Introduction to EBM", "Therapy." Department of Emergency Medicine Evidence Based Medicine Series, 2013 – 2020.

"The Hidden Curriculum" Department of Emergency Medicine Grand Rounds. July 2, 2013.

Invited Presentations - External

"Academic Symposium 2016: Emergency Physician Education & Scholars…the Path to Success!" Symposium facilitator. Canadian Association of Emergency Physcians Annual Conference. Quebec City, QC. June 4, 2016.

"Direct Observation: Do You REALLY Know What Your Learner Is Doing?" Canadian Association of Emergency Physicians Annual Conference. Quebec City, QC. June 8, 2016.

"Top Five Mind Blowing, Practice-Changing Articles About Clerk and Resident Teaching in 2013!" with Dr. Glen Bandiera. Canadian Association of Emergency Physicians Annual Conference. Ottawa, ON, June 1, 2014.

"Workshop: Narrative ITERs – Really, No Tick Boxes?" with Dr. Darren Nichols. Emergency Physician Educators' Symposium, Canadian Association of Emergency Physicians Annual Conference. St John's, NL, June 4, 2011.

"Workshop: Narrative ITERs: Capturing progress during residency." with Drs. D. Nichols & K. Peterson. The International Conference on Residency Education. Ottawa, ON, September 25, 2010.

Publications

Primavesi, R., Patocka, C., Burcheri, A., Coutin, A., Elhalwi A., Ali, A., Pandya, A., Gagné, A., Johnston, B., Thomas, B., LeBlanc, C., Fovet, F., Gallinger, J., Mohadeb, J., Ragheb, M., Dong, S., Smith, S., Oyedokun, T., Newmarch, T., Knight, V., McColl, T. Call to action: equity, diversity, and inclusion in emergency medicine residenct physician selection. (2023). *Canadian Journal of Emergency Medicine.* https://doi.org/10.1007/s43678-023-00528-9

Ma, K., Ali, J., Deutscher, J., Silverman, J., Novak, C., Dong, S.L., Chmelicek, J., Dance, E., Goez, E. Preparing Residents to Deal with Human Trafficking. (2020). *The Clinical Teacher*. 17 (6):675-679. https://doi.org/10.1111/tct.13187

Colmers-Gray, I.N., Ha, D., Tan, M.C., Dong, S.L. Evidence-based Medicine Simulation: A Novel and Practice-relevant Approach to Teaching Real-time Literature

Searching to Emergency Medicine Residents. (2020). *AEM Education & Teaching.* 4 (4): 428-432. https://doi.org/10.1002/aet2.10437

Cheung, W.C., Chan, T.M., Hauer, K.E., Woods, R.A., McEwen, J., Martin, L.J., Patocka, C., Dong, S.L., Bhimani, M., McColl, T. (2020). CAEP 2019 Academic Symposium: Got Competence? Best practices in trainee progress decisions. *Canadian Journal of Emergency Medicine*, *22* (2):187-193. https://doi.org/10.1017/cem.2019.480

Woods, R.A., Artz, J.D., Carriere, B., Field, S., Huffman, J., Dong, S.L., Bhanji, F., Yiu, S., Smith, S., Mengual, R., Hicks, C., Frank, J.R. (2017). CAEP 2016 Academic Symposium on Education Scholarhip: Training our Future Clinician Educators in Emergency Medicine. *Canadian Journal of Emergency Medicine, 19*(S1), S1-S8.

Brown, G.M., Lang, E., Patel, K., McRae, A., Chung, B., Yoon, P., Dong, S., Blouin, D., Sherbino, J., Hicks, C., Bandiera, G., Meyers, C. (2016). A National Faculty Development Needs Assessment in Emergency Medicine. *Canadian Journal of Emergency Medicine, 16*(3), 161-182.

Kanji, H., Thirsk, W., Dong, S.L., Szava-Kovats, M., Villa-Roel, C., Singh, M., Rowe, B.R. (2012). Emergency cricothyroidotomy: A randomized crossover trial comparing percutaneous techniquest: Classic needle first versus “incision first”. *Academic Emergency Medicine, 19* (9), 1061-1067.

Franc, J.M., Nichols, D., Dong, S.L. (2012). Increasing Emergency Medicine Residents’ Confidence in Disaster Management: Use of an Emergency Department Simulator and an Expedited Curriculum. *Prehospital and Disaster Medicine, 27* (1), 313-5.

Shavit, I., Grant, V.J., Kramsky, A., Dong., S.L., Michaelson, M. (2009). A Comparison of Two Mechanisms of Severe Pediatric Injury in Northern Israel. *Injury, 40* (5), 541-544.

Dong, S.L., Bullard, M.J., Meurer, D.P., Blitz, S., Holroyd, B.R., Rowe, B.H. (2007). The effect of training on nurse agreement using an electronic triage system. *Canadian Journal of Emergency Medicine, 9*(4), 260-266.

Dong, S.L., Bullard, M.J., Meurer, D.P., Blitz, S., Akhemtshin, E., Ohinmaa, A., Holroyd, B.R., Rowe, B.H. (2007). Predictive validity of a computerized emergency triage tool. *Academic Emergency Medicine, 14* (1), 16-22.

Dong, S.L., Bullard, M.J., Meurer, D.P., Blitz, S., Ohinmaa, A., Holroyd, B.R., Rowe, B.H. (2006). Reliability of computerized emergency triage. *Academic Emergency Medicine, 13*(3), 269-275.

Dong, S.L., Bullard, M.J., Rowe, B.H. (2005). The Need for Reliable and Valid Triage. *Academic Emergency Medicine, 12*(10), 1013.

Dong, S.L., Bullard, M.J., Meurer, D.P., Colman, I., Blitz, S., Holroyd, B.R., Rowe, B.H. (2005). Emergency triage: Comparing a novel computer triage program with standard triage. *Academic Emergency Medicine,* 12(6), 502-507.

Dong, S.L., Kelly, K.D., Oland, R.C., Holroyd, B.R., Rowe, B.H. (2001). ED management of cellulitis: a review of five urban centres. *American Journal of Emergency Medicine, 19* (7), 535-540.

Morrison, L.J., Allan, R., Vermeulen, M., Dong, S.L., McCallum, A.L. (2001). Conversion rates for prehospital paroxysmal supraventricular tachycardia (PSVT) with the addition of adenosine: a before-and-after trial. *Prehospital Emergency Care, 5* (4), 353 – 359.

Dong, S.L., Reynolds, S.F., Steiner, I.P. (2001). Brain abscess in patients with hereditary hemorrhagic telangiectasia: case report and literature review. *Journal of Emergency Medicine, 20*(3), 247 – 251.

Published Abstracts

Gray I, Dong S, Ha D. (2019). “Evidence-based medicine (EBM) simulation: teaching real-life literature searching to emergency medicine residents using a flipped classroom and high-fidelity simulation.” *Canadian Journal of Emergency Medicine*. 21(S1): S83-84.

Kanji, H.D., Thirsk, W., Dong, S.L., Szava-Kovats, M., Villa-Roel, C., Singh, M., Rowe, B.R. (2011). Emergency cricothyroidotomy: a randomized crossover trial comparing percutaneous techniques: classic Seldinger versus ‘incision first’. *Canadian Journal of Emergency Medicine, 13* (3), 183.

Dong, S.L., Lund, A., Woods, R.A., Bullard, M.J. (2011). The CanMEDS observer program for direct clinical observation. *Teaching and assessing the CanMEDS Framework. What Works: An inventory of best practices.* Retrieved from http://www.royalcollege.ca/rcsite/documents/canmeds/canmeds-dong-clinical-observation-e.pdf

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Lam, N.T., Dong, S.L., Bullard, M.J., Vester, M., Villa-Roel, C., Rowe, B.H. (2010). Impact of learners on emergency department length of stay. *Canadian Journal of Emergency Medicine, 12* (3), 236.

Dong, S.L., Nichols, D.N., Franc-Law, J.M. (2009). Resident acceptance and attitudes to a simulation based disaster medicine curriculum. *Canadian Journal of Emergency Medicine, 11* (3), 278.

Dong, S.L., Bullard, M.J., Meurer, D.P., Villa-Roel, C., Holroyd, B.R., Rowe, B.H. (2008). Comparing the predictive validity of memory based triage to a computerized emergency triage tool. *Canadian Journal of Emergency Medicine, 10*(3), 272-273.

Dong, S.L., Bullard, M.J., Meurer, D.P., Akhmetshin, E., Holroyd, B.R., Rowe, B.H. (2008). Agreement of a computerized triage tool using written case scenarios. *Annals of Emergency Medicine, 41*(4), 532.

Dong, S.L., Bullard, M.J., Meurer, D.P., Akhmetshin, E., Holroyd, B.R., Rowe, B.H. (2007). Agreement of a computerized triage tool using written case scenarios. *Canadian Journal of Emergency Medicine, 9*(3), 222.

Dong, S.L., Bullard, M.J., Meurer, D.P., Blitz, S., Ohinmaa, A., Holroyd, B.R., Rowe, B.H. (2006). Predictive validity of a computerized emergency triage tool. *Canadian Journal of Emergency Medicine, 8*(3), 179-180.

Dong, S.L., Bullard, M.J., Meurer, D.P., Blitz, S., Ohinmaa, A., Holroyd, B.R., Rowe, B.H. (2006). Predictive Validity of a Computerized Emergency Triage Tool. *Academic Emergency Medicine, 13* (15), S127.

Dong, S.L., Bullard, M.J., Meurer, D.P., Blitz, S., Rowe, B.H. (2005). Emergency department triage: evaluating a computerized triage tool and its implementation strategies. *Canadian Journal of Emergency Medicine, 7* (3), 186.

Dong, S.L., Bullard, M.J., Meurer, D.P., Blitz, S., Rowe, B.H. (2005). Emergency department triage: evaluating the reliability of a computerized triage tool and the effect of overcrowding. *Canadian Journal of Emergency Medicine, 7* (3), 195.

Dong, S.L., Bullard, M.J., Meurer, D.P., Blitz S., Colman, I., Rowe, B.H. (2004). Emergency department triage: evaluating the validity of a computerized triage tool. *Canadian Journal of Emergency Medicine, 6* (3), 209.

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Bullard, M.J., Dong, S.L., Meurer, D.P., Blitz, S., Colman, I., Rowe, B.H. (2004). Emergency department triage: Evaluating the implementation of a computerized triage tool. *Canadian Journal of Emergency Medicine, 6* (3): 188.

Dong, S.L., Bullard, M.J., Meurer, D.P., Colman, I., Rowe, B.H. (2003). Triage of patients in the emergency department: Evaluating the reliability and validity of a computerized triage tool. *Annals of Emergency Medicine, 42* (4), S7.

Morrison, L.J., Allen, R., Dong, S.L., McCallum, A.L. (1997). The change in outcome of all PSVT patients with the addition of adenosine in the prehospital setting. *Clinical and Investigative Medicine, 20* (4), S14.

Morrison, L.J., Allen, R., Dong, S.L., McCallum, A.L. (1997). Increase in out-of-hospital conversion rate of all paroxysmal supraventricular tachycardia patients with adenosine. *Academic Emergency Medicine, 4* (5), 458.

Online Publications

Gray, I., Dong, S. (2021, January 5). Teaching EBM? You can sim that!. Retrieved from https://canadiem.org/teaching-ebm-you-can-sim-that/.

Dong, S.L. (2017, April 14). The Hidden Curriculum. Retrieved from https://www.aliem.com/wp-content/uploads/2017/04/4.6-Case-of-the-Lazy-Learner.pdf.

Book Chapters

Dong, S. (2018). The Hidden Curriculum. In: Chan TM, McColl T, Luckett-Gatopoulos S, Purdy E, Velji A, Eicken J, Thoma B. *Medical Education in Cases: Volume 4 (1st Edition).* Digital File. San Francisco, CA: Academic Life in Emergency Medicine. ISBN: 978-0-9992825-2-6 Available at: https://itunes.apple.com/ca/book/medical-education-in-cases/id1446081908?mt=11

Dong, S.L., Bullard M.J. (2009). Chapter 7: Emergency Department Triage. In B.H. Rowe (Ed.), *Evidence-based Emergency Medicine* (pp 58-65). Hoboken, NJ: Wiley-Blackwell Publishing.

Dong, S.L., Rowe, B.H. (2009). Chapter 33: Wrist Injuries In B.H. Rowe (Ed.), *Evidence-based Emergency Medicine* (pp 344-349). Hoboken, NJ: Wiley-Blackwell Publishing.

Thesis

Dong. S.L. (2005). Reliability and validity of a computer-assisted emergency department triage system. (Master's thesis). University of Alberta, Edmonton, Canada.

Grants

2012 Royal College of Physicians and Surgeons of Canada Faculty Development Grant. "Coaching the coaches – Use of a novel faculty development tool to improve feedback to medical learners." ($5,000)

2009 Canadian Association of Emergency Physicians
"Incision first versus classical Seldinger technique for emergency cricothyroidotomy: a randomized crossover trial" ($4,995)

2009 Kingsway Emergency Agency Research Fund
"Incision first versus classical Seldinger technique for emergency cricothyroidotomy: a randomized crossover trial" ($9,875)

2007 Alberta Heritage Foundation for Medical Research
Visiting Scholar Program
Dr. Rob Stenstrom, St Paul's Hospital, Vancouver, BC
June, 2007 ($1,291.92).

2003 University Hospital Foundation Medical Research Competition
"Emergency department triage: validity and reliability of a computerized triage tool" ($15,300)

2002 Royal Alexandra Hospital Foundation
Research and Innovative Program Grant
"Triage of patients in the emergency department" ($21,360)

2002 Kingsway Emergency Agency Research Fund
"Triage of patients in the emergency department" ($4,320)

Peer Reviewer

2020 - *Academic Emergency Medicine Education and Training*

2005 - *Annals of Emergency Medicine*

2004 *Infections in Medicine*

2003 - *Canadian Journal of Emergency Medicine*

Awards and Honours

2023 Certificate of Merit Award
Canadian Association for Medical Education (Ottawa, ON)

2022 Garnet Cummings Lifetime Achievement Award in Emergency Medicine
Department of Emergency Medicine
Faculty of Medicine & Dentistry
University of Alberta (Edmonton, AB)

2022 PARA Clinical Teaching Award
Professional Association of Residents and Physicians of Alberta
Edmonton, AB

2014 PARA Well-being Award
Professional Association of Residents and Physicians of Alberta
Edmonton, AB

2007 Outstanding Clinical Teacher of Medical Students Award
Department of Emergency Medicine, University of Alberta

2004 Bronze Benefactor Medal
Lifesaving Society, Edmonton, AB

2003 Undergarduate Medical Education Teaching Award
Division of Emergency Medicine, University of Alberta

Community Volunteerism

2018 - 2022 U12 Ski Coordinator
Edmonton Alpine Ski Racing Society (Edmonton, AB)

2018 - 2019 President

Grant MacEwan Mountain Club (Edmonton, AB)

2017 -2018 Summer Trips Chair
Grant MacEwan Mountain Club

2015 - 2018 Communications Director
Edmonton Alpine Ski Racing Society

2015 - 2017 Vice-President & Safety Chair
Grant MacEwan Mountain Club

2004 - 2006 Winter Trips Chair
Grant MacEwan Mountain Club

This is Exhibit "B" referred to in the Affidavit of Dr. Sandy Dong, affirmed this 15th day of September, 2023

CHRISTOPHER WIEBE
LAWYER

Edmonton

Front-line workers seeing more amputations in Edmonton homeless community

Frostbite a concern, says physician calling for better health data

Andrea Huncar · CBC News · Posted: Nov 24, 2022 11:23 AM PST | Last Updated: November 24, 2022

Losing fingers or toes to frostbite on Edmonton's streets creates even more barriers for homeless Edmontonians including the inability to work or get around. (Trevor Wilson/CBC)

An emergency room physician is among front-line workers calling for more shelter space and the collection of data after seeing more amputations in Edmonton's homeless community.

Dr. Sandy Dong, who has practised medicine in the Edmonton for two decades, says he has never seen more amputations due to frostbite than he did last year.

"The vast majority was because they were houseless and did not have access to a warm place," said Dong.

He said he hopes to see better decisions this year "because we have a situation where the outcome and the injury is preventable."

In an email, Alberta Health Services said it does not track amputations from frostbite and had no further information.

The health department does not track deaths, or causes of death, among Edmontonians living homeless, either.

Dong said an official count should be kept of mortality and amputation rates to better understand the scope of the problem.

- **Edmonton advocates urge province to track deaths in homeless community**
- **City council to consider $7.5M funding request for emergency shelter in west Edmonton**

The Alberta government announced last month that it would spend an additional $63 million over two years to reduce homelessness province-wide.

Of 450 provincially-funded additional shelter spaces, 260 spots at Hope Mission and Herb Jamieson Centre are already open.

Forty additional overnight spaces are expected to open November 23 at the Mustard Seed Trinity Lutheran Church.

The Hope Mission is working toward opening up at least 150 more spaces at an off-site location near Argyll Road and 77th Street by mid-December.

With roughly 2,700 Edmontonians now living homeless, the Edmonton Coalition for Housing and Homelessness says at least 1,550 additional shelter spaces are needed.

Dong said investment in shelter and housing is relatively inexpensive compared to the required acute care, treatment, surgeries and rehabilitation.

Amputees are often discharged back to homelessness where healing and getting around are even more challenging, and many can no longer work.

"Now they have no income and then they're back into the cycle of poverty," Dong said.

'Four walls and a roof'

While handing out supplies on her regular patrols, Judith Gale, local chapter leader for the outreach group Bear Clan Patrol, said she is seeing more people who have lost their fingers and toes due to exposure.

Gale recalled some of those heartbreaking circumstances: a double amputee stuck in a snow pile while trying to cross the street in a wheelchair; a homeless refugee who escaped war in Somalia only to lose all of his fingers on Edmonton's streets.

"It's a life sentence," Gale said. "It's a life sentence of not being able to work with your hands again, not being able to walk shoulder to shoulder with your peers and society. It's a life sentence and it could be avoided so easily just by four walls and a roof."

Judith Gale, leader of Bear Clan Patrol Beaver Hills House Edmonton, said amputation is a life sentence that is easily preventable. (Jamie McCannel/CBC)

Elliott Tanti, a senior manager with Boyle Street Community Services, said collecting data would show whether the rate of amputations has gone up or the number has increased because more people are experiencing homelessness.

He noted that earlier in the pandemic, daily updates were provided so that appropriate health decisions could be made.

"So how as a society, how as an agency, how as a health-care provider, are we able to make effective decisions around public health if we don't have effective information, whether it be deaths or amputations?"

Edmonton · CBC Investigates

Frostbite amputations hit 10-year high in Edmonton last winter, new data show

'The vast, vast majority of these individuals were unhoused,' says emergency physician

Taylor Lambert · CBC News · Posted: Jan 11, 2023 2:00 AM MST | Last Updated: January 11

Laurie-Lynn Discoteau was already an amputee when she lost her other foot to frostbite in 2022. (Jamie McCannel/CBC)

Laurie-Lynn Discoteau went to the University of Alberta Hospital one evening in November 2022, seeking help for a painful and swollen infected foot.

The swelling meant her shoe and sock didn't fit on the foot, resulting in frostbite.

After surgery, Discoteau says she was discharged with only a light bandage.

When she couldn't recall the address of the place she'd been staying, she says the hospital staff put her in a cab to the Hope Mission shelter in central Edmonton, assuring her that the staff there had been notified and would bring her in immediately.

Upon arrival she recalls being told by shelter staff the facility was full and they'd had no call from the hospital.

"I had to wait for two hours outside in the cold. I think it was –40 with the wind chill that night," she said in a recent interview with CBC News.

Hope Mission says after speaking to staff and reviewing CCTV footage, they can't confirm Discoteau came to the shelter.

Regardless, Discoteau spent the night in a nearby encampment, in a damp tent with wet blankets. By morning the skin on her foot had blackened.

"I knew what that meant," she says.

In late December, her leg was amputated below the knee. It was her second amputation: she'd lost the other foot in an accident five years ago.

It's a common situation.

New data obtained by CBC News shows a major spike in the number of frostbite amputations performed in Edmonton last winter — more than the previous three years combined, and more than double any other year over the past decade.

Last winter was colder than average, but other even colder winters since 2011 saw little or no increase in amputations. What made last winter different was the sharp increase in the number

of people who were homeless during the pandemic, experts say.

That influx into a flawed and under-resourced system produced a situation that became dangerous when freezing temperatures arrived.

"It's a societal failure because we're not making sure that our most vulnerable are taken care of," says Scarlet Bjornson with the Bissell Centre, another of Edmonton's homeless shelters.

Tracking the data

CBC News asked Alberta Health Services in November how many amputations due to frostbite there were in Edmonton each year.

A senior AHS communications advisor responded they didn't have the information.

But a freedom of information request revealed that AHS does in fact track this data — and the numbers tell an alarming story.

The numbers are broken down by fiscal year, from April to March. This means each year of data includes one full winter season.

The fiscal year of 2021-2022 shows a dramatic spike in frostbite amputations in both Edmonton and Calgary, as registered by a code entered in AHS's system.

There were 91 codes in Edmonton that year, the most of any year since at least 2011, sometimes by a factor of three or four. Calgary saw 65 codes, up from 19 the previous year.

Last winter was colder than average in Edmonton, with 6.7 more days than normal below –20 C, and nearly eight more days than normal below –30 C. The climate normals are calculated by Environment Canada based on Edmonton data from 1981 to 2010.

But there have been similar and even colder winters over the past decade, including 2013-2014 and 2018-2019, none of which saw even a modest increase in frostbite amputations.

Indeed, the winter of 2020-2021 had fewer days of extreme cold but the second-most number of frostbite amputations over the past decade.

People without housing face countless dangers

Sandy Dong, an emergency physician who has practised in Alberta for two decades, says the data confirms what he and his colleagues witnessed last winter.

While the figures do not indicate which demographics are receiving frostbite amputations, Dong says that, in his experience, nearly all are people who are homeless.

"The vast, vast majority of these individuals were unhoused. I can think of one person out of those, I'm going to say, scores, that had a permanent address," says Dong.

"I think you can draw a straight line between our housing crisis and these outcomes."

The loss of body parts due to prolonged exposure to cold weather is one of the more visceral risks endured by people without stable access to safe housing, but it's far from the only one.

Violence, sexual assault and property theft are more common in homeless populations, and the risks are particularly high for youth and people identifying as LGBTQ2.

People experiencing homelessness are also disproportionately drawn from other vulnerable communities with their own elevated risk factors.

For example, while Indigenous people represent five per cent of the general population in Canada, nearly half of people who are homeless are Indigenous — and statistically more likely to experience police violence or intergenerational trauma from residential schools.

Several homeless people have died in recent years due to fires while trying to stay warm. Drug poisoning deaths from opioids have also skyrocketed.

In 2022, Edmonton saw an outbreak of shigella, a bacteria which causes dysentery and is typically found in areas where people lack access to basic sanitation.

Judith Gale, with the outreach group Bear Clan Patrol, agrees that the number of people she's encountered with amputations has noticeably increased.

Gale says she's often witnessed vulnerable people seeking warmth in the city's LRT stations being forced to leave.

"Our brothers and sisters are constantly getting shuffled around by peace officers and police," she said.

"In this cold weather, I would hope they would open their hearts a bit more and allow our brothers and sisters to stay within the confines of four walls and a roof, for goodness sake."

Police and peace officers are required to ensure people are offered transportation to shelters when they're kicked out of the LRT during cold weather, although there have been multiple instances where they've been accused of not doing so.

"These folks are the victims of a housing system that's not working," says Damian Collins, a professor and housing expert at the University of Alberta.

Official responses

City of Edmonton administration declined a request for an interview, instead offering to provide a statement in response to written questions.

"LRT stations are not appropriate shelter space as they lack basic amenities such as sufficient heat and washroom facilities," the statement said.

Police and peace officers will evict people trying to stay warm in LRT stations, and while they "cannot force people to go to shelter... during extreme weather activations the city provides a number of options to anyone on ETS properties needing access to services, including direct transport to shelters with capacity."

While noting that "some Edmontonians can't or won't access available shelter space," the statement pointed to the city's minimum standards for emergency shelters, which were adopted by council in 2021 to encourage shelter operators to address issues like safety, trauma, and lack of space for couples or pets.

However, the city provides no enforcement nor incentives for operators to implement the standards.

The statement did not answer the question of whether the city was aware of the sharp increase in frostbite amputations, only noting that "health statistics are provincial responsibilities."

AHS did not answer a question about why CBC News had previously been told that frostbite amputations statistics were not tracked.

In a statement, AHS said the increase in frostbite amputations was "due to a number of factors, likely including higher numbers of unhoused homeless during a harsh winter.

"Increased numbers of overdoses attributable to the fentanyl crisis during the past three to four years have also contributed to higher numbers of individuals suffering frostbite.

"While not all homeless are unhoused during the cold winter months, many struggle with multiple issues including mental health, addictions, and general health problems. Barriers to accessing community and health supports, especially during the pandemic, were also compounding factors that may have contributed to higher incidents of frostbite-related amputations."

AHS said the shigella outbreak in Edmonton was ongoing but that case numbers were trending downward. There have been 197 cases to date, of which 132 required hospitalization.

Housing-first is the most proven approach, say experts

Homelessness is a complex issue with myriad causes and intersections, touching on addiction, mental health, racism and intergenerational trauma. But experts and advocates say the solution is simple: unhoused people need housing.

"Housing-first works," said Collins. "There's really strong evidence of that."

The concept of housing-first originated in New York City in the early 1990s.

Rather than require homeless people to deal with their addictions or mental health prior to receiving housing support, the housing-first approach provides people with safe, reliable, affordable housing, giving them the secure environment needed to more effectively and durably address the other challenges in their lives.

It's an approach that's been proven highly effective.

Finland is the only European Union country where homelessness is falling, and steadily so — results credited to its housing-first policy.

The approach has been implemented in Alberta, including Edmonton and Calgary.

Medicine Hat famously used housing-first to largely eradicate chronic homelessness, only to see the problem return during the pandemic.

Edmonton saw the number of people experiencing homelessness decrease steadily for years by as much as 40 per cent before the pandemic.

Advocates say the evidence is clear: not only does the approach work in the long term, it also lowers the many risks people without housing face, such as amputations due to frostbite.

"Housing really could fix that immediately," says Bjornson from the Bissell Centre.

"If people had housing, they could have the harm to their person reduced.

An encampment in the heart of Edmonton as seen on November 15, 2022. (Kory Siegers/CBC)

The problem in Alberta, says Collins, is two-fold: insufficient government funding for housing given the rapid increase in need and the general unaffordability of market housing, which affects all Albertans but particularly those on low-income support.

"We did adopt housing-first and we did fund programs," says Collins.

"But we didn't do the other side of the coin, which is build the social and affordable units that are necessary to address the more systematic problems in the housing market."

"The alternative, I guess," he continued, "is a system that relies on shelters and policing, and that's what we are seeing a lot of in Edmonton right now."

That's a view echoed by others.

"I'm really concerned how the narrative around homelessness is really at this point woven in a conversation around public safety, and it's not around decency and human dignity and

providing people with the things that they desperately need," said Elliott Tanti, a senior manager with Boyle Street Community Services.

- **Alberta government pledges to tackle addiction, crime in Edmonton with new task force**

The provincial government announced in October a plan to spend $187 million to address homelessness, mental health and addictions. Some of that money will go toward shelters and policing. In December, the province surprised the municipal government with a task force charged with finding and implementing solutions to those issues.

Public Safety Minister Mike Ellis — the task force chair and a former cop — said at the announcement that the police are "not to be cast aside and pushed away... they're the ones that need to help people."

Tanti, Bjornson, Gale and Collins all raised the point that, while a housing-first approach would require public spending, the current approach — including the cost of policing, amputations and other preventable health issues — is already significant.

People pay the price

"I knew how to be very independent with that one leg," says Discoteau, "but now having both of them gone, it's another 360 in my life."

Once a champion swimmer and University of Alberta student, she's now receiving AISH and trying to find an affordable place to move into with her husband while grappling with phantom limb pain.

"It's not something I'd wish on my worst enemy."

- **Alberta to spend combined $187M for homelessness, addictions in Edmonton, Calgary**

An opioid addiction began in the hospital when she was given opioids for her first amputation.

Her second amputation, she says, occurred in part because a doctor dismissed her as merely a drug user seeking a warm bed.

AHS wouldn't comment on an individual case but said it "consults with multiple groups including social work and specialty services to prepare discharge plans that are suitable for the individual."

Discoteau says that kind of discrimination is not unique to her as an Indigenous woman, nor to the health-care system

- **Edmonton advocates urge province to track deaths in homeless community**

It's pervasive in a society more concerned with pushing homeless people out of the way rather than addressing their needs, she says.

"I know people who would rather die than go to a hospital, because of the treatment they'd received at a hospital," she says.

Compassion is what's most needed, says Collins, from street level interactions up to the policymakers.

"We need to view the problem through that lens: that this is the symbol of a failing housing system, people sleeping in LRT stations, for example, and we need to have some sympathy rather than outrage, perhaps."

WATCH | Frostbite amputations a symptom of failure to house vulnerable, say experts:

Frostbite amputations in Edmonton see 10-year high

7 months ago | 2:02

CBC News has learned that Edmonton doctors conducted 94 amputations due to frostbite last year, the highest number in a decade. Though last winter wasn't especially cold, there were far more people living on the streets.

This is Exhibit "C" referred to in the Affidavit of Dr. Sandy Dong, affirmed this 15th day of September, 2023

CHRISTOPHER WIGGS
LAWYER

Occupancy Date
All

Shelter Type
All

Agency
All

Shelter Operational Capacity and Usage by Agency on All

Agency	Shelter	Usage (%)
E4C	WEAC	96%
Hope Mission	Central Baptist Site	Null
	Central Lions Site	Null
	Commonwealth Stadium	82%
	Emergency - Female only	98%
	Herb Jamieson - Emergency - Intox- Male o..	109%
	Herb Jamieson - Emergency - Limited Mobi..	87%
	Herb Jamieson - Emergency - Male only	103%
	Herb Jamieson Centre	97%
	Main Building	110%
	Main Building (Basement) - Emergency Wi..	55%
	Main Building Overflow - Emergency Winter	74%
	Spectrum	84%
	Warehouse - Emergency - Winter	16%
	Winter Emergency Shelter- Emergency - W..	30%
Mustard Seed	CESSCO	119%
	Commonwealth	90%
	Kinsmen Site	Null
	Knox Evangelical Church	79%
	Moravian Church	65%
	Neighbour Centre - Emergency	48%
	Southside	Null
	Strathcona Baptist Church	80%
	Tipinawaw	87%
	Trinity Lutheran - Emergency Winter	93%
	Trinity Lutheran Church	70%
YESS	Youth Shelter	99%
Grand Total		

Total usage

Operational capacity - number of shelter beds that the shelter provider can provide due to current circumstances

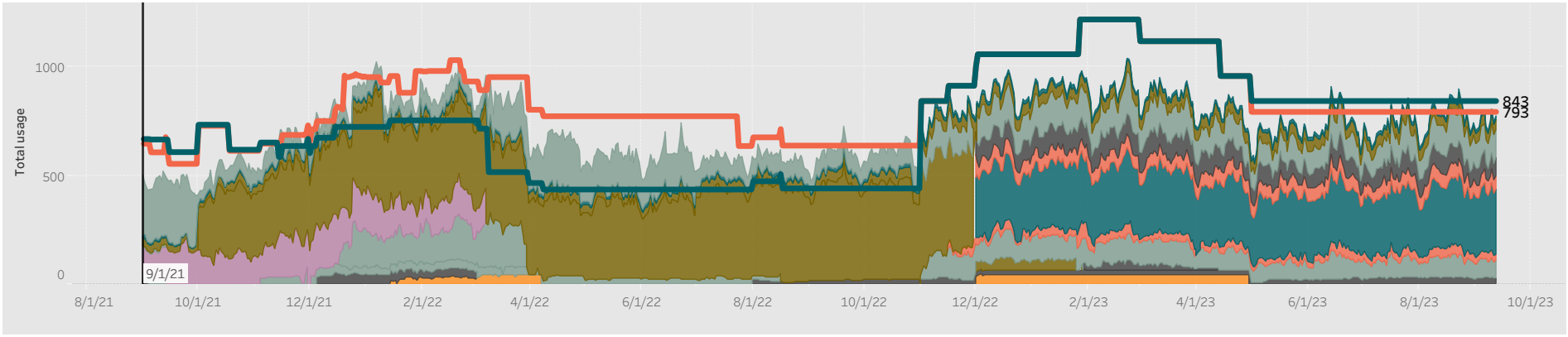
Shelter Usage Overtime

Date 9/1/2021 to 9/13/2023 and Null values

Agency All

Operational capacity - number of shelter beds that the shelter provider can provide due to current circumstances

Contracted capacity - maximum number of shelter beds in each facility as contracted by Alberta Community and Social Services



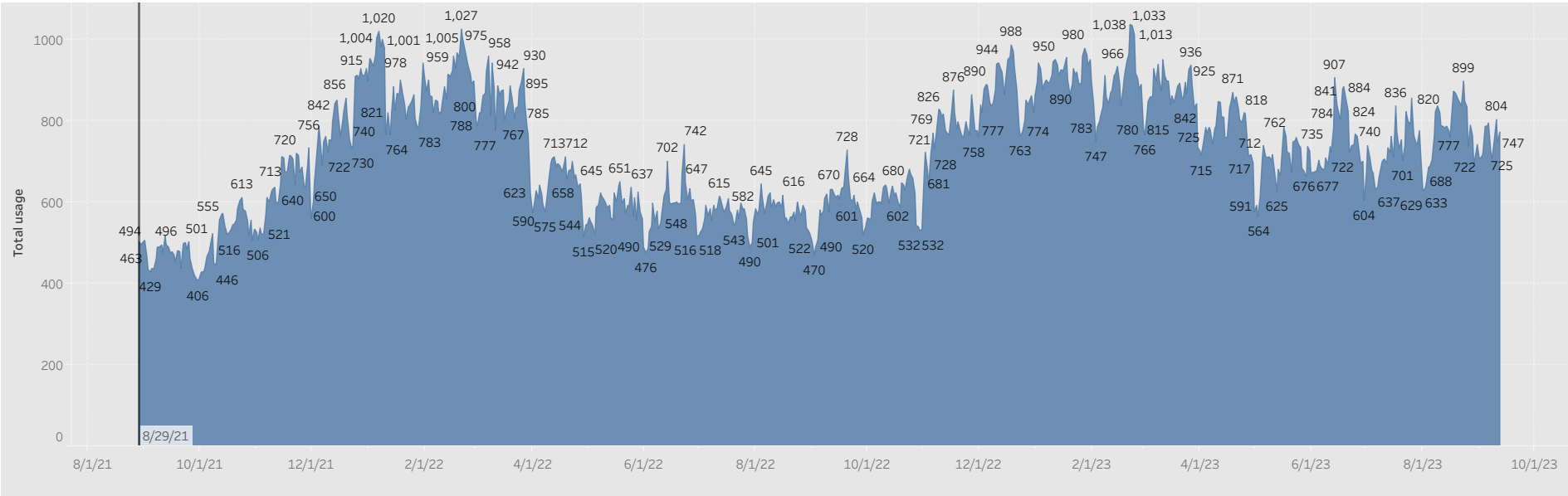
Site

- Hope Mission - Main Building
- YESS - Youth Shelter
- e4c - WEAC
- Mustard Seed - Moravian Church
- Hope Mission - Emergency - Female only
- Hope Mission - Herb Jamieson - Emergency - Intox- Male only
- Hope Mission - Herb Jamieson - Emergency - Limited Mobility - ..
- Hope Mission - Herb Jamieson - Emergency - Male only
- Hope Mission - Herb Jamieson Centre
- Hope Mission - Main Building (Basement) - Emergency Winter
- Hope Mission - Main Building Overflow - Emergency Winter
- Hope Mission - Spectrum
- Hope Mission - Warehouse - Emergency - Winter
- Hope Mission - Winter Emergency Shelter- Emergency - Winter
- Mustard Seed - Commonwealth
- Mustard Seed - Knox Evangelical Church
- Mustard Seed - Neighbour Centre - Emergency
- Mustard Seed - Strathcona Baptist Church
- Mustard Seed - Trinity Lutheran - Emergency Winter

Daily Shelter Usage Overtime

Date	Agency
8/29/2021 to 9/13/2023 and Null values	All

COVID-19 Response: Emergency shelter capacity, 23 March - current



Average nightly occupancy rate, by month

Month: Multiple values

Agency: All

Agency	Shelter	Sep 21	Oct 21	Nov 21	Dec 21	Jan 22	Feb 22	Mar 22	Apr 22	May 22	Jun 22	Jul 22	Aug 22
Hope Mission	Emergency - Female only												
	Herb Jamieson - Emergency - Intox- Male only												
	Herb Jamieson - Emergency - Limited Mobility - Male only												
	Herb Jamieson - Emergency - Male only												
	Herb Jamieson Centre		77%	97%	100%	110%	101%	91%	87%	87%	86%	100%	105%
	Main Building	78%	64%	106%	101%	109%	112%	65%	76%	61%	62%	35%	65%
	Main Building (Basement) - Emergency Winter												
	Main Building Overflow - Emergency Winter												
	Spectrum	95%	88%	94%	94%	81%	74%	88%					
	Warehouse - Emergency - Winter												
	Winter Emergency Shelter- Emergency - Winter												
E4C	WEAC	77%	78%	91%	96%	76%	91%	88%	90%	76%	79%	85%	73%
Mustard Seed	Commonwealth				73%	79%	85%	121%					
	Knox Evangelical Church	79%		90%	92%	93%	97%	96%	67%	63%	61%	65%	50%
	Moravian Church	39%											
	Neighbour Centre - Emergency												
	Strathcona Baptist Church	49%			98%	100%	92%	83%					30%
	Trinity Lutheran - Emergency Winter					68%	97%	125%	133%				
YESS	Youth Shelter	37%	56%	78%	87%	78%	92%	75%	91%	94%	93%	96%	96%
Monthly Average		**80%**	**77%**	**96%**	**95%**	**94%**	**92%**	**90%**	**83%**	**76%**	**76%**	**77%**	**88%**

Average nightly occupancy rate, by month

Month: (Multiple values)

Agency: (All)

Agency	Shelter	Sep 22	Oct 22	Nov 22	Dec 22	Jan 23	Feb 23	Mar 23	Apr 23	May 23	Jun 23	Jul 23	Aug 23
Hope Mission	Emergency - Female only			97%	107%	113%	110%	105%	90%	79%	91%	88%	104%
	Herb Jamieson - Emergency - Intox- Male only				110%	120%	122%	120%	112%	96%	101%	103%	101%
	Herb Jamieson - Emergency - Limited Mobility - Male only				88%	88%	88%	83%	87%	84%	86%	85%	92%
	Herb Jamieson - Emergency - Male only				95%	99%	99%	98%	92%	112%	112%	109%	113%
	Herb Jamieson Centre	109%	108%	100%									
	Main Building	64%	75%										
	Main Building (Basement) - Emergency Winter			38%	40%	61%	56%	44%	43%	49%	74%	68%	79%
	Main Building Overflow - Emergency Winter			70%	70%	73%	69%	73%	58%	78%	90%	82%	88%
	Spectrum												
	Warehouse - Emergency - Winter					14%	21%	15%	8%				
	Winter Emergency Shelter- Emergency - Winter				47%	49%							
E4C	WEAC	79%	81%	88%	89%	88%	85%	88%	89%	87%	80%	86%	82%
Mustard Seed	Commonwealth												
	Knox Evangelical Church												
	Moravian Church												
	Neighbour Centre - Emergency			49%	44%	45%	44%	44%	44%	34%	48%	60%	64%
	Strathcona Baptist Church	39%	49%										
	Trinity Lutheran - Emergency Winter				88%	89%	89%	89%	89%				
YESS	Youth Shelter	95%	95%	99%	93%	93%	76%	92%	93%	98%	99%	97%	99%
Monthly Average		**93%**	**95%**	**88%**	**82%**	**86%**	**80%**	**78%**	**77%**	**88%**	**94%**	**92%**	**98%**

Average nightly occupancy rate, by month

Month: (Multiple values)

Agency: (All)

Agency	Shelter	Oct 22	Nov 22	Dec 22	Jan 23	Feb 23	Mar 23	Apr 23	May 23	Jun 23	Jul 23	Aug 23	Sep 23
Hope Mission	Emergency - Female only		97%	107%	113%	110%	105%	90%	79%	91%	88%	104%	99%
	Herb Jamieson - Emergency - Intox- Male only			110%	120%	122%	120%	112%	96%	101%	103%	101%	98%
	Herb Jamieson - Emergency - Limited Mobility - Male only			88%	88%	88%	83%	87%	84%	86%	85%	92%	87%
	Herb Jamieson - Emergency - Male only			95%	99%	99%	98%	92%	112%	112%	109%	113%	114%
	Herb Jamieson Centre	108%	100%										
	Main Building	75%											
	Main Building (Basement) - Emergency Winter		38%	40%	61%	56%	44%	43%	49%	74%	68%	79%	65%
	Main Building Overflow - Emergency Winter		70%	70%	73%	69%	73%	58%	78%	90%	82%	88%	81%
	Spectrum												
	Warehouse - Emergency - Winter				14%	21%	15%	8%					
	Winter Emergency Shelter- Emergency - Winter			47%	49%								
E4C	WEAC	81%	88%	89%	88%	85%	88%	89%	87%	80%	86%	82%	80%
Mustard Seed	Commonwealth												
	Knox Evangelical Church												
	Moravian Church												
	Neighbour Centre - Emergency		49%	44%	45%	44%	44%	44%	34%	48%	60%	64%	61%
	Strathcona Baptist Church	49%											
	Trinity Lutheran - Emergency Winter			88%	89%	89%	89%	89%					
YESS	Youth Shelter	95%	99%	93%	93%	76%	92%	93%	98%	99%	97%	99%	98%
Monthly Average		**95%**	**88%**	**82%**	**86%**	**80%**	**78%**	**77%**	**88%**	**94%**	**92%**	**98%**	**95%**

This is Exhibit "D" referred to in the Affidavit of Dr. Sandy Dong, affirmed this 15th day of September, 2023

CHRISTOPHER WIGBE
LAWYER

Daily Data Report for November 2021

EDMONTON BLATCHFORD
ALBERTA
Current Station Operator: ECCC - MSC

Latitude:	53°34'23.008" N
Longitude:	113°31'00.010" W
Elevation:	671.00 m
Climate ID:	3012209
WMO ID:	71157
TC ID:	XEC

DAY	Max Temp °C	Min Temp °C	Mean Temp °C	Heat Deg Days	Cool Deg Days	Total Rain mm	Total Snow cm	Total Precip mm	Snow on Grnd cm	Dir of Max Gust 10's deg	Spd of Max Gust km/h
01											
02											
03											
04	M	M	M	M	M		M	M	M		
05	M	M	M	M	M		M	M	M		
06											
07											
08	M	M	M	M	M		M	M	M		
09	3.7	-4.8	-0.6	18.6	0.0		0.0	11	37		
10	5.4	-5.3	0.1	17.9	0.0		0.0				
11	3.6	-7.9	-2.1	20.1	0.0		0.0				
12	M	M	M	M	M		M	M	M		
13	9.1	-2.2	3.4	14.6	0.0		0.0	31	51		
14	2.4	-1.6	0.4	17.6	0.0		0.0				
15	0.6	-1.3	-0.3	18.3	0.0		6.0	8	36		
16	-1.2	-10.9	-6.1	24.1	0.0		8.8	31	58		
17	-3.1	-13.8	-8.4	26.4	0.0		0.0				
18	-1.7	-8.5	-5.1	23.1	0.0		0.0				
19	0.4	-10.9	-5.2	23.2	0.0		0.0				
20	-1.0	-12.8	-6.9	24.9	0.0		0.3	36	39		
21	1.9	-12.3	-5.2	23.2	0.0		0.0				
22	6.5	-3.3	1.6	16.4	0.0		0.0				
23	0.1	-15.1	-7.5	25.5	0.0		0.0	1	38		

DAY	Max Temp °C	Min Temp °C	Mean Temp °C	Heat Deg Days	Cool Deg Days	Total Rain mm	Total Snow cm	Total Precip mm	Snow on Grnd cm	Dir of Max Gust 10's deg	Spd of Max Gust km/h
24	-3.3	-16.2	-9.7	27.7	0.0			0.0			
25	5.7	-4.4	0.7	17.3	0.0			0.0			
26	6.6	-1.9	2.3	15.7	0.0			0.0		32	38
27	0.6	-9.1	-4.3	22.3	0.0			0.0		15	33
28	7.4	-1.5	2.9	15.1	0.0			0.0			
29	3.7	-4.0	-0.2	18.2	0.0			0.0			
30	4.6	-3.0	0.8	17.2	0.0			0.0			
Sum				427.4^	0.0^	0.0^	0.0^	15.1^			
Avg	2.5^	-7.2^	-2.4^								
Xtrm	9.1^	-16.2^				M	M	8.8^		31^	58^

Summary, average and extreme values are based on the data above.

Legend

- A = Accumulated
- C = Precipitation occurred, amount uncertain
- E = Estimated
- F = Accumulated and estimated
- L = Precipitation may or may not have occurred
- M = Missing
- N = Temperature missing but known to be > 0
- S = More than one occurrence
- T = Trace
- Y = Temperature missing but known to be < 0
- [empty] = Indicates an unobserved value
- ^ = The value displayed is based on incomplete data
- † = Data that is not subject to review by the National Climate Archives

Date modified:

2023-07-14

Daily Data Report for December 2021

EDMONTON BLATCHFORD
ALBERTA
Current Station Operator: ECCC - MSC

Latitude:	53°34'23.008" N
Longitude:	113°31'00.010" W
Elevation:	671.00 m
Climate ID:	3012209
WMO ID:	71157
TC ID:	XEC

DAY	Max Temp °C	Min Temp °C	Mean Temp °C	Heat Deg Days	Cool Deg Days	Total Rain mm	Total Snow cm	Total Precip mm	Snow on Grnd cm	Dir of Max Gust 10's deg	Spd of Max Gust km/h
01	7.3	-1.2	3.0	15.0	0.0			0.0		31	39
02	1.4	-2.5	-0.6	18.6	0.0			1.7		30	58
03	-1.6	-8.5	-5.0	23.0	0.0			0.0			
04	-5.7	-14.3	-10.0	28.0	0.0			0.0			
05	-14.1	-19.7	-16.9	34.9	0.0			0.4		1	39
06	-7.8	-18.5	-13.1	31.1	0.0			0.0			
07	-2.7	-14.7	-8.7	26.7	0.0			0.0			
08	1.9	-4.2	-1.1	19.1	0.0			5.9		31	61
09	-2.5	-6.2	-4.4	22.4	0.0			0.0			
10	-0.7	-6.9	-3.8	21.8	0.0			0.0			
11	1.6	-5.4	-1.9	19.9	0.0			0.0		31	42
12	-3.0	-11.8	-7.4	25.4	0.0			0.9			
13	-10.3	-15.4	-12.8	30.8	0.0			0.0			
14	-13.9	-20.2	-17.1	35.1	0.0			8.5		32	32
15	-18.2	-23.7	-21.0	39.0	0.0			0.2			
16	-19.7	-23.1	-21.4	39.4	0.0			2.8			
17	-21.4	-28.1	-24.7	42.7	0.0			0.0			
18	-16.3	-23.1	-19.7	37.7	0.0			0.2			
19	-10.5	-16.3	-13.4	31.4	0.0			0.4			
20	-13.1	-20.4	-16.7	34.7	0.0			0.0			
21	-3.9	-14.6	-9.2	27.2	0.0			2.4			
22	-4.5	-10.4	-7.5	25.5	0.0			3.6			
23	-10.0	-18.2	-14.1	32.1	0.0			0.9		34	32

DAY	Max Temp °C	Min Temp °C	Mean Temp °C	Heat Deg Days	Cool Deg Days	Total Rain mm	Total Snow cm	Total Precip mm	Snow on Grnd cm	Dir of Max Gust 10's deg	Spd of Max Gust km/h
24	-18.2	-24.4	-21.3	39.3	0.0			0.0		34	31
25	-24.4	-28.0	-26.2	44.2	0.0			0.6			
26	-27.3	-29.0	-28.1	46.1	0.0			1.8			
27	-27.6	-32.9	-30.3	48.3	0.0			0.2			
28	-23.1	-35.0	-29.1	47.1	0.0			0.2		34	32
29	-22.1	-28.0	-25.0	43.0	0.0			0.0			
30	-22.1	-29.3	-25.7	43.7	0.0			0.4			
31	-23.6	-31.7	-27.6	45.6	0.0			0.2			
Sum				1018.8	0.0			31.3			
Avg	-11.5	-18.2	-14.9								
Xtrm	7.3	-35.0				M	M	8.5		31^	61^
Summary, average and extreme values are based on the data above.											

Legend

- A = Accumulated
- C = Precipitation occurred, amount uncertain
- E = Estimated
- F = Accumulated and estimated
- L = Precipitation may or may not have occurred
- M = Missing
- N = Temperature missing but known to be > 0
- S = More than one occurrence
- T = Trace
- Y = Temperature missing but known to be < 0
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Date modified:

2023-07-14

Daily Data Report for January 2022

EDMONTON BLATCHFORD
ALBERTA
Current Station Operator: ECCC - MSC

Latitude:	53°34'23.008" N
Longitude:	113°31'00.010" W
Elevation:	671.00 m
Climate ID:	3012209
WMO ID:	71157
TC ID:	XEC

DAY	Max Temp °C	Min Temp °C	Mean Temp °C	Heat Deg Days	Cool Deg Days	Total Rain mm	Total Snow cm	Total Precip mm	Snow on Grnd cm	Dir of Max Gust 10's deg	Spd of Max Gust km/h
01	-8.7	-28.6	-18.6	36.6	0.0			0.0			
02	-5.5	-22.7	-14.1	32.1	0.0			0.0		34	35
03	-22.6	-25.4	-24.0	42.0	0.0			5.4			
04	-25.1	-28.8	-26.9	44.9	0.0			1.6			
05	-26.4	-31.6	-29.0	47.0	0.0			0.2			
06	-24.8	-28.8	-26.8	44.8	0.0			0.2			
07	M	M	M	M	M			M		M	M
08	-21.6	-27.3	-24.4	42.4	0.0			0.2			
09	M	M	M	M	M			M		M	M
10	M	M	M	M	M			M		M	M
11	M	M	M	M	M			M		M	M
12	4.3	-4.9	-0.3	18.3	0.0			0.0			
13	2.0	-4.6	-1.3	19.3	0.0			3.2			
14	-1.2	-10.1	-5.6	23.6	0.0			0.2			
15	6.2	-5.5	0.3	17.7	0.0			0.0		30	35
16	1.5	-3.7	-1.1	19.1	0.0			0.0			
17	1.8	-17.5	-7.8	25.8	0.0			7.3		32	60
18	-17.5	-24.9	-21.2	39.2	0.0			0.2		33	47
19	-16.8	-26.4	-21.6	39.6	0.0			0.0			
20	5.0	-17.6	-6.3	24.3	0.0			0.0		31	52
21	2.7	-7.2	-2.3	20.3	0.0			1.1		34	44
22	7.6	-3.2	2.2	15.8	0.0			0.4			
23	6.6	1.5	4.1	13.9	0.0			0.4		32	45

DAY	Max Temp °C	Min Temp °C	Mean Temp °C	Heat Deg Days	Cool Deg Days	Total Rain mm	Total Snow cm	Total Precip mm	Snow on Grnd cm	Dir of Max Gust 10's deg	Spd of Max Gust km/h
24	2.5	-8.2	-2.9	20.9	0.0			2.4			
25	4.9	-7.4	-1.2	19.2	0.0			0.0		30	44
26	3.8	-1.0	1.4	16.6	0.0			0.0		31	50
27	1.1	-8.1	-3.5	21.5	0.0			0.2			
28	6.9	-7.8	-0.4	18.4	0.0			0.0			
29	5.4	-3.1	1.2	16.8	0.0			0.0			
30	6.0	-4.7	0.6	17.4	0.0			0.0			
31	-0.3	-19.3	-9.8	27.8	0.0			1.3		33	80
Sum				725.3^	0.0^			24.3^			
Avg	-3.8^	-14.0^	-8.9^								
Xtrm	7.6^	-31.6^				M	M	7.3^		33^	80^

Summary, average and extreme values are based on the data above.

Legend

- A = Accumulated
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- F = Accumulated and estimated
- L = Precipitation may or may not have occurred
- M = Missing
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- T = Trace
- Y = Temperature missing but known to be < 0
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Date modified:

2023-07-14

Daily Data Report for February 2022

EDMONTON BLATCHFORD
ALBERTA
Current Station Operator: ECCC - MSC

Latitude:	53°34'23.008" N
Longitude:	113°31'00.010" W
Elevation:	671.00 m
Climate ID:	3012209
WMO ID:	71157
TC ID:	XEC

DAY	Max Temp °C	Min Temp °C	Mean Temp °C	Heat Deg Days	Cool Deg Days	Total Rain mm	Total Snow cm	Total Precip mm	Snow on Grnd cm	Dir of Max Gust 10's deg	Spd of Max Gust km/h
01	-16.6	-21.0	-18.8	36.8	0.0			0.2			
02	-18.0	-26.2	-22.1	40.1	0.0			0.0		16	37
03	-17.6	-20.6	-19.1	37.1	0.0			0.8			
04	-7.7	-19.7	-13.7	31.7	0.0			1.8		16	34
05	3.0	-11.6	-4.3	22.3	0.0			1.9		31	42
06	9.7	-5.1	2.3	15.7	0.0			0.0		28	34
07	8.4	-1.1	3.7	14.3	0.0			0.0		29	45
08	6.8	-0.5	3.2	14.8	0.0			0.0		30	44
09	9.3	0.2	4.7	13.3	0.0			0.0			
10	9.7	0.3	5.0	13.0	0.0			0.0		30	64
11	0.4	-4.5	-2.1	20.1	0.0			0.2		32	53
12	6.6	-3.5	1.5	16.5	0.0			0.0			
13	7.4	-3.6	1.9	16.1	0.0			0.0		36	38
14	-2.0	-6.9	-4.4	22.4	0.0			0.2			
15	-3.6	-11.9	-7.8	25.8	0.0			0.4		34	39
16	-11.4	-15.7	-13.6	31.6	0.0			1.3			
17	4.9	-13.7	-4.4	22.4	0.0			2.0		31	51
18	-4.8	-14.5	-9.6	27.6	0.0			0.2		35	44
19	7.7	-15.6	-3.9	21.9	0.0			0.0		31	47
20	-15.5	-21.1	-18.3	36.3	0.0			1.3			
21	-18.5	-23.4	-21.0	39.0	0.0			0.2			
22	-15.9	-23.9	-19.9	37.9	0.0			0.0			
23	-11.9	-22.5	-17.2	35.2	0.0			0.0			

DAY	Max Temp °C	Min Temp °C	Mean Temp °C	Heat Deg Days	Cool Deg Days	Total Rain mm	Total Snow cm	Total Precip mm	Snow on Grnd cm	Dir of Max Gust 10's deg	Spd of Max Gust km/h
24	-6.5	-13.3	-9.9	27.9	0.0			1.9			
25	1.6	-16.4	-7.4	25.4	0.0			0.0			
26	5.6	-8.4	-1.4	19.4	0.0			0.0			
27	-2.5	-7.9	-5.2	23.2	0.0			0.0			
28	M	M	M	M	M			M		M	M
Sum				687.8^	0.0^			12.4^			
Avg	-2.6^	-12.3^	-7.5^								
Xtrm	9.7^	-26.2^				M	M	2.0^		30^	64^

Summary, average and extreme values are based on the data above.

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- A = Accumulated
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- F = Accumulated and estimated
- L = Precipitation may or may not have occurred
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- N = Temperature missing but known to be > 0
- S = More than one occurrence
- T = Trace
- Y = Temperature missing but known to be < 0
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Date modified:

2023-07-14

Daily Data Report for March 2022

EDMONTON BLATCHFORD
ALBERTA
Current Station Operator: ECCC - MSC

Latitude:	53°34'23.008" N
Longitude:	113°31'00.010" W
Elevation:	671.00 m
Climate ID:	3012209
WMO ID:	71157
TC ID:	XEC

DAY	Max Temp °C	Min Temp °C	Mean Temp °C	Heat Deg Days	Cool Deg Days	Total Rain mm	Total Snow cm	Total Precip mm	Snow on Grnd cm	Dir of Max Gust 10's deg	Spd of Max Gust km/h
01	-3.3	-8.3	-5.8	23.8	0.0			0.0			
02	-5.3	-7.9	-6.6	24.6	0.0			0.7			
03	-7.9	-11.0	-9.4	27.4	0.0			5.9			
04	-7.8	-15.6	-11.7	29.7	0.0			4.2			
05	-3.2	-17.6	-10.4	28.4	0.0			0.0			
06	0.4	-9.6	-4.6	22.6	0.0			0.0			
07	M	M	M	M	M			M		M	M
08	-6.3	-14.2	-10.3	28.3	0.0			0.0		35	49
09	-7.5	-17.5	-12.5	30.5	0.0			0.2			
10	-5.6	-17.2	-11.4	29.4	0.0			0.0		2	42
11	-1.9	-19.1	-10.5	28.5	0.0			0.0			
12	5.5	-5.7	-0.1	18.1	0.0			0.0		29	46
13	-0.2	-9.5	-4.9	22.9	0.0			0.0			
14	2.5	-9.7	-3.6	21.6	0.0			0.5			
15	10.2	-5.5	2.3	15.7	0.0			0.0		31	55
16	7.9	-2.1	2.9	15.1	0.0			0.0		33	38
17	9.6	-4.9	2.4	15.6	0.0			0.0			
18	8.6	-0.7	4.0	14.0	0.0			0.0			
19	8.0	-4.0	2.0	16.0	0.0			0.0			
20	4.2	-4.3	-0.1	18.1	0.0			2.1		34	50
21	8.7	-7.3	0.7	17.3	0.0			0.0			
22	11.1	-3.9	3.6	14.4	0.0			0.0		22	34
23	18.7	1.5	10.1	7.9	0.0			0.2		32	64

DAY	Max Temp °C	Min Temp °C	Mean Temp °C	Heat Deg Days	Cool Deg Days	Total Rain mm	Total Snow cm	Total Precip mm	Snow on Grnd cm	Dir of Max Gust 10's deg	Spd of Max Gust km/h
24	6.5	-2.3	2.1	15.9	0.0			0.5		30	45
25	1.7	-4.6	-1.5	19.5	0.0			0.2		9	32
26	-1.4	-6.7	-4.1	22.1	0.0			3.0		9	31
27	3.1	-6.6	-1.8	19.8	0.0			0.2			
28	-0.2	-4.2	-2.2	20.2	0.0			6.5			
29	7.5	-6.9	0.3	17.7	0.0			0.0			
30	11.4	0.0	5.7	12.3	0.0			0.0		31	46
31	7.5	0.8	4.1	13.9	0.0			0.6		33	52
Sum				611.3^	0.0^			24.8^			
Avg	2.8^	-7.5^	-2.4^								
Xtrm	18.7^	-19.1^				M	M	6.5^		32^	64^

Summary, average and extreme values are based on the data above.

Legend

- A = Accumulated
- C = Precipitation occurred, amount uncertain
- E = Estimated
- F = Accumulated and estimated
- L = Precipitation may or may not have occurred
- M = Missing
- N = Temperature missing but known to be > 0
- S = More than one occurrence
- T = Trace
- Y = Temperature missing but known to be < 0
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Date modified:

2023-07-14

Daily Data Report for November 2022

EDMONTON BLATCHFORD
ALBERTA
Current Station Operator: ECCC - MSC

Latitude:	53°34'23.008" N
Longitude:	113°31'00.010" W
Elevation:	671.00 m
Climate ID:	3012209
WMO ID:	71157
TC ID:	XEC

DAY	Max Temp °C	Min Temp °C	Mean Temp °C	Heat Deg Days	Cool Deg Days	Total Rain mm	Total Snow cm	Total Precip mm	Snow on Grnd cm	Dir of Max Gust 10's deg	Spd of Max Gust km/h
01	2.7	-2.3	0.2	17.8	0.0			2.8		7	37
02	-2.3	-6.5	-4.4	22.4	0.0			5.2		35	43
03	-4.6	-8.3	-6.5	24.5	0.0			0.2			
04	4.4	-8.8	-2.2	20.2	0.0			0.0			
05	-1.4	-10.0	-5.7	23.7	0.0			2.1		9	44
06	-9.8	-14.2	-12.0	30.0	0.0			1.3			
07	-12.9	-15.6	-14.3	32.3	0.0			5.0		9	31
08	-14.0	-18.9	-16.4	34.4	0.0			1.4			
09	-12.9	-21.2	-17.1	35.1	0.0			0.0			
10	-9.3	-20.9	-15.1	33.1	0.0			0.0			
11	-3.8	-17.7	-10.8	28.8	0.0			0.0			
12	1.6	-8.1	-3.3	21.3	0.0			0.0			
13	1.7	-10.4	-4.3	22.3	0.0			0.0			
14	3.1	-6.1	-1.5	19.5	0.0			0.0			
15	4.0	-4.9	-0.5	18.5	0.0			0.0		31	37
16	-0.3	-11.3	-5.8	23.8	0.0			0.0		1	47
17	-9.1	-16.6	-12.9	30.9	0.0			0.0			
18	-1.8	-10.1	-6.0	24.0	0.0			0.0		31	35
19	4.2	-12.5	-4.1	22.1	0.0			0.0			
20	5.6	-4.6	0.5	17.5	0.0			0.0			
21	5.5	-1.2	2.2	15.8	0.0			0.0			
22	5.2	-0.7	2.2	15.8	0.0			0.0			
23	5.8	-2.9	1.5	16.5	0.0			0.0			

DAY	Max Temp °C	Min Temp °C	Mean Temp °C	Heat Deg Days	Cool Deg Days	Total Rain mm	Total Snow cm	Total Precip mm	Snow on Grnd cm	Dir of Max Gust 10's deg	Spd of Max Gust km/h
24	7.4	-1.5	3.0	15.0	0.0			0.0			
25	3.2	-5.7	-1.2	19.2	0.0			0.9			
26	3.5	-1.4	1.1	16.9	0.0			0.0			
27	1.4	-9.6	-4.1	22.1	0.0			0.0		31	48
28	-9.6	-13.8	-11.7	29.7	0.0			2.2		32	48
29	-13.7	-17.6	-15.7	33.7	0.0			0.9		34	34
30	-16.1	-20.3	-18.2	36.2	0.0			3.8			
Sum				723.1	0.0			25.8			
Avg	-2.1	-10.1	-6.1								
Xtrm	7.4	-21.2				M	M	5.2		32^	48^S

Summary, average and extreme values are based on the data above.

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- C = Precipitation occurred, amount uncertain
- E = Estimated
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- M = Missing
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- T = Trace
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Date modified:

2023-07-14

Daily Data Report for December 2022

EDMONTON BLATCHFORD
ALBERTA
Current Station Operator: ECCC - MSC

Latitude:	53°34'23.008" N
Longitude:	113°31'00.010" W
Elevation:	671.00 m
Climate ID:	3012209
WMO ID:	71157
TC ID:	XEC

DAY	Max Temp °C	Min Temp °C	Mean Temp °C	Heat Deg Days	Cool Deg Days	Total Rain mm	Total Snow cm	Total Precip mm	Snow on Grnd cm	Dir of Max Gust 10's deg	Spd of Max Gust km/h
01	-20.0	-24.4	-22.2	40.2	0.0			0.2			
02	-18.2	-25.5	-21.9	39.9	0.0			0.0			
03	-4.8	-22.6	-13.7	31.7	0.0			0.0		30	37
04	-1.4	-12.4	-6.9	24.9	0.0			0.0		31	45
05	-12.4	-24.4	-18.4	36.4	0.0			0.7		34	40
06	-22.7	-28.8	-25.8	43.8	0.0			0.2			
07	-2.8	-22.7	-12.8	30.8	0.0			M			
08	-4.3	-12.9	-8.6	26.6	0.0			M			
09	-2.2	-12.5	-7.3	25.3	0.0			M			
10	-3.8	-14.5	-9.1	27.1	0.0			M			
11	-9.3	-19.8	-14.6	32.6	0.0			M		33	33
12	-15.5	-19.2	-17.4	35.4	0.0			M			
13	-4.4	-17.3	-10.9	28.9	0.0			M			
14	M	M	M	M	M			M		M	M
15	M	M	M	M	M			M		M	M
16	-1.1	-11.4	-6.2	24.2	0.0			M		36	46
17	-10.1	-19.9	-15.0	33.0	0.0			M		33	45
18	-19.3	-22.8	-21.1	39.1	0.0			M			
19	-22.8	-28.1	-25.5	43.5	0.0			M			
20	-28.1	-33.4	-30.8	48.8	0.0			M			
21	-29.6	-34.1	-31.9	49.9	0.0			M			
22	-24.8	-33.8	-29.3	47.3	0.0			M			
23	-19.0	-26.6	-22.8	40.8	0.0			M		17	41

DAY	Max Temp °C	Min Temp °C	Mean Temp °C	Heat Deg Days	Cool Deg Days	Total Rain mm	Total Snow cm	Total Precip mm	Snow on Grnd cm	Dir of Max Gust 10's deg	Spd of Max Gust km/h
24	-13.5	-19.2	-16.4	34.4	0.0			M			
25	-12.2	-16.4	-14.3	32.3	0.0			M			
26	-8.2	-15.4	-11.8	29.8	0.0			M			
27	-10.1	-15.0	-12.5	30.5	0.0			M			
28	-10.1	-12.3	-11.2	29.2	0.0			M			
29	-3.1	-11.3	-7.2	25.2	0.0			M			
30	-7.2	-14.0	-10.6	28.6	0.0			M			
31	-8.5	-16.6	-12.5	30.5	0.0			M			
Sum				990.7^	0.0^			1.1^			
Avg	-12.1^	-20.3^	-16.2^								
Xtrm	-1.1^	-34.1^				M	M	0.7^		36^	46^

Summary, average and extreme values are based on the data above.

Legend

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- M = Missing
- N = Temperature missing but known to be > 0
- S = More than one occurrence
- T = Trace
- Y = Temperature missing but known to be < 0
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Date modified:

2023-07-14

Daily Data Report for January 2023

EDMONTON BLATCHFORD
ALBERTA
Current Station Operator: ECCC - MSC

Latitude:	53°34'23.008" N
Longitude:	113°31'00.010" W
Elevation:	671.00 m
Climate ID:	3012209
WMO ID:	71157
TC ID:	XEC

DAY	Max Temp °C	Min Temp °C	Mean Temp °C	Heat Deg Days	Cool Deg Days	Total Rain mm	Total Snow cm	Total Precip mm	Snow on Grnd cm	Dir of Max Gust 10's deg	Spd of Max Gust km/h
01	-2.4	-12.9	-7.6	25.6	0.0			M			
02	-1.2	-11.8	-6.5	24.5	0.0			M			
03	-6.5	-14.6	-10.5	28.5	0.0			M			
04	-2.3	-15.8	-9.1	27.1	0.0			M			
05	-2.6	-15.9	-9.2	27.2	0.0			M		15	35
06	-1.2	-10.3	-5.8	23.8	0.0			M			
07	-1.9	-11.2	-6.6	24.6	0.0			M			
08	-2.7	-12.0	-7.4	25.4	0.0			M			
09	-1.3	-11.9	-6.6	24.6	0.0			M			
10	-4.8	-9.9	-7.3	25.3	0.0			M			
11	-4.2	-8.1	-6.2	24.2	0.0			M			
12	-8.1	-13.4	-10.8	28.8	0.0			M			
13	-10.2	-14.9	-12.6	30.6	0.0			M			
14	-6.9	-12.5	-9.7	27.7	0.0			M			
15	-4.3	-12.4	-8.4	26.4	0.0			M			
16	-4.2	-6.5	-5.4	23.4	0.0			M			
17	-5.8	-11.0	-8.4	26.4	0.0			M			
18	-6.9	-14.5	-10.7	28.7	0.0			M			
19	0.5	-13.9	-6.7	24.7	0.0			M			
20	2.7	-8.8	-3.1	21.1	0.0			M			
21	8.1	-2.3	2.9	15.1	0.0			M			
22	3.4	-4.6	-0.6	18.6	0.0			M		30	43
23	3.2	-7.3	-2.0	20.0	0.0			M		31	57

DAY	Max Temp °C	Min Temp °C	Mean Temp °C	Heat Deg Days	Cool Deg Days	Total Rain mm	Total Snow cm	Total Precip mm	Snow on Grnd cm	Dir of Max Gust 10's deg	Spd of Max Gust km/h
24	3.3	-4.3	-0.5	18.5	0.0			M		31	41
25	5.8	-4.5	0.6	17.4	0.0			M			
26	6.9	2.3	4.6	13.4	0.0			M		33	56
27	2.7	-15.5	-6.4	24.4	0.0			M		36	36
28	-15.0	-18.6	-16.8	34.8	0.0			M		31	44
29	-10.7	-20.6	-15.6	33.6	0.0			M		35	43
30	-8.5	-14.8	-11.7	29.7	0.0			M		35	33
31	-7.8	-12.4	-10.1	28.1	0.0			M			
Sum				772.2	0.0			M			
Avg	-2.7	-11.1	-6.9								
Xtrm	8.1	-20.6				M	M	M		31^	57^

Summary, average and extreme values are based on the data above.

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- T = Trace
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Date modified:

2023-07-14

Daily Data Report for February 2023

EDMONTON BLATCHFORD
ALBERTA
Current Station Operator: ECCC - MSC

Latitude:	53°34'23.008" N
Longitude:	113°31'00.010" W
Elevation:	671.00 m
Climate ID:	3012209
WMO ID:	71157
TC ID:	XEC

DAY	Max Temp °C	Min Temp °C	Mean Temp °C	Heat Deg Days	Cool Deg Days	Total Rain mm	Total Snow cm	Total Precip mm	Snow on Grnd cm	Dir of Max Gust 10's deg	Spd of Max Gust km/h
01	-10.6	-20.9	-15.7	33.7	0.0			M		35	33
02	-13.4	-21.1	-17.2	35.2	0.0			M		17	37
03	5.1	-15.0	-5.0	23.0	0.0			M			
04	7.2	-4.2	1.5	16.5	0.0			M			
05	6.1	-5.5	0.3	17.7	0.0			M		28	36
06	6.3	-6.2	0.0	18.0	0.0			M		32	38
07	5.5	-4.8	0.4	17.6	0.0			M		29	33
08	2.5	-5.5	-1.5	19.5	0.0			M			
09	1.1	-10.2	-4.6	22.6	0.0			M			
10	7.3	-5.7	0.8	17.2	0.0			M		27	40
11	5.8	-5.1	0.3	17.7	0.0			M			
12	5.4	-5.7	-0.1	18.1	0.0			M			
13	3.9	-7.6	-1.9	19.9	0.0			M		30	56
14	-3.6	-12.0	-7.8	25.8	0.0			M			
15	-3.5	-9.7	-6.6	24.6	0.0			M			
16	M	M	M	M	M			M		M	M
17	M	M	M	M	M			M		M	M
18	0.1	-10.7	-5.3	23.3	0.0			M			
19	-1.2	-10.6	-5.9	23.9	0.0			M			
20	-8.0	-13.5	-10.8	28.8	0.0			M			
21	-13.5	-22.3	-17.9	35.9	0.0			M			
22	-22.3	-27.8	-25.0	43.0	0.0			M			
23	-20.2	-25.0	-22.6	40.6	0.0			M			

DAY	Max Temp °C	Min Temp °C	Mean Temp °C	Heat Deg Days	Cool Deg Days	Total Rain mm	Total Snow cm	Total Precip mm	Snow on Grnd cm	Dir of Max Gust 10's deg	Spd of Max Gust km/h
24	-20.3	-27.9	-24.1	42.1	0.0			M			
25	-6.3	-21.6	-13.9	31.9	0.0			0.0			
26	-8.0	-15.1	-11.6	29.6	0.0			0.0			
27	-3.0	-12.3	-7.6	25.6	0.0			0.0			
28	-10.2	-14.8	-12.5	30.5	0.0			0.2			
Sum				682.3^	0.0^			0.2^			
Avg	-3.4^	-13.1^	-8.2^								
Xtrm	7.3^	-27.9^				M	M	0.2^		30^	56^

Summary, average and extreme values are based on the data above.

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- F = Accumulated and estimated
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- N = Temperature missing but known to be > 0
- S = More than one occurrence
- T = Trace
- Y = Temperature missing but known to be < 0
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Date modified:

2023-07-14

Daily Data Report for March 2023

EDMONTON BLATCHFORD
ALBERTA
Current Station Operator: ECCC - MSC

Latitude:	53°34'23.008" N
Longitude:	113°31'00.010" W
Elevation:	671.00 m
Climate ID:	3012209
WMO ID:	71157
TC ID:	XEC

DAY	Max Temp °C	Min Temp °C	Mean Temp °C	Heat Deg Days	Cool Deg Days	Total Rain mm	Total Snow cm	Total Precip mm	Snow on Grnd cm	Dir of Max Gust 10's deg	Spd of Max Gust km/h
01	-6.6	-12.9	-9.7	27.7	0.0			0.2			
02	6.2	-8.1	-1.0	19.0	0.0			0.0		35	47
03	1.5	-8.6	-3.5	21.5	0.0			0.0		30	34
04	-7.5	-14.0	-10.7	28.7	0.0			0.0			
05	-13.1	-18.1	-15.6	33.6	0.0			0.2			
06	-13.9	-17.4	-15.7	33.7	0.0			0.4			
07	-9.2	-16.8	-13.0	31.0	0.0			0.3		13	33
08	-13.5	-19.6	-16.6	34.6	0.0			0.0			
09	-10.6	-18.5	-14.6	32.6	0.0			0.0		16	39
10	-9.5	-17.3	-13.4	31.4	0.0			0.0			
11	-5.8	-16.6	-11.2	29.2	0.0			0.2			
12	-6.6	-16.9	-11.7	29.7	0.0			0.0			
13	-8.5	-15.8	-12.2	30.2	0.0			0.0			
14	1.0	-10.7	-4.9	22.9	0.0			0.0			
15	0.6	-14.0	-6.7	24.7	0.0			0.0			
16	4.8	-8.6	-1.9	19.9	0.0			0.0			
17	6.5	-9.2	-1.3	19.3	0.0			0.0			
18	7.3	-10.7	-1.7	19.7	0.0			0.0			
19	7.3	-7.7	-0.2	18.2	0.0			0.0			
20	6.4	-8.9	-1.2	19.2	0.0			0.0		3	32
21	-2.5	-9.8	-6.2	24.2	0.0			0.0			
22	10.3	-10.8	-0.3	18.3	0.0			0.0			
23	11.2	-6.3	2.4	15.6	0.0			0.0			

DAY	Max Temp °C	Min Temp °C	Mean Temp °C	Heat Deg Days	Cool Deg Days	Total Rain mm	Total Snow cm	Total Precip mm	Snow on Grnd cm	Dir of Max Gust 10's deg	Spd of Max Gust km/h
24	2.3	-4.9	-1.3	19.3	0.0			0.0			
25	3.9	-6.0	-1.1	19.1	0.0			0.7			
26	0.7	-6.0	-2.7	20.7	0.0			0.2			
27	-4.2	-11.4	-7.8	25.8	0.0			0.0		3	31
28	3.3	-12.1	-4.4	22.4	0.0			0.0			
29	6.5	-6.7	-0.1	18.1	0.0			0.0			
30	2.5	-2.9	-0.2	18.2	0.0			0.0		15	37
31	4.8	-6.3	-0.7	18.7	0.0			0.0			
Sum				747.2	0.0			2.2			
Avg	-0.8	-11.4	-6.1								
Xtrm	11.2	-19.6				M	M	0.7		35^	47^

Summary, average and extreme values are based on the data above.

Legend

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Date modified:

2023-07-14

This is Exhibit "E" referred to in the Affidavit of Dr. Sandy Dong, affirmed this 15th day of September, 2023

CHRISTOPHER WIEBE
LAWYER

INJURY PREVENTION CENTRE

KNOWLEDGE. LEADERSHIP. ACTION.

HOUSELESSNESS AND INJURIES IN ALBERTA: 2019-2020

INJURY PREVENTION CENTRE

May 2022

injurypreventioncentre.ca

UNIVERSITY OF ALBERTA

Bissell

The Injury Prevention Centre resides on the traditional territory of Cree, Blackfoot, Métis, Nakota Sioux, Iroquois, Dene, and Ojibway/Saulteaux/Anishinaabe nations; lands that are now known as part of Treaties 6, 7, and 8, and homeland of the Métis. We respect the sovereignty, lands, histories, languages, knowledge systems, and cultures of First Nations, Métis and Inuit nations.

Author
Colleen Drul
injury Data Analyst

Introduction
Jakob Koziel
Research Analyst, Analysis and Evaluation Department, Bissell Centre

Editing
Patti Stark
Dr. Kathy Belton
George Frost

For questions regarding this report, contact:

Injury Prevention Centre, School of Public Health
4-248 ECHA, University of Alberta
11405 87 Avenue NW
Edmonton AB T6G 1C9

Email: ipc@ualberta.ca
Phone: 780.492.6019
Fax: 780.492.7154
Web: www.injurypreventioncentre.ca

SUGGESTED CITATION
Houselessness and Injuries in Alberta. Edmonton, AB: Injury Prevention Centre, 2022

INTRODUCTION

Houselessness is a grave and complex societal issue that requires a multi-disciplinary approach (i.e., social work and public health) when investigating its etiology and developing evidence-based interventions. Houselessness is "the condition of being without a house..."[1] and is an extreme manifestation of poverty experienced by many individuals and families across the world.[2] Houselessness / houseless refers to the same state of being as 'homelessness'. However, the former term is preferable over the latter due to houselessness acknowledging the reality of individuals currently living without a physical space or house.[3] 'Home' can be used plurally by individuals who may define their communities, land, neighborhoods, or social support networks as 'homes'.[3] By labeling individuals who do not have a house or physical location to live as 'homeless', one may unintentionally disregard these connections made by individuals and sever their connections with their current homes.[3] Therefore, this report will use the terms "Houselessness" or "Houseless" throughout and when referencing prior literature on "homelessness".

Risk factors for entering houselessness have been explored by the literature.[4-5] Harmful and traumatic life events experienced during one's life course, mental health issues, unemployment,[4-5] and the unaffordable rent due to economic changes[6] are one of the many reasons why anyone is at risk for entering houselessness. One of the critical issues individuals may face while experiencing houselessness, is the increased risk of sustaining injuries because of one's living conditions (i.e., emergency shelters, living in outside conditions) when experiencing houselessness.[7]

As reported by research, frequently occurring injuries among those experiencing houselessness are sprains/strains, contusions/abrasions, burns, and injuries to the lower extremities.[8] The prevalence of traumatic brain injuries are also noticeably high among those experiencing houselessness.[9-10] A study in Toronto showed that men experiencing houselessness have greater rates of emergency department visits for cold weather-related injuries than men not currently experiencing houselessness,[11] highlighting the unique geographic challenges of experiencing houselessness during harsh winter climates predominant among most Canadian provinces, including Alberta.

Along with the harsh realities of experiencing houselessness in Alberta, there is also evidence to suggest that houselessness has increased among some Albertan jurisdictions since the COVID-19 pandemic. The *Alberta 2018 Point-in-Time Homeless Count* estimated that there were 5,735 individuals experiencing houselessness among seven major Albertan cities in 2018, with the majority of those experiencing houselessness centered in the Edmonton and Calgary regions.[6] However, these estimates were calculated before the pandemic; more recent estimates suggest that the number of Albertans experiencing houselessness has increased compared to what was reported by the seven cities report. For example, experts have suggested that the number of Edmontonians currently experiencing houselessness is closer to 3,000,[12-13] a substantial increase than what was reported by Seven Cities in 2018 (1,971).[6] To our knowledge, more recent numbers for the remaining cities are unknown but could be theorized to have increased due to the aftereffects of the COVID-19 pandemic. Some have suggested that a recession caused by the COVID-19 pandemic may have contributed to increased houselessness across Canada. As such, it could take years (up to 5) before the full impact of the COVID-19 recession on houselessness is fully realized.[14] Despite the methodological limitations of Point-in-Time (PIT) estimates regarding houselessness,[15] these estimates suggest a high likelihood of increased houselessness in Albertan municipalities than in previous years.

While recent data suggests a 'lag effect' regarding the rise in houselessness across the country, there is also time to implement preventative measures to address this increase.[14] Furthermore, most of the previously discussed injuries sustained by those experiencing houselessness can be prevented, highlighting the significant role that public health officials in injury prevention can play in mitigating the harms associated with houselessness. Coupled with the increase in those experiencing houselessness along with a higher risk of injuries, efforts focused on preventing injuries are critical.

The first step towards effective injury control programming for those experiencing houselessness in Alberta is to provide a clear understanding of what injuries are, their causes, and effective prevention strategies. Previous research reporting on the prevalence of injury among Albertans experiencing houselessness was only contained within one geographic location and only within small samples of individuals.[16] Given the current data drought surrounding injury rates among those experiencing houselessness in Alberta, this report will be the first in Alberta to provide baseline information on injury-related emergency department visits for people experiencing houselessness. The intended purpose of this report is to determine areas of greatest need to plan and deliver effective injury prevention programming.

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PRESENTATION OF DATA

The data presented in this report includes injury-related emergency department visits of those reporting houselessness. Exclusions from the report are: adverse events, medical / surgical complications, transfers to another facility.

The primary data in this report are:

- the number of emergency department visits by mechanism
- the number of emergency department visits by detailed mechanism of injury (where available)
- the number of emergency department visits by age / sex
- the number of emergency department visits by body region and nature of injury (where applicable)

Houselessness was identified by documentation within the emergency department visit and the use of ICD10-CA diagnosis code Z59.0 houselessness, in any diagnosis field.

The mechanism of injury is identified by the first listed external cause code using the International Classification of Disease 10 edition, Canadian Adaptation (ICD10-CA) diagnosis code V00-Y36.9.

Due to the lack of population numbers for the houselessness, age specific rates could not be calculated.

Data collection around gender was not self-reported, and individuals were not asked about their preferred pronouns. The data regarding non-binary or transgender individuals was also not collected.

OVERVIEW

There was an average of 5,814 injury-related emergency department visits of people experiencing houselessness.

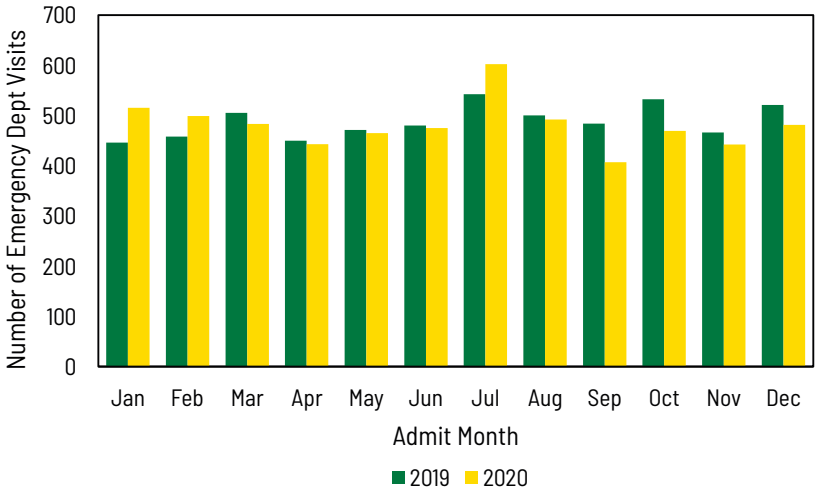
In 2019, there were 5,855 injury-related visits and, in 2020, there were 5,773 injury-related visits of people experiencing houselessness.

The number of injury-related emergency department visits by people experiencing houselessness remained relatively consistent.

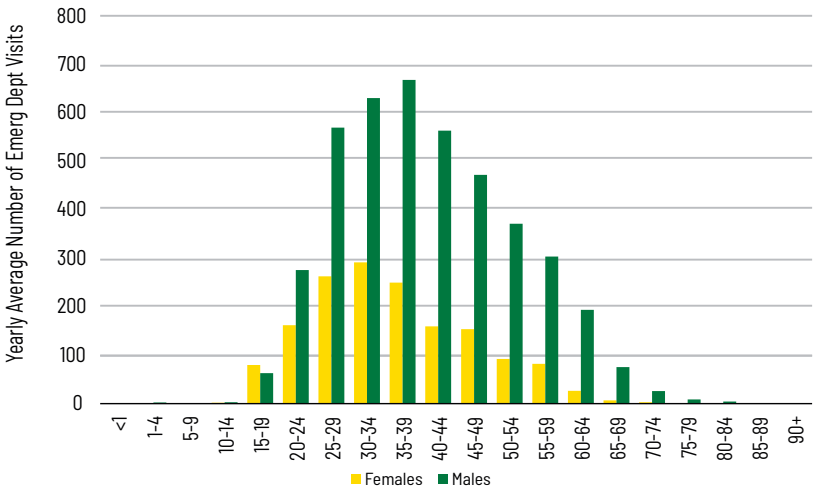
July had the highest number of injury-related visits with 542 visits in 2019, and 602 visits in 2020.

September had the lowest number of visits with 484 injury-related visits in 2019 and 407 injury-related visits in 2020.

Number of Emergency Department Visits by Month, Alberta, 2019-2020



Number of Emergency Department Visits by Age Group and Sex, Alberta, 2019-2020



Seventy-three percent of injury-related emergency department visits from people experiencing houselessness were males, with an average of 4,237 visits each year.

The remaining 27% of injury-related emergency department visits were females, with an average of 1,578 visits each year.

Males between 35 and 39 years of age had the highest number of visits, with an average of 669 each year.

Females between 30 and 34 years of age had the highest number of injury-related emergency department visits, with an average of 292 visits each year.

NOTE: as there is no source that accurately counts the houselessness population, rates can not be calculated.

SELECTION OF CAUSES

Injuries are defined as the physical damage a person suffers from mechanical energy (a motor vehicle crash), thermal energy (a burn from a flame), electrical energy (a shock) or chemical energy (poisoning) or from the absence of essentials such as heat (resulting in frost bite or hypothermia) or oxygen (resulting in suffocation). Injury can be further categorized as unintentional (unexpected), such as falling or drowning, or intentional (having an intent to harm oneself or others), such as suicide or violence.

This report focuses on the most significant causes of injury-related emergency department visits for those experiencing houselessness. The most significant causes with actionable prevention strategies discussed in this report include: unintentional/undetermined intent of poisonings, violence/injury purposely inflicted, falls and injuries due to environmental conditions.

DEFINITIONS FOR PREVENTABLE LEADING CAUSES

Unintentional / undetermined poisoning include: A poisoning may occur when a substance (drug, medication or biological agent) is taken incorrectly. This includes wrong drug being given/taken, wrong dosage, self-prescribed drug in combination with a prescribed drug, any drug taken in combination with alcohol. According to coding standards, all poisonings are classified as accidental unless there is clear documentation of intentional self-harm or undetermined intent.

Violence includes: injuries inflicted by another with the intent to injure or kill, by any means. Including use of firearms, fight/brawl, sexual assault, cutting / piercing (stabbing), maltreatment / neglect / abandonment, drugs / liquid, being struck with a blunt object, and other/unspecified.

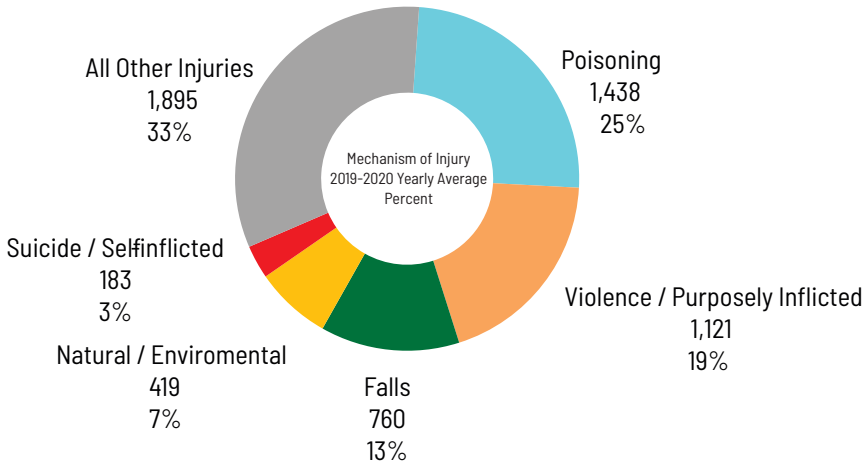
Falls include: ice and snow, slipping / tripping / stumbling, due to collision with, or pushing by another person, while being carried or supported by another person, falls involving wheelchairs and other type of walking devices, from furniture, playground equipment including trampolines, stairs / steps, ladders / scaffolding, out of / from buildings or structures, falls from high place, falls from one level to another, falls on same level, unspecified falls.

Natural / environmental includes: bites / stings from insects or other nonvenomous arthropods / spiders, contact with venomous plants / animals, contact with hornets / wasps / bees, dog bites, bite by other mammals, lack of food / water, excessive heat due to weather, excessive cold due to weather and other unspecified forces of nature.

Suicide / self-inflicted injuries include: (self-inflicted) poisoning, intentional exposure to gas / vapours, intentional self harm from hanging / strangulation / suffocation, firearms, cutting / piercing, and other (explosive materials, smoke / fire / flames, hot steam / hot objects), intentional self-harm with the use of a blunt object, jumping from a high place, jumping / lying before a moving object, intentional crashing of a motor vehicle, other and unspecified means of self-harm.

Percentage include adverse events, complications

Number and Percent of Emergency Department Visits by Mechanism of Injury, Alberta, 2019-2020



The leading cause of injury-related emergency department visits of individuals experiencing houselessness was unintentional / undetermined poisoning accounting for 25%, with 1,438 visits each year.

The second leading cause of injury-related visits was as a result of violence / injury purposely inflicted which accounted for 19%, with an average of 1,121 visits each year.

Fall-related injuries accounted for 13% of the emergency department visits, with an average of 760 visits each year.

Natural / environmental (exposure to extreme weather, bites / sting from insects, and dog bites) accounted for 7% of the injury-related visits, with an average of 419 each year.

Suicide / self-inflicted harm injuries accounted for 3% of the injury-related emergency department visits, with an average of 183 visits each year.

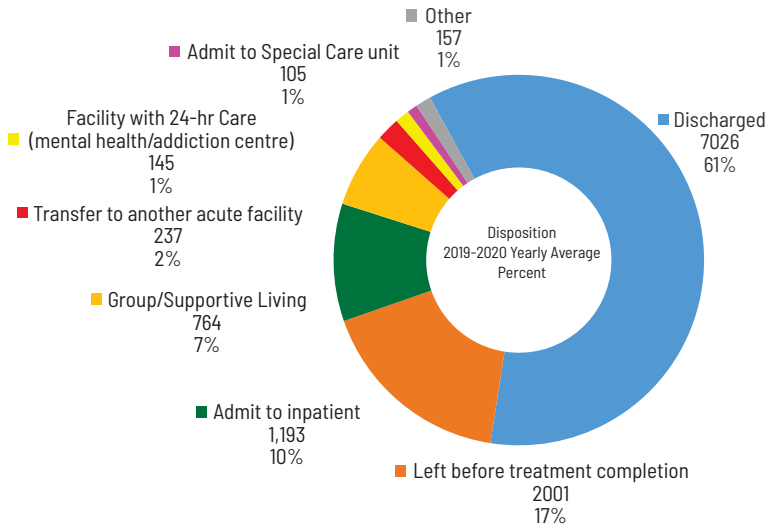
All other injuries accounted for the largest portion of injury-houselessness. Of the 1,895 average yearly visits in the other injuries category,

- 39% were identified as other / unspecified with an average of 743 visits each year.
- 12% were identified as cutting / piercing with an average of 227 visit each year.
- 11% were identified as being struck by / against person / object (not violence-related) with an average of 212 visits each year.

These 3 mechanisms of injury accounted for 69% of the injuries in the other injury category and accounted for 20% of all injury visits.

Percentage include adverse events, complications

Number and Percent of Emergency Department Visits by Disposition, Alberta, 2019-2020



Sixty one percent of people experiencing houselessness who were seen at an emergency department due to an injury were discharged from the department.

Seventeen per cent of the visits left either before being triage, being seen by a physician or having their treatment completed.

Ten per cent were admitted as an inpatient.

Seven per cent were discharged to a group / supportive living facility. These facilities are non-institutional community residential settings that integrate a shared living environment with varying degrees of supportive services (e.g., meal service) and sometimes staff supervision (professional services). These include group homes, retirement residences and seniors' lodges and transitional housing which is a community setting providing food and shelter on a short-term basis, including shelters, hostels and hotels.

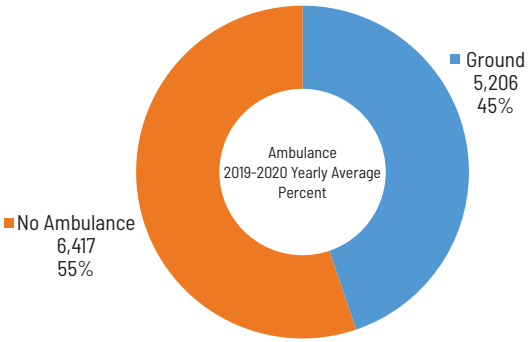
Another 2% of the injury-related emergency department visits from those experiencing houselessness were admitted to another care facility (hospital).

One per cent were transferred to a facility with 24 hour care. This includes: long-term care centres that provide 24-hour nursing care, (e.g., extendicare, personal care homes, nursing homes, health centres, care centres), mental health and addiction centres, residential treatment centres (community-based, not in an acute care facility) that provide 24-hour care, including detox and withdrawal management and hospice / palliative care facilities.

One per cent were admitted to a special care unit.

One per cent other. This includes: transfer to a correctional institute, discharged with supports, transferred to a non-acute care facility, intra-facility transfer to clinic, day surgery, or died in the facility.

Number and Percent of Emergency Department Visits by Ambulance, Alberta, 2019-2020



Fifty five percent of the injury-related emergency department visits (6,417 visits each year) from those experiencing houselessness did not arrive via ambulance.

The remaining 45% of the injury-related emergency department visits from those experiencing houselessness arrived via ambulance (5,206 visits each year).

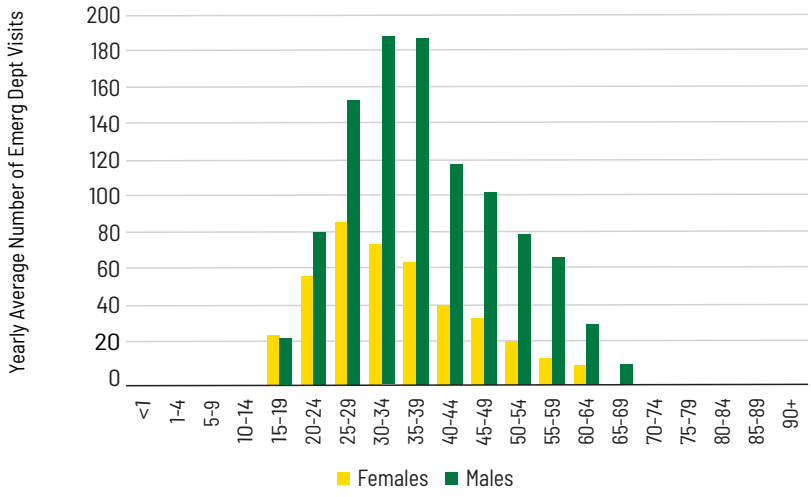
UNINTENTIONAL / UNDETERMINED POISONING

Unintentional / undetermined poisoning is a poisoning that may occur when a substance (drug, medication or biological agent) is taken incorrectly. This includes wrong drug given / taken, wrong dosage, self-prescribed drug take in combination with a prescribed drug, any drug taken in combination with alcohol. According to coding standards, all poisonings are classified as accidental unless there is clear documentation of intentional self-harm or undetermined intent.

Number of Unintentional / undetermined Poisoning-related Emergency Department Visits by Age Group and Sex, Alberta, 2019-2020

Over the period from 2019 through 2020, 25% of the injury-related emergency department visits of people experiencing houselessness was due to an unintentional / undetermined poisoning, accounting for an average of 1,438 visits each year.

Seventy two percent of the unintentional / undetermined poisoning-related visits of those experiencing houselessness were males, with an average of 1,035 visits each year. The remaining 28% were females, with an average of 403 visits each year.



Males, aged 30 to 34 years who experience houselessness had the highest number of visits with an average of 188 visits each year. This was closely followed by males, 35 to 39 years of age with an average of 187 unintentional / undetermined poisoning-related visits each year.

Females, 25 to 29 years old experiencing houselessness had the highest average number of unintentional / undetermined poisoning-related emergency department visits with an average of 83 visits each year.

VIOLENCE / INJURY PURPOSELY INFLICTED

Violence includes: injuries inflicted by another with the intent to injure or kill, by any means. It includes use of firearms, fight / brawl, sexual assault, cutting / piercing (stabbing), maltreatment / neglect/abandonment, drugs / liquid, being struck with a blunt object, drowning / submersion, explosive materials, smoke / fire / flames, steam / hot vapours / hot objects, pushing from a high place, pushed or placing victim before moving object, crashing a motor vehicle, and other / unspecified.

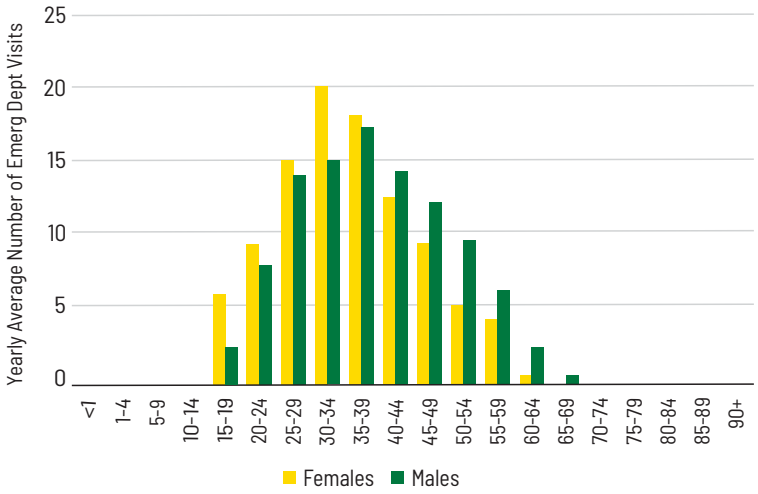
Over the period from 2019 through 2020, there was an average of 1,121 violence-related emergency department visits each year to those experiencing houselessness.

Overall, males experiencing houselessness accounted for 64% of the visits, with an average of 718 visits each year.

Females accounted for the remaining 34% with an average of 403 violence-related visits each year.

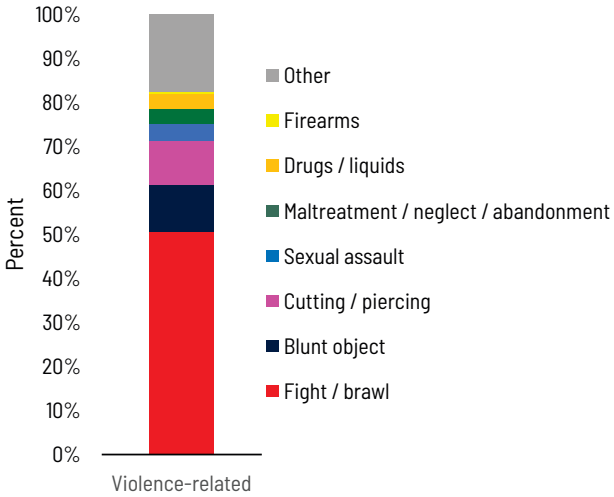
Females from 15 to 39 years of age experiencing houselessness had a higher average number of violence-related visits than houseless men of the same age. From 40 years of age and older, males experiencing houselessness had higher numbers violence-related emergency department visits than females.

Number of Violence-Related Emergency Department Visits by Age Group and Sex, Alberta, 2019-2020



Females 30 to 34 years of age had the highest number of violence-related emergency department visits with an average of 20 visits each year. Males 35 to 39 years of age had the highest number of violence-related emergency department visits with an average of 16 visits each year.

Percent of Violence-related Injuries by Specific Mechanism, Alberta, 2019-2020



Overall, fights / brawls accounted for 51% of the violence-related emergency department visits of those experiencing houselessness, with an average of 226 visits each year.

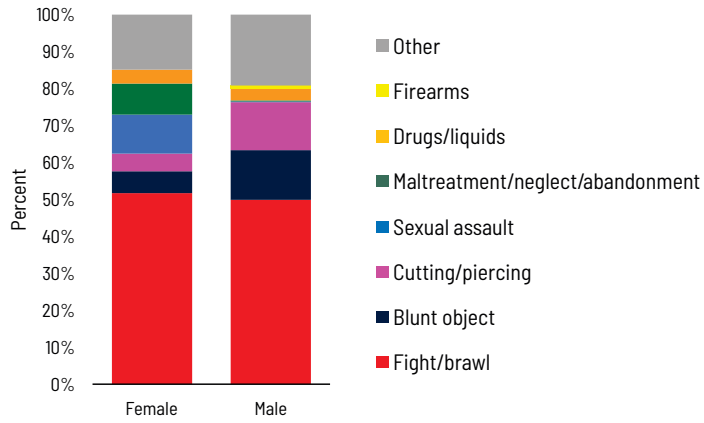
Injuries as a result of being struck with a blunt object accounted for 11% of the violence-related emergency department visits of those experiencing houselessness, with an average of 120 visits each year.

Cutting / piercing (stabbing)-related emergency department visits accounted for another 10%, with an average of 112 visits each year.

Sexual assault, maltreatment / neglect / abandonment, drugs / liquids, and firearm related emergency department visits each accounted for less than 10% of the violence-related emergency department visits.

Other violence-related injuries accounting for 18%, with an average of 198 visits each year.

Percent of Specific Mechanism of Violence-related Injuries by Sex, Alberta, 2019-2020



When we look at the specific violence-related mechanisms by sex:

Fight / brawl-related injuries accounted for 52% of violence-related emergency department visits for females experiencing houselessness, with an average of 208 visits each year. Fights / brawls accounted 50% of the violence-related injuries of males experiencing houselessness, with than an average of 358 visits each year.

Injury-related emergency department visits as a result of being struck by a blunt object accounted for 13% of the violence-related visits by males experiencing houselessness, with an average of 91 visits each year. For females experiencing houselessness, injuries as a result of being struck by an blunt object accounted 6% of violence-related injuries, with an average of 24 visits each year.

Cutting / piercing (stabbing) accounted for 13% of the violence-related injuries to males experiencing houselessness, with an average of 94 emergency department visits each year. Whereas, cutting / piercing (stabbing)-related emergency department visits accounted for 5% of the violence-related injuries to females experiencing houselessness, with an average of 19 visits each year.

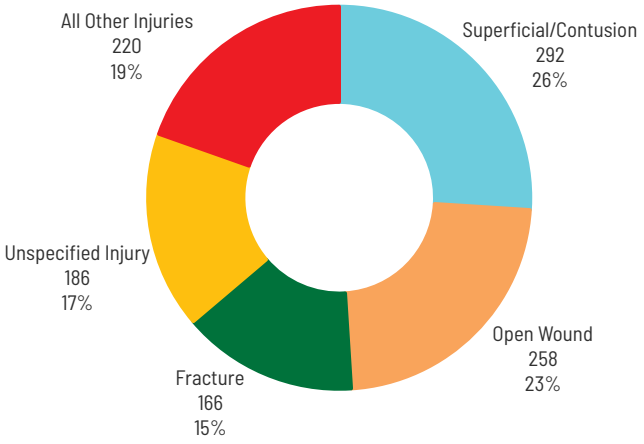
Sexual assault-related emergency department visits accounted for 11% of violence-related emergency department visits for females experiencing houselessness, with 43 visits each year. Whereas males experiencing houselessness accounted for 0% of violence-related emergency department visits.

Maltreatment / neglect / abandonment accounted for 8% of violence-related emergency department visits for females experiencing houselessness, with 34 visits each year and 0% of violence-related emergency department visits for males experiencing houselessness.

Violence-related injuries with the use of drug / liquids accounted for 4% for females experiencing houselessness, with an average of 15 visits each year. For males experiencing houselessness, this accounted for 3%, with an average of 23 visits each year.

Firearm violence-related emergency department visits accounted for 1% of the visits by males experiencing houselessness with an average of 6 firearm-related visits. Whereas for females experiencing houselessness, there were zero firearm-related visits.

Number and Percent Violence-related of Emergency Department Visits by Nature of Injury, Alberta, 2019-2020



Of the annual 760 violence-related emergency department visits of people experiencing houselessness, 26% were diagnosed with a superficial injury or contusion, with an average of 292 visits each year. This would include: scrapes, scratches, bumps and bruises.

Another 23% of the violence-related visits were diagnosed with an open wound with an average of 258 visits each year. This includes cuts.

Another 15% were diagnosed with a fracture after a violence-related incident, with an average of 166 visits each year.

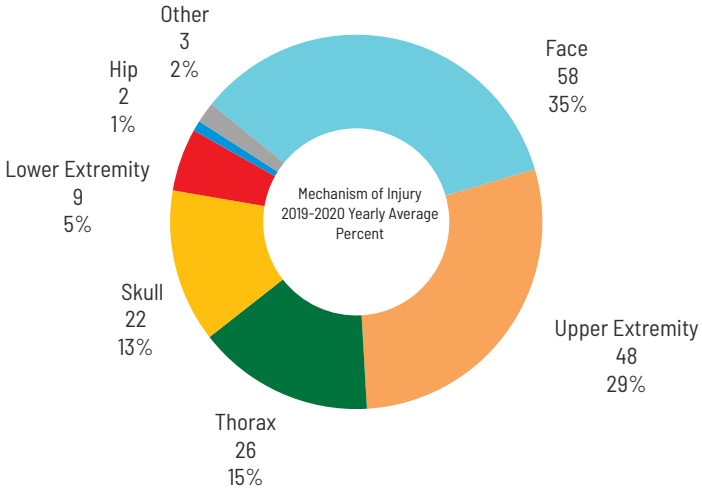
Unspecified injuries accounted for 17% of the violence-related emergency department visits with an average of 186 visits each year. This category is used when there is lack of adequate documentation for a more specific mechanism violence-related injury.

Another 19% of the violence-related injuries were all other injuries with an average of 220 emergency department visits each year. This includes dislocations of joints, amputations, injuries to blood vessels, burns, foreign body, and multiple injuries.

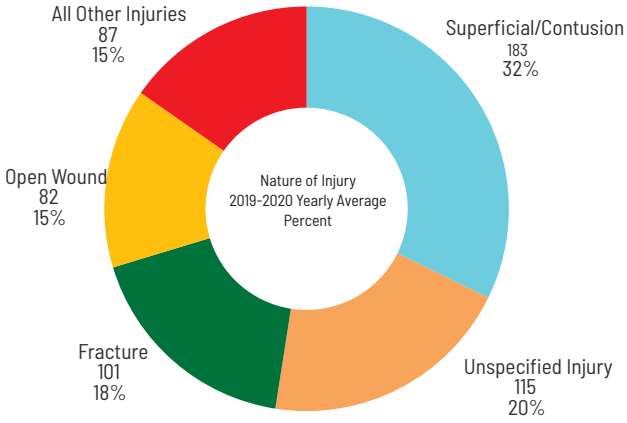
Number and Percent of Violence-related Fractures by Body Region, Alberta, 2019-2020

Of the 166 violence-related emergency department visits each year diagnosed with a fracture:

- 35% involve fracture the face. This includes fractures of the nose, cheek bone, jaw or teeth.
- 29% involved a fracture of the upper extremity. This includes fractures of the shoulder / upper arm, forearm, wrist or hand.
- 15% involved a fracture of the chest / thorax cavity. This includes fracture of the ribs or sternum.
- 13% involved a fracture of the skull. This includes fracture of skull vault, base, orbital floor, or multiple skull / facial bones.
- 5% involved the lower extremity. This includes a fracture of the shaft or lower end of femur (excludes fractured hip), multiple leg fractures, or fractures of lower leg including ankle and foot.
- 1% involved a fracture of the hip.
- 2% involved other body regions.



Number and Percent of Fight/brawl-related Emergency Department Visits by Nature of Injury, Alberta, 2019-2020



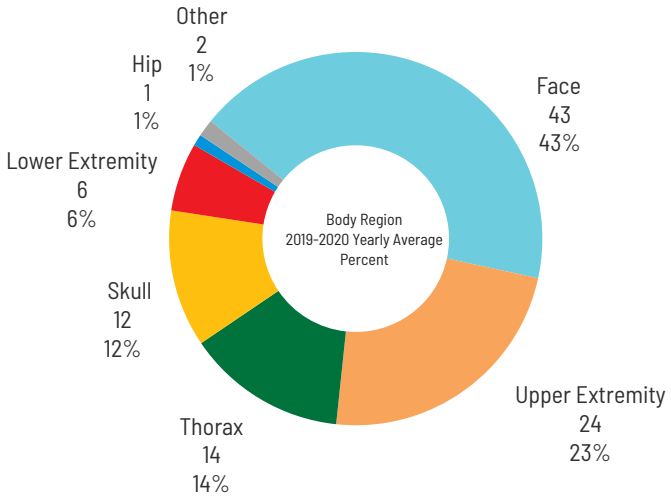
Of the annual 566 fight / brawl-related emergency department visits of people experiencing houselessness:

- 32% were diagnosed with a superficial injury or contusion with an average of 183 visits each year. This would include: scrapes, scratches, bumps and bruises.
- Unspecified injuries accounted for 20% of the fight/brawl-related emergency department visits, with an average of 115 visits each year. This category is used when there is a lack of adequate documentation for a more specific mechanism violence-related injury.
- Another 18% were diagnosed with a fracture after a fight / brawl-related incident, with an average of 101 visits each year.
- Another 15% of the fight / brawl-related visits were diagnosed with an open wound, with an average of 82 visits each year. This includes cuts.
- Another 15% of the fight / brawl-related injuries were all other injuries, with an average of 87 emergency department visits each year. This includes dislocations of joints, amputations, injuries to blood vessels, burns, foreign body, and multiple injuries.

Number and Percent of Fight/brawl-related Fractures by Body Region, Alberta, 2019-2020

Of the 101 fights / brawls-related emergency department visits each year diagnosed with a fracture:

- 43% involve fracture of the face with an average of 43 visits each year. This includes fractures of the nose, cheek bone, jaw or teeth.
- 23% involved a fracture of the upper extremity with an average of 24 visits each year. This includes fractures of the shoulder / upper arm, forearm, wrist or hand.
- 14% involve a fracture of the chest / thorax cavity with an average of 14 visits each year. This includes fracture of the ribs or sternum.
- 12% involve a fracture of the skull with an average of 12 visits each year. This includes fracture of skull vault, base, orbital floor, or multiple skull / facial bones.
- 6% involve the lower extremity with an average of 6 visits each year. This includes a fracture of the shaft or lower end of femur (excludes fractured hip), multiple leg fractures, or fractures of lower leg including ankle and foot.
- 1% involve fracture of the hip.
- 2% involve other body regions.



FALLS

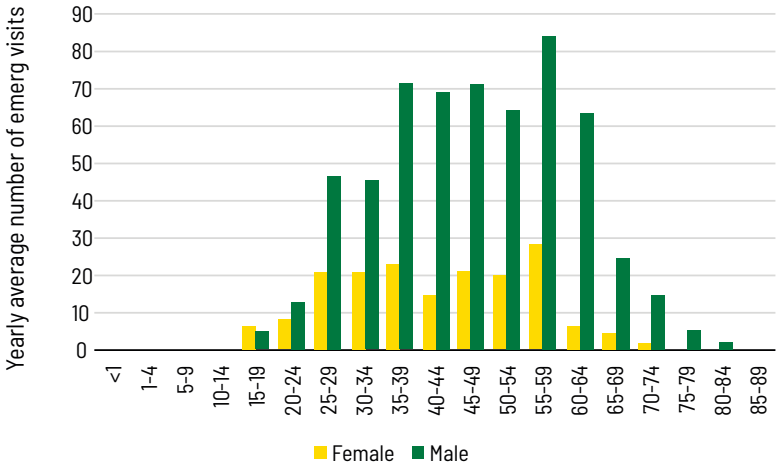
Falls include: falls due to ice and snow, slipping / tripping / stumbling, due to collision with, or pushing by another person, while being carried or supported by another person, falls involving wheelchairs and other type of walking devices, from furniture, playground equipment including trampolines, stairs / steps, ladders / scaffolding, out of / from buildings or structures, falls from high place, falls from one level to another, falls on same level, unspecified falls.

Overall, between 2019 and 2020 there were 760 fall-related emergency department visits of those experiencing houselessness.

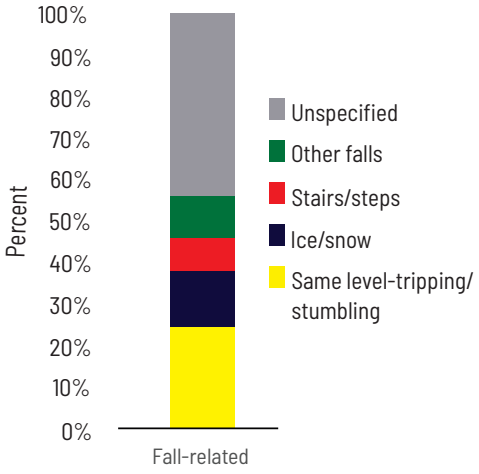
Seventy seven percent of the fall-related emergency department visits of those experiencing houselessness were males, with an average of 585 visits each year. The remaining 23% were females, with an average of 175 visits each year.

Those between 55 to 59 years of age experiencing houselessness had the highest number of fall-related emergency department visits for both females and males with females having an average of 16 fall-related visits each year and males having an average of 14 fall-related visits each year.

Number of Fall-related Emergency Department Visits by Age Group and Sex, Alberta, 2019-2020



Percent of Fall-related Injuries by Specific Mechanism, Alberta, 2019-2020



Falls on the same level due to tripping and stumbling accounted for the largest percent of fall-related emergency department visits of those experiencing houselessness accounting for 25% with an average of 194 visits each year.

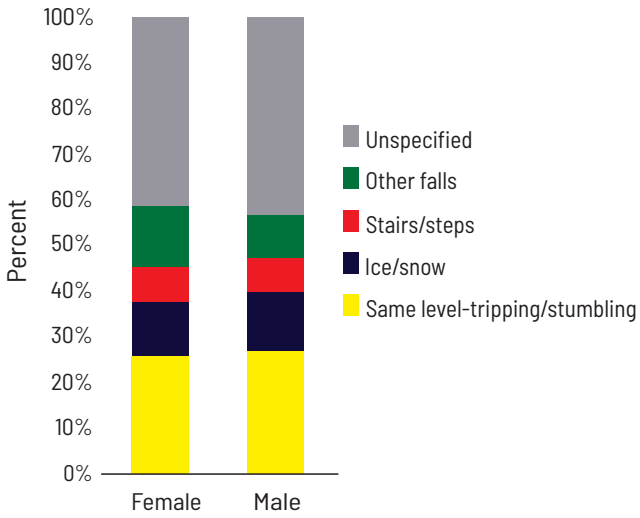
Fall-related injuries involving ice / snow accounted for another 13%, with an average of 100 visits each year.

Fall-related injuries on stairs / steps accounted for 8%, with an average of 61 visits each year.

Fall-related injuries as a result of other causes of falls accounted for 11%, with an average of 82 visits each year. This would includes falls from a ladder / scaffolding, building structure, fall from one level to another, falls from furniture and playground equipment.

The largest category was fall-related injuries due to other unspecified mechanisms which accounted for 43% of the visits, with an average of 325 visits each year. This category includes falls while being carried or supported by another person, falls from wheelchairs and other types of walking devices, fall on same level (in or from bathtub / shower stall / toilet / unspecifed fall on same level). Also includes unspecified fall in which there was a lack of documentation to identify a more specific mechanism.

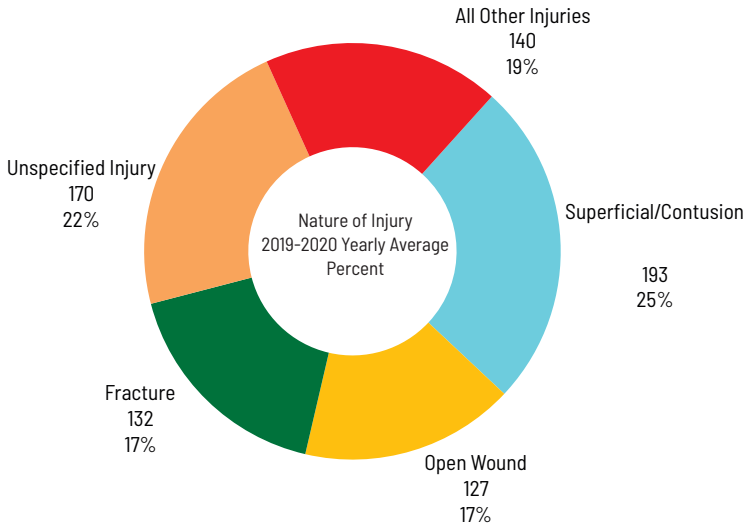
Percent of Specific Mechanism of Fall-related Injuries by Sex, Alberta, 2019-2020



Examining specific fall-related mechanisms by sex:

- Falling from a trip / stumble accounted for 25% of fall-related emergency department visits for females experiencing houselessness with an average of 44 visits each year. Falls from tripping / stumbling accounted 26% of the fall-related injuries of males experiencing houselessness with an average of 150 visits each year.
- Injury emergency department visits as a result of a fall from ice / snow accounted for 13% for both males and females experiencing houselessness. Females had an average of 24 visits each year and males had an average of 76 ice / snow-related fall emergency department visits each year.
- Falling from stairs / steps accounted for 8% of the fall-related injuries to males experiencing houselessness with an average of 49 emergency department visits each year. Whereas for females experiencing houslessness, falling from stair/step accounted for 7% of emergency department visits, with an average of 12 visits each year.
- Fall-related injuries as a result of other mechansims / causes accounted for 10% of emergency department visits for males experiencing houselessness and 13% for females. Males had an average of 59 visits each year and females had an average of 22 visits each year. This would includes falls from a ladder / scaffolding, building structure, fall from one level to another, falls from furniture and playground equipment.
- The largest category was fall-related injuries due other unspecified mechanisms which accounted for 43% of the visits of males experiencing houselessness, with an average of 252 visits each year. For females experiencing houselessness, this category accounted for 42% of fall-related emergency department visits with an average of 74 visits each year. This category includes falls while being carried or supported by another person, falls from wheelchairs and other types of walking devices, fall from on same level (in or from bathtub / shower stall / toilet / unspecifed fall on same level). Also includes unspecified fall in which there was a lack of documentation to identify a more specific mechanism.

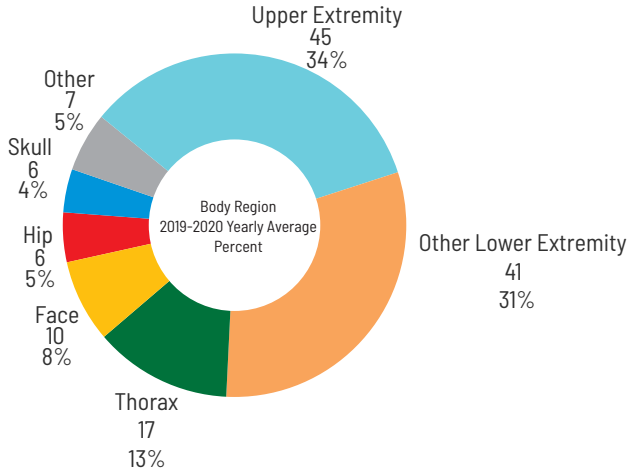
Number and Percent of Fall-related Emergency Department Visits by Nature of Injury, Alberta, 2019-2020



Of the 760 fall-related emergency department visits of people experiencing houselessness

- 25% were diagnosed with a superficial injury or contusion with an average of 193 visits each year. This would include: scrapes, scratches, bumps and bruises.
- 17% of the fall-related visits were diagnosed with an open wound with an average of 127 visits each year. This includes cuts.
- 17% were diagnosed with a fracture after a fall-related incident with an average of 132 visits each year.
- 22% of the fall-related emergency department visits were unspecified injury often described as head injury unspecified.
- 19% of the fall-related emergency department visits were diagnosed with dislocation, multiple injuries, and sprains / strains.

Number and Percent of Fall-related Emergency Department Visits by Nature of Injury, Alberta, 2019-2020



Of the 132 visits each year diagnosed with a fracture:

- 34% involved fractures of the upper extremity with an average of 41 visits each year. This would include: shoulder / upper arm, forearm, wrist and hand.
- 31% involved a fracture of the lower extremity with an average of 41 visits each year. This would include: shaft or lower end of femur (excludes fractured hip), multiple leg fractures, lower leg including ankle or foot.
- 13% involve fracture of the thorax / chest including ribs or sternum with an average of 17 visits each year.
- 8% involve fractures of the face with an average of 10 visits each year. This includes fractures of the nose, cheek bone, jaw or teeth.
- 5% involve fracture of the hip with an average of 6 visits each year.
- 4% involve a fracture of the skull with an average of 6 visits each year. This includes fractures of the vault, base, orbital floor, multiple skull / facial bones.
- 5% involve other body regions with an average of 7 visits each year.

NATURAL / ENVIRONMENTAL

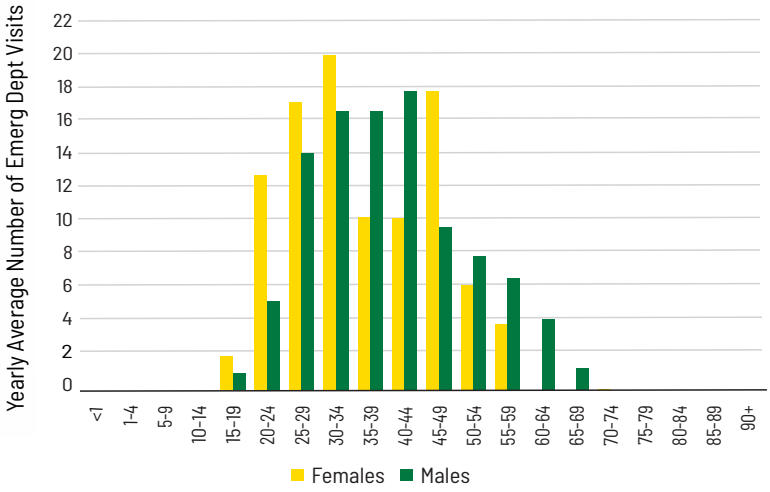
Natural / environmental includes: bites / stings from insects or other non-venomous arthropods / spiders, contact with venomous plants / animals, contact with hornets / wasps/bees, dog bites, bite by other mammals, lack of food / water, excessive heat due to weather, excessive cold due to weather and other unspecified forces of nature.

Over the period from 2019 through 2020, there was an average of 419 natural-related emergency department visits each year to those experiencing houselessness.

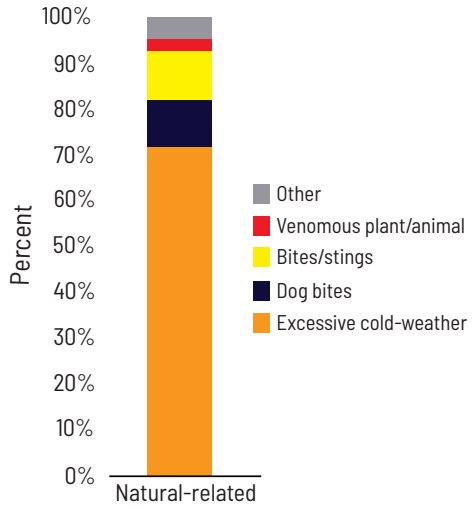
Females 30 to 34 years old experiencing houselessness had the highest number of natural-related emergency department visits, with an average of 20 each year.

Males 40 to 44 years old experiencing houselessness had the highest number of natural-related emergency department visits, with an average of 18 each year.

Number of Natural-related Injury Emergency Department Visits by Age Group and Sex, Alberta, 2019-2020



Percent of Natural-related Injuries by Specific Mechanism, Alberta, 2019-2020



Overall, exposure to cold weather accounted for 73% of the natural-related emergency department visits of those experiencing houselessness, with an average of 307 visits each year.

This was followed by dog bites, accounting for 11% of the natural-related emergency department visits, with an average of 44 visits each year.

Insect and bugs bites or stings accounted for another 9% of natural-related injury visits, with an average of 39 visits each year.

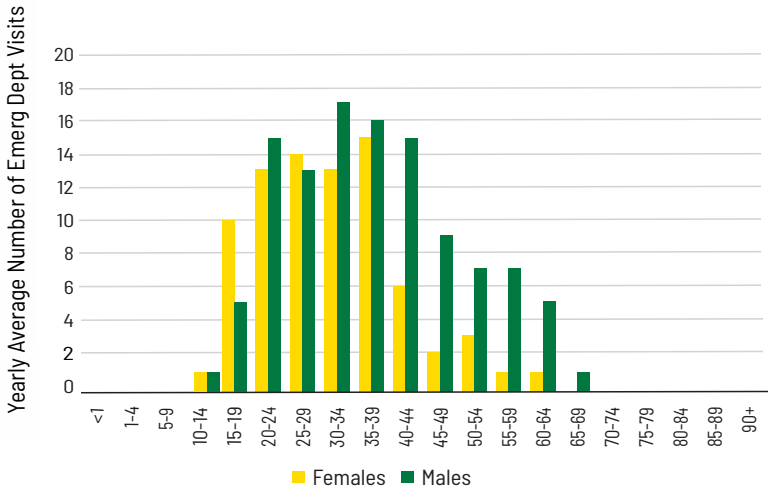
Emergency department visits as a result of contact with a venomous plant / animal accounted for 2% of all natural-related visits, with an average of 10 visits each year.

Other natural-related injury emergency department of visits of people experiencing houselessness accounted for 5% with an average of 20 visits each year. This includes exposure to excessive heat due to weather or man made, exposure to high / low air pressure and changes, victim of lightning, earthquake, tsunami, snow / ice storm, hurricane / tropical storm, tornado or other specified or unspecified storm.

SUICIDE / SELF-INFLICTED

Suicide / self-inflicted injuries include: (self-inflicted) poisoning, intentional exposure to gas / vapours, intentional self harm from hanging / strangulation / suffocation, firearms, cutting / piercing, and other (explosive materials, smoke / fire / flames, hot steam / hot objects, intentional self-harm with the use of a blunt object, jumping from a high place, jumping / lying before a moving object, intentional crashing of a motor vehicle, other and unspecified means of self-harm).

Number of Suicide / self-Inflicted Injury Emergency Department Visits by Age Group and Sex, Alberta, 2019-2020



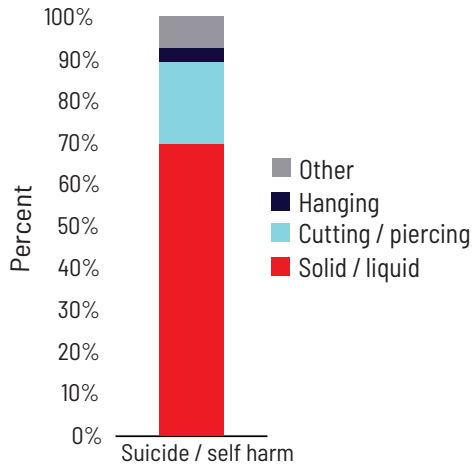
Over the period from 2019 through 2020, on average there was an average of 183 suicide / self-inflicted injury related emergency department visits to those experiencing houselessness.

Suicide / self-inflicted injuries accounted for 3% of all injury-related emergency department visits of those experiencing houselessness.

Females 35 to 39 years old experiencing houselessness had the highest number of suicide / self-inflicted injury related emergency department, with an average of 15 visits each year.

Males 30 to 34 years old experiencing houselessness had the highest number of suicide / self-inflicted injury related emergency department visits, with an average of 17 visits each year.

Percent of Suicide / self-inflicted Injury Emergency Department Visits by Specific Mechanism, Alberta, 2019-2020



The majority of suicide / self-inflicted injury related emergency department visits of those experiencing houselessness was due to intentional poisoning by a solid or liquid accounting for 69%, with an average of 126 visits each year.

Another 20% of the suicide / self-inflicted injuries involved cutting or piercing, with an average of 37 visits each year.

Another 4% of the suicide / self-inflicted injuries were due to hanging, strangulation, or suffocation, accounting for 8 visits each year.

Other methods of self-inflicted injuries accounted for 7%, with an average of 7 visits each year. This includes: explosive materials, smoke / fire / flames, hot steam / hot objects, intentional self-harm with the use of a blunt object, jumping from a high place, jumping / lying before a moving object, intentional crashing of a motor vehicle, other and unspecified means of self-harm.

APPENDIX I

UNINTENTIONAL FALLS												
same level from slipping, tripping and stumbling	W01											
same level due to collision with or pushing by another person	W03											
Stairs,steps	W10											
Ladder, scaffolding	W11	W12										
Building, structure	W13											
One level to another	W14	W15	W16	W17								
Other, unspecified	W04	W05.00	W05.01	W05.02	W05.03	W05.04	W05.08	W05.09	W18	W19		
Ice, snow	W00											
Playground Equipment	W09.01	W09.02	W09.03	W09.04	W09.05	W09.08	W09.09					
Furniture	W06	W07	W08									
OPERATIONS OF WAR/LEGAL INTERVENTION												
War	Y36.0	Y36.1	Y36.2	Y36.3	Y36.4	Y36.5	Y36.6	Y36.7	Y36.8	Y36.9		
Legal	Y35.0	Y35.1	Y35.2	Y35.3	Y35.4	Y35.5	Y35.6	Y35.7				
UNINTENTIONAL POISONING												
Unintent Poisoning	X40	X41	X42	X43	X44	X45	X46	X47	X48	X49		
VIOLENCE AND INJURY PURPOSELY INFLICTED												
Firearms	X93	X94	X95.00	X95.01	X95.08	X95.09						
Fight/Brawl	Y04											
Sexual Assault	Y05											
Cutting/Piercing	X99											
Maltreatment	Y07.0	Y07.1	Y07.2	Y07.3	Y07.8	Y07.9						
Drugs/Liquids	X85	X86	X87	X88	X89	X90						
Other	X91	X92	X96	X97	X98	Y01	Y02	Y03	Y08	Y09		
Neglect/ Abandoment	Y06.0	Y06.1	Y06.2	Y06.8	Y06.9							
Blunt Object	Y00											
OTHER/UNSPECIFIED												
Other/Unspec	W41	W42	W43	W49	X58	X59.0	X59.1	X59.9				
NATURAL AND ENVIRONMENTAL FACTORS												
Bites/Stings	W53	W55	W56	W57	W58	W59						
Venomous Plant/Animal	X20	X21	X22	X23	X24	X25	X26	X27	X28	X29		
Dog Bites	W54											
Lack of Food/Water	X53	X54	X57									
Excessive Heat-weather	X30											
Excessive Cold-weather	X31											
Other CIHI included	W64	W92	W93	W94	W99	X33	X34.0	X34.1	X34.8	X34.9	X35	X36
	X37.00	X37.01	X37.02	X37.08	X37.09	X38	X39	X52				
Other CIHI excluded	X51											

If you would like additional information about this topic or other types of injuries, please visit **http://injurypreventioncentre.ca** or contact us via phone at **780.492.6019** or email **ipc@ualberta.ca**

INJURY PREVENTION CENTRE
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INJURY PREVENTION CENTRE
4-248 ECHA, University of Alberta
11405 87 Ave NW
Edmonton AB T6G 1C9

Phone 780.492.6019
ipc@ualberta.ca

injurypreventioncentre.ca

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REV: 05-2022

This is Exhibit "F" referred to in the Affidavit of Dr. Sandy Dong, affirmed this 15th day of September, 2023

CHRISTOPHER WIESE
LAWYER

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ORIGINAL RESEARCH

Cold-related injuries among patients experiencing homelessness in Toronto: a descriptive analysis of emergency department visits

Lucie Richard[1] · Haley Golding[2] · Refik Saskin[2] · Jesse I. R. Jenkinson[3] · Katherine Francombe Pridham[3] · Evie Gogosis[3] · Carolyn Snider[4] · Stephen W. Hwang[3]

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Abstract

Purpose Homelessness increases the risk of cold-related injuries. We examined emergency department visits for cold-related injuries in Toronto over a 4-year period, comparing visits for patients identified as homeless to visits for patients not identified as homeless.

Methods This descriptive analysis of visits to emergency departments in Toronto between July 2018 and June 2022 used linked health administrative data. We measured emergency department visits with cold-related injury diagnoses among patients experiencing homelessness and those not identified as homeless. Rates were expressed as a number of visits for cold-related injury per 100,000 visits overall. Rate ratios were used to compare rates between homeless vs. not homeless groups.

Results We identified 333 visits for cold-related injuries among patients experiencing homelessness and 1126 visits among non-homeless patients. In each of the 4 years of observation, rate ratios ranged between 13.6 and 17.6 for cold-related injuries overall, 13.7 and 17.8 for hypothermia, and 10.3 and 18.3 for frostbite. Rates per 100,000 visits in the fourth year (July 2021 to June 2022) were significantly higher than in the pre-pandemic period. Male patients had higher rates, regardless of homelessness status; female patients experiencing homelessness had higher rate ratios than male patients experiencing homelessness.

Conclusion Patients experiencing homelessness visiting the emergency department are much more likely to be seen for cold-related injuries than non-homeless patients. Additional efforts are needed to prevent cold-related exposure and consequent injury among people experiencing homelessness.

Keywords Homelessness · Cold-related injuries · Emergency department

Résumé

Objectif L'itinérance augmente le risque de blessures liées au froid. Nous avons examiné les visites aux urgences pour des blessures liées au froid à Toronto sur une période de quatre ans, en comparant les visites de patients en situation d'itinérance aux visites de patients pas en situation d'itinérance.

Méthodes Cette analyse descriptive des visites aux services d'urgence à Toronto entre juillet 2018 et juin 2022 a utilisé des données administratives de santé liées. Nous avons mesuré les visites aux services d'urgence avec un diagnostic de blessure liée au froid parmi les patients en situation d'itinérance et ceux pas en situation d'itinérance. Les taux ont été exprimés en

✉ Lucie Richard
lucie.richard@unityhealth.to

1 MAP Centre for Urban Health Solutions, Unity Health Toronto, 30 Bond St., Toronto, ON, Canada

2 ICES, Toronto, ON, Canada

3 MAP Centre for Urban Health Solutions, Unity Health Toronto, Toronto, ON, Canada

4 Unity Health Toronto, Toronto, ON, Canada

nombre de visites pour les blessures liées au froid par 100 000 visites au total. Le rapport de taux ont été utilisés pour comparer les taux entre les groupes en situation d'itinérance et ceux pas en situation d'itinérance.

Résultats Nous avons identifié 333 visites pour des blessures liées au froid chez les patients en situation d'itinérance et 1126 chez les patients pas en situation d'itinérance. Au cours de chacune des quatre années d'observation, les rapports de taux variaient entre 13,6 et 17,6 pour l'ensemble des blessures liées au froid, 13,7 et 17,8 pour l'hypothermie et 10,3 et 18,3 pour les engelures. Les taux par 100 000 visites au cours de la quatrième année (de juillet 2021 à juin 2022) étaient considérablement plus élevés que pendant la période précédant la pandémie. Les patients de sexe masculin affichaient des taux plus élevés, peu importe leur statut d'itinérance; les patients de sexe féminin en situation d'itinérance affichaient des rapports de taux plus élevés que les patients de sexe masculin en situation d'itinérance.

Conclusion Les patients en situation d'itinérance qui se rendent à l'urgence sont beaucoup plus susceptibles d'être vus pour des blessures liées au froid que les autres. Des efforts supplémentaires sont nécessaires pour prévenir l'exposition au froid et les blessures qui en découlent chez les personnes en situation d'itinérance.

Mots clés L'itinéranc · Blessures liées au froid · Service des urgences

Clinician's capsule

What is known about the topic?
People experiencing homelessness are at disproportionate risk for cold-related injuries, but the rate since the COVID-19 pandemic began is unknown.

What did this study ask?
What is the rate of cold-related injury ED visits occurring among patients experiencing homelessness compared to non-homeless patients?

What did this study find?
Patients experiencing homelessness have 14 to 18 times more cold-related injuries compared to non-homeless patients; Rates increased during the pandemic.

Why does this study matter to clinicians?
Additional efforts are needed to prevent cold-related exposure and consequent injury among people experiencing homelessness.

Introduction

Emergency medicine professionals play a crucial role in addressing the healthcare needs of individuals experiencing homelessness, who have a disproportionate reliance on emergency department (ED) resources [1] and face an elevated risk of preventable injuries, particularly cold-related injuries [2–6]. In Toronto, Canada, the risk of cold-related injuries remains significant even during conditions locally considered to be mild [7, 8]. Recently, healthcare organizations have reported a concerning increase in the utilization of local EDs by individuals experiencing homelessness during the cold season [9, 10].

The COVID-19 pandemic has greatly exacerbated the potential risk for cold-related injury in this group. More individuals than ever are living in encampments or are otherwise unsheltered [11]. Furthermore, with the end of pandemic-related funding, the City of Toronto has closed many of the single-occupancy shelter hotel spaces it had created, starting in the spring of 2022 [12, 13]. While efforts are underway to increase capacity elsewhere [13, 14], there is currently an insufficient number of spaces to accommodate all those seeking shelter [12–15]. In concert, these circumstances that increase the likelihood of cold exposure may have led to an exacerbation of ED utilization for cold-related injuries by people experiencing homelessness in Toronto.

For this reason, healthcare organizations, medical professionals and housing advocates have been urging the City of Toronto to implement additional measures to protect individuals experiencing homelessness during the winter months [9, 10]. Short-term recommendations include increasing the availability and accessibility of winter-related services, such as 24-h drop-in warming centers. However, timely evidence regarding the extent and burden of cold-related injuries among people experiencing homelessness is essential to substantiate the need for additional services. We aim to fill this gap by analyzing Ontario health administrative data to measure cold-related injury visits among patients experiencing homelessness who sought care in Toronto-based EDs between July 1 2018 and June 30 2022. Additionally, we compare these rates to those of patients not identified as experiencing homelessness.

Methods

Study design and setting

We conducted this descriptive analysis in Toronto, Ontario's largest city, using health administrative data from between July 1 2018 and June 30 2022. Years were defined as July 1 to June 30 to integrate cold months into a single year. Datasets were linked using unique encoded identifiers and analyzed at ICES (formerly known as the Institute for Clinical Evaluative Sciences) [16], an independent, non-profit research institute whose legal status under Ontario's health information privacy law allows it to collect and analyze healthcare and demographic data, without explicit consent, for health system evaluation and improvement.

Population and data source

We obtained visits to all 18 Toronto-based EDs between July 1 2018 and June 30 2022 from the Canadian Institute for Health Information's (CIHI) National Ambulatory Care Reporting System (NACRS) database. No exclusions were applied.

Patients attending Toronto-based EDs were classified into two groups. The first group was patients experiencing homelessness ("patients experiencing homelessness"). This group was defined as anyone with at least one visit during the year with International Classification of Diseases, 10th Revision (ICD-10-CA) diagnosis codes Z590 ('Homelessness') or Z591 ('inadequate housing'); whose residential type was listed as 'Homeless' or 'Shelter'; or who provided a postal code that uniquely identifies a shelter (that is, the postal code does not identify other residences). These identifiers were previously validated [17] and show that identification across a year improves sensitivity without reducing specificity. The second group was patients not identified as experiencing homelessness ("non-homeless patients"), defined as anyone not identified in the first group.

We further classified groups by sex. Sex for patients with valid Ontario health insurance was derived from the ICES Registered Persons Database; for patients without Ontario health insurance, it was derived from the hospital record.

Outcomes

We ascertained cold-related injuries as any visit coded with ICD-10-CA codes T33 ('Superficial frostbite'), T34 ('Frostbite with tissue necrosis'), T35 ('Frostbite involving multiple body regions and unspecified frostbite'), or T68 ('Hypothermia') or T69 ('Other effects of reduced temperature') when combined with external code X31 ('Exposure to excessive natural cold'). Secondary outcomes of interest included frostbite (ICD-10-CA codes T33, T34 or T35) and hypothermia (ICD-10-CA T68 or T69 when combined with external code X31). We considered any diagnosis code as sufficient evidence for the outcome of interest, to avoid missing cases when injuries were not deemed the most responsible diagnosis.

Statistical analysis

We describe characteristics from the visit record, by group membership (however, some important social determinants of health such as race/ethnicity, income level, or educational background, were unavailable). We further determined counts (provided in supplement tables) and rates of each outcome per 100,000 visits, by group, year, and sex. 95% confidence intervals (CI) for rates in the supplements were calculated from the gamma distribution. We also calculated rate ratios and 95% CIs to summarize the excess burden of visits by homeless patients as compared to non-homeless patients.

Finally, we conducted a post-hoc z-score test comparing proportions to assess the significance of a change in cold-related injuries among patients experiencing homelessness between 2018/2019 and 2019/2020 and the pandemic period (2021/2022). We a priori excluded 2020/2021 from this test, as there was a significant drop in emergency department (ED) visits in Ontario during the early pandemic [18], artificially reducing the denominator and rendering this data point non-comparable to the others.

Cells with fewer than six visits were suppressed to protect patient privacy. All analyses were conducted using SAS enterprise guide v7.1 [19]. This study followed the Reporting of Studies Conducted Using Observational Routinely Collected Data (RECORD) reporting guidelines (Supplement Table 1).

Ethical review

The use of data in this project was authorized under Sect. 45 of Ontario's *Personal Health Information Protection Act*, which does not require review by a research ethics board.

Results

Between July 1 2018 and June 30 2022, we identified 4,872,279 ED visits to Toronto-based hospitals (Table 1). 90,165 (1.9%) visits were for patients experiencing homelessness, who were disproportionately 25 to 54 years old and male (73.3%). Visits by patients experiencing homelessness were twice as likely to be 15 or more hours long and more than twice as likely to have arrived by ambulance (47.7%

Table 1 Characteristics of visits, by group membership (patients experiencing homelessness vs. patients not experiencing homelessness)

	Visits from patients identified as experiencing homelessness (90,165)	Visits from patients not identified as experiencing homelessness (N=4,782,114)
Year of visit, %		
July 2018 to June 2019	25.3%	28.0%
July 2019 to June 2020	27.6%	25.4%
July 2020 to June 2021	23.2%	21.9%
July 2021 to June 2022	23.8%	24.7%
Age at visit		
Median (IQR)	40 (31–53)	43 (25–64)
%, 0–24 years old	10.3%	24.0%
%, 25–44 years old	49.0%	27.5%
%, 45–54 years old	18.2%	11.9%
%, 55 + years old	21.8%	36.5%
% Unknown/missing	0.8%	0.0%
Sex, %		
Male	73.3%	48.0%
Female	26.7%	52.0%
Other/missing	0.1%	0.0%
Visit duration in hours		
Median (IQR)	5 (3–10)	4 (3–7)
%, 0- < 4 h	9.6%	9.6%
%, 4- < 10 h	11.4%	10.8%
%, 10- < 15 h	2.9%	1.6%
%, 15 + hours	4.4%	2.1%
Patient arrived by ambulance, %	47.7%	20.0%
Triage level, %		
Non-urgent	4.2%	3.5%
Less-urgent	13.4%	13.8%
Urgent	48.7%	53.9%
Emergent	29.5%	27.3%
Resuscitation	3.9%	1.5%
Unknown	0.2%	0.1%
Visit for cold-related injury, %	0.37%	0.02%

vs 20.0%). Despite this, they exhibited similar CTAS triage levels. Over the 4-year period, we found 333 cold-related injury visits among patients experiencing homelessness, representing 0.37% of their visits overall, compared to 1,126 cold-related injury visits among non-homeless patients, representing 0.02% of their overall visits.

Cold-related injury rates (per 100,000 visits) among patients experiencing homelessness ranged between a low of 268.9 visits/100,000 (in 2019/2020) and a high of 483.9 visits/100,000 (in 2021/2022) (Table 2 and Supplement Table 1). By contrast, rates among non-homeless patients ranged between 15.8 and 30.0 visits/100,000. Rates among patients experiencing homelessness significantly increased ($p < 0.01$) during the pandemic period (2021/2022) from the pre-pandemic period (2018/2019 and 2019/2020). Overall, patients experiencing homelessness were between 13.6 and 17.6 times more likely to visit EDs for cold-related injuries compared to non-homeless patients (Fig. 1). While female patients experiencing homelessness had lower visit rates than male patients experiencing homelessness, they had higher rate ratios due to the more acute sex disparity present among non-homeless patients.

Supplement table 3 and Fig. 2 summarize visits with coding for hypothermia. Patients experiencing homelessness had visit rates ranging between 256.9 and 479.3 visits/100,000, while non-homeless patients had visit rates ranging between 14.7 and 28.8 visits/100,000. As with cold-related injuries generally, patients experiencing homelessness were much more likely to visit EDs for hypothermia compared to non-homeless patients.

Table 2 Rate per 100,000 visits (95% CI) of emergency department visits to Toronto-based hospitals for cold-related injury, by group, subgroup and year

	Patients experiencing homelessness, Rate per 100,000 visits (95% CI)	Patients not experiencing homelessness, Rate per 100,000 visits (95% CI)	Rate ratio (95% CI)
Overall			
2018/2019	407.0	30.0	13.6 (10.8–17.0)
2019/2020	268.9	15.8	17.0 (12.9–22.5)
2020/2021	330.0	19.8	16.7 (12.7–21.9)
2021/2022	483.9	27.5	17.6 (14.1–21.9)
Female			
2018/2019	243.4	15.2	16.0 (9.2–30.0)
2019/2020	153.7	9.5	16.2 (8.3–31.6)
2020/2021	264.3	10.9	24.2 (13.8–42.7)
2021/2022	375.6	19.2	19.6 (12.5–30.6)
Male			
2018/2019	462.4	46.3	10.0 (7.8–12.8)
2019/2020	310.0	22.5	13.8 (10.1–18.8)
2020/2021	354.6	29.4	12.1 (8.8–16.5)
2021/2022	527.7	36.5	14.4 (11.2–18.7)

[1]Years grouped from July 1st to June 30th the following year to group together winter seasons. CI = Confidence Interval. *95% confidence interval calculated from the gamma distribution. Source: Golding H, and Saskin R. Cold-related injuries among people experiencing homelessness visiting Toronto-area hospitals, Applied Health Research Questions (AHRQ) #0950 144 000. Toronto: Institute for Clinical Evaluative Sciences; 2023

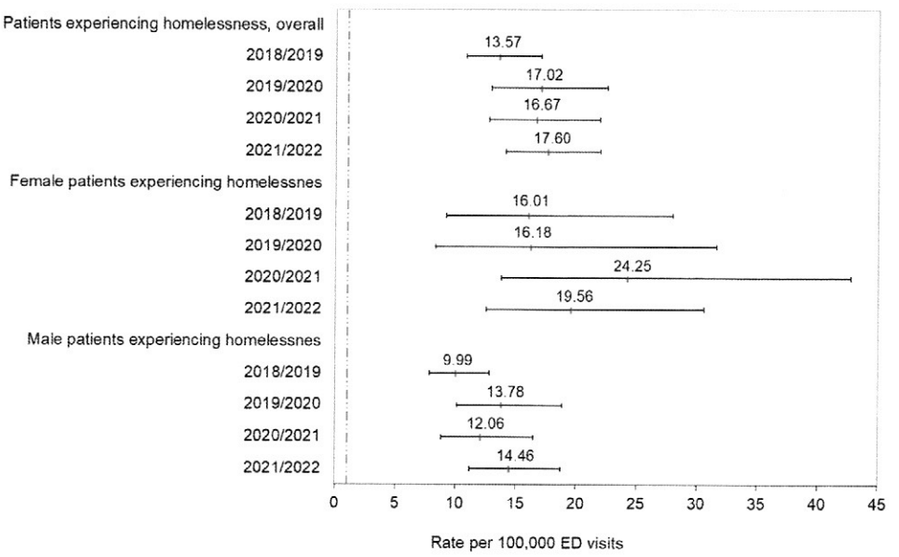

Fig. 1 Rate ratio[1] of cold-related injury visits among patients experiencing homelessness compared to patients not experiencing homelessness, overall and among male or female subgroups, by year. [1]Rate ratio is the rate (per 100,000 visits) of cold-related injury visits by people experiencing homelessness divided by the rate (per 100,000 visits) of cold-related injury visits by people not experiencing homelessness. The vertical axis (1.0) represents the point of parity between groups. Source: Golding H, and Saskin R. Cold-related injuries among people experiencing homelessness visiting Toronto-area hospitals, Applied Health Research Questions (AHRQ) #0950 144 000. Toronto: Institute for Clinical Evaluative Sciences; 2023

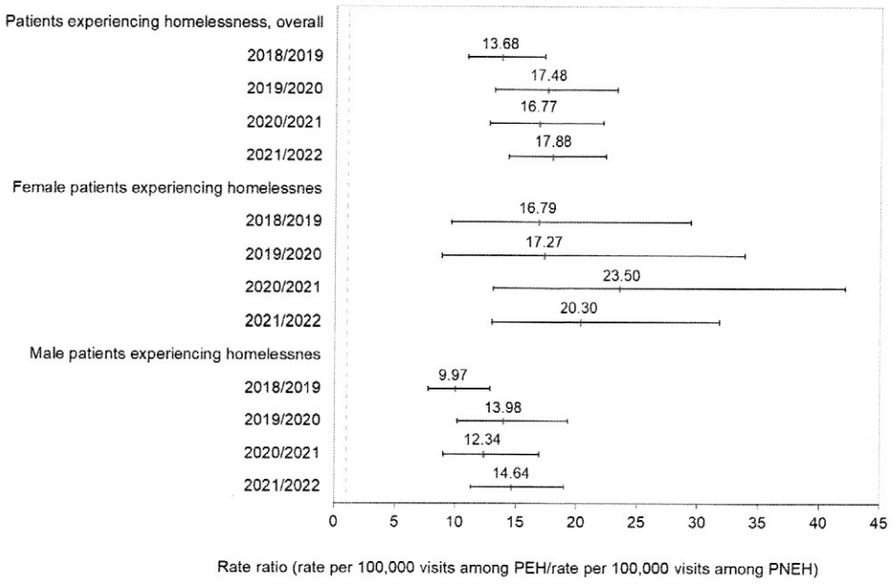

Fig. 2 Rate ratio[1] of hypothermia-related visits among patients experiencing homelessness compared to patients not experiencing homelessness, overall and among male or female subgroups, by year. [1]Rate ratio is the rate (per 100,000 visits) of hypothermia-related visits by people experiencing homelessness divided by the rate (per 100,000 visits) of hypothermia-related visits by people not experiencing homelessness. The vertical axis (1.0) represents the point of parity between groups. Source: Golding H, and Saskin R. Cold-related injuries among people experiencing homelessness visiting Toronto-area hospitals, Applied Health Research Questions (AHRQ) #0950 144 000. Toronto: Institute for Clinical Evaluative Sciences; 2023

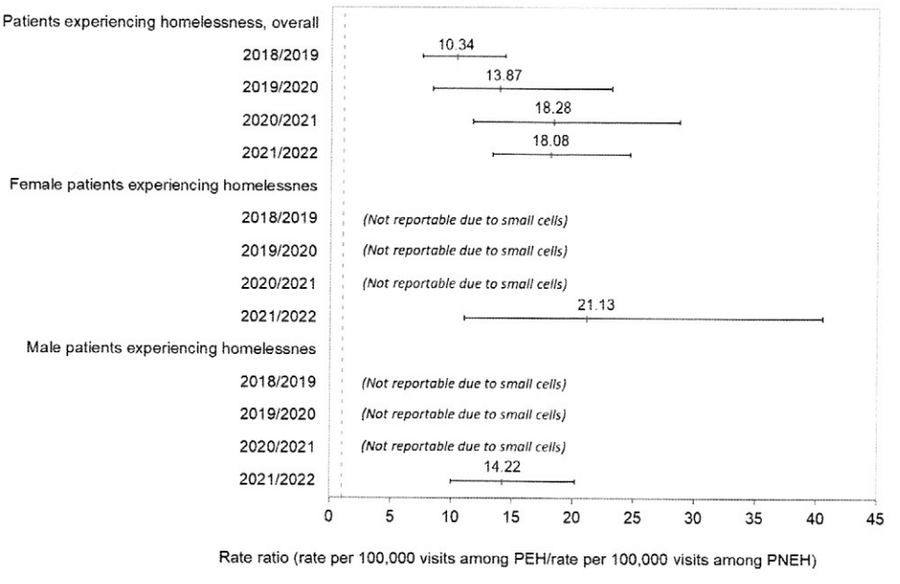

Fig. 3 Rate ratio[1] of frostbite-related visits among patients experiencing homelessness compared to patients not experiencing homelessness, by year, overall and among male or female subgroups. [1]Rate ratio is the rate (per 100,000 visits) of frostbite-related visits by people experiencing homelessness divided by the rate (per 100,000 visits) of frostbite-related visits by people not experiencing homelessness. The vertical axis (1.0) represents the point of parity between groups. Source: Golding H, and Saskin R. Cold-related injuries among people experiencing homelessness visiting Toronto-area hospitals, Applied Health Research Questions (AHRQ) #0950 144 000. Toronto: Institute for Clinical Evaluative Sciences; 2023

Supplement table 4 and Fig. 3 summarize visits coded for frostbite. Fewer patients had visits coded with frostbite than for hypothermia; however, trends between groups persisted. Visit rates for patients experiencing homelessness ranged between 76.3 and 251.3 visits/100,000, compared to 5.5 and 18.2 visits/100,000 among non-homeless patients. Patients experiencing homelessness were between 10.3 and 18.3 times more likely to visit the ED for frostbite compared to non-homeless patients. In the final year (2021/2022), female patients experiencing homelessness were over 21 times more likely to receive care for frostbite compared to female non-homeless patients; Male patients experiencing homelessness were 14.2 times more likely to receive care for frostbite compared to male non-homeless patients.

Discussion

Interpretation

We found that ED visits for cold-related injuries were significantly higher (between 13.6 and 17.6 times higher) among patients experiencing homelessness than non-homeless patients between 2018 and 2022. Our findings suggest that homelessness is a major risk factor for this outcome, both due to the higher prevalence of underlying conditions exacerbating risk (for example, substance use or mental health concerns) and far greater exposure to environmental cold stress. We also found that male patients experiencing homelessness had higher visit rates, but that female patients experiencing homelessness have consistently higher rate ratios, indicating that inequity in the risk for females to be particularly acute. Finally, we found that rates increased in the final year of observation compared to the pre-pandemic period. This might have been due to the lower number of ED visits overall, as patients continued to be relatively avoidant of hospitals due to the perceived risk of COVID-19 infection [18]. It is also possible that 2021/2022 winter had particularly severe winter weather, although summary data does not suggest this to be likely [20]. Finally, recent changes to social and policy conditions in Toronto may have made avoiding cold-exposure increasingly challenging for people experiencing homelessness. Many indoor spaces, like 24-h drop-ins and Out Of The Cold programs, were shut down in response to pandemic-related safety guidelines [21]; distancing between shelter beds increased, which reduced shelter capacity until shelter hotels were leased [13]; and, numerous individuals resided in encampments as they felt unsafe in shelters and shelter hotels [11].

Previous studies

These results extend previous work showing disparities in Toronto existing in prior decades [1, 7], as well as elsewhere [3–6]. In France, 61.7% of medical charts with a primary diagnosis of hypothermia were for individuals experiencing homelessness [3], with 6.4 times risk of death from this injury [6]. In New York, three times more individuals experiencing homelessness were hospitalized for cold-related injury than housed comparators [4]. In Northeastern Poland, deaths caused by hypothermia were thirteen times more frequent among people experiencing homelessness than housed counterparts [5]. In Toronto between 2005 and 2009, there was on average 4.8 cold-related injury visits per 1000 person-years of observation [2]. Our results are not directly comparable to this literature, as our study denominator was ED visits by patients experiencing homelessness (rather than a cohort of participants experiencing homelessness who may not have used hospital-based care, or individuals who died). However, our annual rates expressed per 1000 visits (ranging between 2.7 per 1000 visits in 2019/2020 and 4.8 in 2021/2022) is in the same range as prior work in Toronto [2].

Strengths and limitations

This study benefits from the use of NACRS, which provides standardized ED abstracts across Toronto over the observation period. The use of administrative data to identify homelessness also dramatically increased our sample as compared to studies leveraging primary research data and prevented issues with participation bias common in studies involving people experiencing homelessness.

We also note the following limitations. First, our case definition of homelessness is highly specific but relatively insensitive [17]. Although we restricted our analysis to the period during which coding for homelessness became mandatory [17], it is possible the case definition undercounted visits where homelessness was not documented in the chart. Consequently, our results may underestimate cold-related injuries among patients experiencing homelessness and overestimate them among patients not experiencing homelessness.

Second, this analysis only considered ED care related to cold-related injuries. Every winter, an estimated 15% of ED visits by individuals experiencing homelessness in Toronto are for seeking warmth, and occur due to a lack of alternatives such as shelters and warming centres [22, 23]. As a result, the true level of ED usage for cold exposure by people experiencing homelessness is likely much higher than our analysis indicates.

Third, our results are limited to individuals receiving healthcare at emergency departments and is reflected in our

rate being per 100,000 visits as opposed to rates per 1000 person-years of observation. People experiencing homelessness are disproportionately likely to avoid hospital-based care due to previous stigmatizing experiences and other factors [24]. Thus, any injuries that might have been treated in outpatient clinic settings were missed. This is unlikely to have affected our measured rates and rate ratios; nevertheless, results should only be generalized to homeless patients who use hospital-based healthcare.

Finally, our finding that ED visits significantly increased during the pandemic is based on a post-hoc test that does not account for the large confidence intervals in our measured rates; therefore, this finding should be interpreted with caution until future work can substantiate the result.

Clinical implications

The disproportionate burden of cold-related injuries among people experiencing homelessness is an equity issue of significant relevance for emergency medicine. If we treat the rate of cold-related injuries among non-homeless patients as a baseline level, excess visits for people experiencing homelessness represent avoidable morbidity and strain on emergency departments. To mitigate the risk of recurring morbidity, particularly in cases of frostbite, clinicians treating these injuries must attempt to ensure continuity of services in the community prior to discharge. Yet, this presents a major challenge due to ED surge pressures and the severe, consistent shortage of shelter space to which to discharge patients. Ultimately, individuals experiencing homelessness and the emergency departments that treat them both bear the consequences of policy decisions that fail to prioritize the provision of sufficient, accessible emergency shelter services within the community, such as an adequate number of shelter beds and drop-in warming services. Addressing these issues is vital for the welfare of those experiencing homelessness and the effectiveness of emergency medical care.

Research implications

The use of emergency departments by people experiencing homelessness for avoiding cold exposure is a greatly underexplored topic given its relevance in the pandemic era in Canada. We show that cold-related injuries, acute clinical manifestations of cold-exposure, are vastly overrepresented among patients experiencing homelessness, with female patients bearing the worst inequities. To gain a comprehensive understanding of the impact of homelessness on the preventable use of ED resources, future studies should endeavor to estimate the overall and gender-specific ED usage related to all cold exposure. These studies should also estimate the economic costs associated with excess ED utilization for cold exposure; this measurement would enable meaningful comparisons between the cost of avoidable healthcare for cold exposure and the cost of providing sufficient community-based services providing emergency shelter.

Conclusions

Cold-related injuries related to cold exposure are largely preventable. People experiencing homelessness in Toronto remain at much higher risk for such injuries compared to their housed counterparts, including after the onset of the COVID-19 pandemic. The findings of this study strongly suggest the need to provide additional alternative services such as shelter beds for all individuals experiencing homelessness seeking shelter and 24-h, accessible and low-barrier warming centres throughout the cold season.

Supplementary Information The online version contains supplementary material available at https://doi.org/10.1007/s43678-023-00546-7.

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Data availability The dataset from this study is held securely in coded form at ICES. While legal data sharing agreements between ICES and data providers (e.g., healthcare organizations and government) prohibit ICES from making the dataset publicly available, access may be granted to those who meet pre-specified criteria for confidential access, available at www.ices.on.ca/DAS (email: das@ices.on.ca). The full dataset creation plan and underlying analytic code are available from the authors upon request, understanding that the computer programs may rely upon coding templates or macros that are unique to ICES and are therefore either inaccessible or may require modification.

Declarations

Conflict of interest The study authors declare no competing interests.

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This is Exhibit "G" referred to in the Affidavit of Dr. Sandy Dong, affirmed this 15th day of September, 2023

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Biopsychosocial factors associated with complications in patients with frostbite

Frederick W. Endorf, MD[a], Deepak Alapati, MD[b], Yee Xiong, MD[b], Cynthia DiGiandomenico, MD[b], Courtney S. Rasimas, MPH[c], Joseph J. Rasimas, PhD, MD[b,*], Rachel M. Nygaard, PhD[a]

Abstract

Cold weather injuries can be devastating and life changing. Biopsychosocial factors such as homelessness and mental illness (especially substance use disorders [SUDs]) are known risk factors for incurring frostbite. Based on clinical experience in an urban level 1 trauma center, we hypothesized that complications following frostbite injury would be influenced by homelessness, SUDs, and other forms of mental illness. The aim of this study was to examine the relationship between biopsychosocial factors and both amputations and unplanned hospital readmissions after cold injuries. Patients admitted with a diagnosis of frostbite between the winters of 2009 and 2018 were included in this retrospective cohort study. Descriptive statistics and multivariable regression assessed factors associated with outcomes of interest. Of the 148 patients in the study, 40 had unplanned readmissions within 1 year. Readmitted patients were significantly less likely to have a stable living situation (48.7% vs 75.0%, $P = .005$) and more likely to have an SUD (85.0% vs 60.2%, $P = .005$) or other psychiatric disorder (70.0% vs 50.9%, $P = .042$). Homelessness and SUDs were independent predictors of unplanned readmission. Overall, 18% of frostbite injuries resulted in amputation. Any history of drug and/or alcohol use independently predicted amputations. The study results suggest that additional hospital and community resources may need to be marshaled to prevent vulnerable patients with biopsychosocial risk factors from having complications after frostbite. Complications place a high downstream burden on healthcare systems. Clinicians caring for frostbite patients with comorbid conditions can use these findings to inform care and discharge decisions.

Abbreviations: CCI = Charlson Comorbidity Index, ED = emergency department, EHR = electronic health record, LOS = length of hospital stay, SUD = substance use disorder.

Keywords: amputation, frostbite, homeless, readmission, substance use disorder

1. Introduction

Exposure to cold weather can result in a range of injuries with central effects such as hypothermia or peripheral effects such as frostbite.[1] Typically, frostbite affects the extremities—primarily the hands, feet, and face. However, any part of the body exposed to cold conditions may be susceptible to frostbite injury.[2] Among the most dreaded complications associated with frostbite are tissue necrosis, gangrene, eschar formation, and full thickness tissue loss. These complications may require surgical interventions such as debridement, escharotomy, skin grafting, and even amputation.[3] Treatment for frostbite injuries can be costly, requiring specialized care and often long lengths of stay in the hospital for patients frequently lacking commercial health insurance coverage.[4,5] Preexisting medical conditions such as diabetes and peripheral vascular disease may put people at higher risk for poor outcomes following frostbite injury.[6] Severe cold weather injuries are associated with increases in morbidity due to cardiovascular, cerebrovascular, and pulmonary effects leading to increased all-cause mortality.[7,8]

Several premorbid biopsychosocial factors are associated with risk of cold-weather injury; however, data in this area come primarily from single-center studies. Economic factors (such as poverty) leading to inadequately heated homes can predispose individuals to cold injury.[9] Acute intoxication is associated with many cases of frostbite and cold injury.[10] Finally, psychiatric disorders with accompanying cognitive impairment may play a role in cold injuries, particularly because they are strongly correlated with homelessness.[11]

We hypothesized that complications of frostbite would be influenced by biopsychosocial factors such as homelessness and mental illness with particular focus on substance use disorders (SUDs). The aim of this study was to examine the effects of these specific biopsychosocial factors on amputations and unplanned hospital readmissions.

The authors have no funding and conflicts of interest to disclose.

The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

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[a] Department of Surgery, Hennepin Healthcare, Minneapolis, MN, USA [b] Department of Psychiatry, Hennepin Healthcare, Minneapolis, MN, USA [c] School of Public Health, University of Minnesota, Minneapolis, MN, USA.

**Correspondence: Joseph J. Rasimas, Department of Psychiatry, Hennepin Healthcare, 165 Viking Drive East, Little Canada, MN 55117, USA (e-mail: jrasimas@umn.edu).*

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2. Methods

The institutional review board for human subjects research at our institution approved this research. All patients admitted to the hospital with a diagnosis of frostbite between the winters of 2009 and 2018 were included in analysis. Exclusion criteria included age < 18 years and those that opted out of research. Upon identification of the final cohort, the health records of individual patients located in the centralized electronic health record (EHR) system were used to identify the outcomes of interest and to gather additional information on relevant biopsychosocial factors.

The primary outcomes of interest were any unplanned readmission to a healthcare institution in the 1-year period following the index hospitalization and any amputation related to the initial frostbite injury. Hospital readmissions excluded emergency department (ED) visits without an associated hospitalization, as well as planned readmissions for surgical management. Demographic variables of interest were age, gender, race, and ethnicity. Variables from the patient's past medical history included any documented history of psychiatric disorders including SUDs, admissions related to substance use or other psychiatric disorders, and any hospital visits (ED and/or hospital admissions) in the year prior to the frostbite admission. In some cases, medical records, including "Problem Lists" in the EHR, contained entries for clinically relevant substance use prior to the index frostbite admission that may or may not reflect an SUD; for our analysis, such data were collected as a variable (history of drug and/or alcohol use) distinct from clearly documented SUDs. Social variables included from the index frostbite admission were marital status and living situation. Additionally, we included variables related to the hospitalization: intoxication at the time of admission, treatment of frostbite injury with thrombolytics, treatment of frostbite injury with hyperbaric oxygen, length of hospital stay (LOS), any surgical intervention (debridement, grafting, and amputation), and the Charlson Comorbidity Index (CCI)[12] at the time of discharge. The CCI has been validated for large-scale national health databases and EHR data as a measure of illness burden and a predictor of mortality.[13,14] The CCI scores were grouped: 0; 1 or 2; 3 or 4; and ≥5. These groupings have been associated with 1-year survival with level 0 corresponding to a 98% survival rate while survival for scores ≥5 was approximately 72%.[14]

Statistical analysis included Student *t* test for continuous variables and Fisher exact test for categorical variables. Univariable and multivariable analysis assessed factors associated with unplanned readmission and amputation. Analysis was conducted using Stata 15.1 (StataCorp, College Station, TX).

3. Results

Patients were divided into 2 cohorts for analysis—those with unplanned readmission (N = 40) and those without unplanned readmission (N = 108; Table 1). Age, gender, and marital status were similar between the 2 cohorts. The unplanned readmission group contained higher percentages of Black (27.5% vs 17.6%) and Native American patients (17.5% vs 6.5%), but these differences did not reach statistical significance ($P = .078$). Patients in the unplanned readmission cohort were significantly less likely to have

Table 1

Patient characteristics.

	Cohort	No unplanned readmission within 1 yr	Unplanned readmission within 1 yr	*P* value
	N = 148	N = 108	N = 40	
Age in years, mean (SD)	42.4 (15.6)	41.3 (16.6)	45.3 (12.3)	.162
Male gender, n (%)	120 (81.1)	88 (81.5)	32 (80.0)	.817
Race, n (%)				.078
White	91 (61.5)	70 (64.8)	21 (52.5)	
Black	30 (20.3)	19 (17.6)	11 (27.5)	
Hispanic	7 (4.7)	6 (5.6)	1 (2.5)	
Native American or Alaskan	14 (9.5)	7 (6.5)	7 (17.5)	
Other or unknown	6 (4.1)	6 (5.6)	0 (0)	
Marital status, n (%)				.507
Single	106 (71.6)	77 (71.3)	29 (72.5)	
Married or partnered	20 (13.5)	17 (15.7)	3 (7.5)	
Divorced or separated	15 (10.1)	9 (8.3)	6 (15.0)	
Widow	4 (2.7)	3 (2.8)	1 (2.5)	
Unknown	3 (2.0)	2 (1.9)	1 (2.5)	
Stable living situation, n (%)	97 (67.8)	78 (75.0)	19 (48.7)	.005
Intoxication on admission, n (%)	98 (66.2)	71 (65.7)	27 (67.5)	1.000
History of drug and/or alcohol use, n (%)	54 (36.5)	37 (34.3)	17 (42.5)	.442
Substance use disorder, n (%)	99 (66.9)	65 (60.2)	34 (85.0)	.005
Other psychiatric disorder, n (%)	83 (56.1)	55 (50.9)	28 (70.0)	.042
Charlson Comorbidity Index, mean (SD)	0.9 (1.6)	0.9 (1.6)	1.1 (1.5)	.625
Charlson Comorbidity Index 10-yr survival %, mean (SD)	90.0 (19.7)	90.0 (20.2)	90.0 (18.6)	.936
ED or hospital admissions in 1 yr prior to frostbite admission, n (%)	69 (46.6)	42 (38.9)	27 (67.5)	.003
History of frostbite injury, n (%)	15 (10.1)	9 (8.3)	6 (15.0)	.234
LOS days, mean (SD)	8.1 (8.7)	8.1 (9.6)	7.9 (6.1)	.867
Thrombolytics, n (%)	94 (63.5)	68 (63.0)	26 (65.0)	.850
Any surgical intervention, n (%)	62 (41.9)	36 (33.3)	26 (65.0)	.001
Amputation, n (%)	27 (18.2)	18 (16.7)	9 (22.5)	.474
Medical discharge disposition, n (%)				.016
Home or stable housing	74 (50)	59 (54.6)	15 (37.5)	
Homeless shelter	14 (9.5)	5 (4.6)	9 (22.5)	
Inpatient psychiatry	13 (8.8)	11 (10.2)	2 (5.0)	
Other healthcare facility	38 (25.7)	26 (24.1)	12 (30.0)	
Against medical advice (to various locations)	9 (6.1)	7 (6.5)	2 (5.0)	
Mortality in 1-yr follow-up, n (%)	4 (2.7)	0 (0)	4 (10.0)	.005

ED = emergency department, LOS = length of hospital stay, SD = standard deviation.

a stable living situation (48.7% vs 75.0%, $P = .005$). Likewise, the unplanned readmission group was more likely to have an SUD (85.0% vs 60.2%, $P = .005$) or other psychiatric disorder diagnosis (70.0% vs 50.9%, $P = .042$). However, there were no differences between the groups with respect to presentation with acute intoxication on admission or a reported history of any prior drug or alcohol use not necessarily meeting criteria for an SUD.

The 2 groups had similar rates of comorbidities and 10-year survival risk using the CCI. The unplanned readmission group was more likely to have had an ED visit or hospital admission in the previous year (67.5% vs 38.9%, $P = .003$), though the rates of previous frostbite injury were not significantly different between the 2 groups (Table 1). Hospital LOS and use of thrombolytics were similar between the cohorts. The unplanned readmission group was more likely to have been discharged to a homeless shelter as opposed to a stable living situation after the index frostbite admission (22.5% vs 4.6%, $P = .016$). Rates of amputation within 1 year of injury were similar between the 2 groups (Table 1). However, the unplanned readmission group did have higher rates of any surgical intervention (65% vs 33.3%, $P = .001$). The mortality rate was higher at 1 year in the unplanned readmission cohort (10.0% vs 0%, $P = .005$).

Multivariable regression assessed factors associated with unplanned readmission in frostbite patients (Table 2). Age, gender, race, and marital status were not independent predictors of unplanned readmission. Substance use disorder was a significant independent predictor of readmission (adjusted odds ratio [OR] 3.19, $P = .025$). Psychiatric disorder unrelated to substance use was not an independent predictor of unplanned readmission (Table 2). Discharge to a homeless shelter was associated with unplanned readmission in frostbite patients (adjusted OR 5.40, $P = .009$). We also performed a multivariate regression analysis to look at predictors of amputation in frostbite patients (Table 3). Substance use disorder (adjusted OR 6.03, $P = .033$), any documented history of drug and/or alcohol use (adjusted OR 1.40, $P = .038$), treatment with thrombolytics (adjusted OR 3.38, $P = .038$), and transfer to another healthcare facility (adjusted OR 3.94, $P = .039$) were independent predictors of amputation.

4. Discussion

Cold weather injuries are more common in people who have a higher probability of exposure to cold weather (mountaineers, military personnel, winter athletes, and those living in cold

Table 2

Variables associated with unplanned readmission.

	OR (95% CI)	*P* value	Adjusted OR (95% CI)	*P* value
Age	1.02 (0.99–1.04)	.163		
Male gender	0.91 (0.36–2.27)	.838		
Non-White race	1.67 (0.80–3.48)	.173		
Intoxication on admission	1.08 (0.50–2.34)	.841		
History of drug and/or alcohol use	1.42 (0.68–2.98)	.356		
Substance use disorder	3.75 (1.45–9.69)	.006	3.19 (1.15–8.81)	.025
Other psychiatric disorder	2.25 (1.04–4.88)	.040	1.70 (0.70–4.15)	.241
Charlson Comorbidity Index	1.06 (0.85–1.32)	.623		
History of frostbite injury	1.94 (0.64–5.86)	.239		
Thrombolytics	1.09 (0.51–2.33)	.819		
Amputation	1.45 (0.59–3.56)	.416		
Medical discharge disposition				
Home or stable housing	1		1	
Homeless shelter	7.08 (2.07–24.26)	.002	5.40 (1.53–19.09)	.009
Inpatient psychiatry	0.72 (0.14–3.58)	.683	0.44 (0.08–2.34)	.336
Other healthcare facility	1.82 (0.75–4.41)	.188	1.52 (0.58—3.98)	.392
Against medical advice (to various locations)	1.12 (0.21–5.97)	.891	0.79 (0.14–4.35)	.785

Univariable and multivariable logistic regression.

CI = confidence interval, OR = odds ratio.

Table 3

Variables associated with amputation.

	OR (CI)	*P* value	Adjusted OR (CI)	*P* value
Age	1.03 (1.00–1.06)	0.031	1.03 (0.99–1.07)	.196
Male gender	1.42 (0.45–4.50)	0.549		
Non-White race	0.62 (0.25–1.53)	0.297		
Intoxication on admission	0.69 (0.29–1.63)	0.399		
History of drug and/or alcohol use	4.91 (1.40–17.21)	0.013	1.40 (1.07–10.68)	.038
Substance use disorder	0.74 (0.30–1.82)	0.509	6.03 (1.16–31.46)	.033
Other psychiatric disorder	3.33 (1.26–8.83)	0.016	1.89 (0.60–5.93)	.275
Charlson Comorbidity Index	1.08 (0.84–1.39)	0.545		
History of frostbite injury	1.34 (0.30–4.34)	0.853		
Thrombolytics	2.30 (0.87–6.12)	0.095	3.38 (1.07–10.68)	.038
Medical discharge disposition				
Home or stable housing	1		1	
Homeless shelter	0.74 (0.08–6.50)	0.783	0.39 (0.04–3.75)	.416
Inpatient psychiatry	2.87 (0.64–12.96)	0.170	1.80 (0.34–9.57)	.492
Other healthcare facility	6.24 (2.26–17.22)	<0.001	3.94 (1.07–14.45)	.039
Against medical advice (to various locations)	1.20 (0.13–11.01)	0.874	0.70 (0.07–6.82)	.755

Univariable and multivariable logistic regression.

CI = confidence interval, OR = odds ratio.

climates).[15–17] Recent studies show that frostbite is increasingly becoming a concern in civilian medical practice in urban areas.[18,19] The increased rates of cold weather injury in urban areas prompted us to assess biopsychosocial factors associated with complications following frostbite. In frostbite, common complications include amputation and unplanned hospital readmission. We sought to determine whether biopsychosocial factors might influence the rates of those complications in frostbite patients at our institution. We found that homelessness was associated with unplanned readmission following frostbite injury, while SUDs were an independent predictor of both unplanned readmission and amputation.

According to the National Coalition for the Homeless, cold weather injuries are more frequent in the homeless than in the population at large. In the United States, as much as a quarter of the homeless population carries a major mental illness diagnosis—a prevalence rate 3 to 4 times that of the population as a whole.[11] It is clear from other areas of medicine that preexisting psychiatric disorders can compromise patient outcomes. Hudson et al[20] found that burn patients with preexisting psychiatric disorders had more severe injuries, higher rates of in-hospital complications, higher mortality, and a lower likelihood of being discharged home. A meta-analysis by Davis et al[21] found that cancer patients with a preexisting psychiatric disorders were more likely to present with an advanced stage of cancer and die sooner after diagnosis. Haupt et al[22] examined orthopedic trauma patients with preinjury depression and anxiety, and found that those patients had a prolonged LOS and more days in the intensive care unit than patients without depression or anxiety. While we found that homelessness was an independent predictor of unplanned readmission after frostbite injury, psychiatric diagnosis unrelated to substance use was not associated with morbidity in the form of unplanned readmission or amputation.

High rates of SUDs may mediate the increased risk of both incidence and severity of cold weather injuries in the homeless.[23] Comorbid SUDs have already been shown to mediate risk and negative outcomes in other circumstances involving acute injury to the skin. Rehou et al[24] looked at SUDs in burn patients and found increased rates of bacteremia and sepsis, as well as increased average LOS compared to burn patients without SUDs. A meta-analysis of SUDs in burns showed that patients with these disorders had higher rates of multiple complications, including more intubations and ventilator days, increased rates of wound infection, and increased overall mortality.[25] We found that SUD diagnosis was a significant predictor of unplanned readmission and amputation, while even just a history of documented drug and/or alcohol use was associated with amputation. This is consistent with our anecdotal experience with these patients. Frostbite patients often need an extended period of outpatient care after their initial admission, including pain management and dressing changes. It is easy to imagine that a significant SUD could impact adherence with proper wound care, and that tolerance and addiction could complicate pain management (especially with narcotics), all leading to unplanned readmissions and subsequent amputation. More aggressive interventions for addictive problems may therefore be warranted to prevent complications and poor outcomes in frostbite patients with SUDs.

In our population of patients hospitalized with cold injury, those with unplanned readmissions after discharge had similar baseline demographics (largely single men in their fourth or fifth decade of life) compared to those without an unplanned readmission. But as expected, the unplanned readmission cohort had higher rates of homelessness, SUDs, other psychiatric disorders, and previous hospital admissions (in the year before their frostbite admission). Given those findings, it was not surprising that they had higher rates of surgical intervention and mortality, as well. Those patients were also less likely to be discharged home after treatment for frostbite, and more likely, instead, to go to a homeless shelter or other healthcare facility. It should be noted that disposition to inpatient psychiatry after treatment for frostbite was associated with lower rates of hospital readmission within a year. Patients who underwent inpatient psychiatric stabilization may have had more durably effective treatment of their underlying SUDs and other mental illnesses, thereby improving adherence with outpatient medical care.

At first glance, it may seem unusual that amputation was not a predictor of unplanned readmission. It is very common for frostbite patients to have a planned readmission for amputation surgery, typically at least 6 weeks after their original frostbite injuries. We excluded these planned readmissions from our analysis. Thrombolytics have been shown to decrease need for amputation following frostbite injury.[26–30] They are only used in the setting of severe frostbite with demonstrable perfusion deficit. While use of thrombolytics is a predictor of amputation in this cohort, that is unsurprising since it is a marker of the severity of injury, and we did not limit our cohort to severe frostbite injury. After adjusting for other factors, age was not an independent predictor of amputation. However, older patients have a decrease in peripheral perfusion,[31] potentially increasing the severity of frostbite.

Limitations of this study include those associated with single-center, retrospective research. Categorical designation of biopsychosocial factors may be overly simplistic. Severity of psychiatric illness varies widely within the same diagnostic category, and thus the impact of those comorbidities in individual patients may vary, as well. Merely carrying a diagnosis of SUD does not account for the current state of the patient's substance use and its impact on health and behavior. As is often the case, documentation of SUDs in our patients' records may not have been diagnostically accurate, and the burden of illness conferred by having substance related problems at some point before frostbite is difficult to quantify. As noted, intoxication at the time of cold injury is common, but that episode may reflect everything from a 1-time misadventure to a manifestation of severely entrenched, life-threatening addiction. An unstable housing situation can be fluid as well and can even change over the course of a patient's treatment for frostbite and its sequel. Noting the complex illness burden in our disadvantaged patient population, one would also expect trauma and stressor-related disorders to be common and potentially impact frostbite outcomes via multiple mechanisms. We suspect that post-traumatic stress disorder was underreported in the medical records of study subjects, since only 1 individual (who did also have an unplanned readmission) had documented post-traumatic stress disorder. The influence of trauma in various forms with or without resulting mental illness is a clear area of need for future study in understanding patients with frostbite and identifying opportunities for improvement in care.

One other limitation relates to the problem of frostbite itself—the initial assessment of frostbite severity can be difficult. Although we are making strides using clinical assessment scores[32] and real-time imaging,[33] those recent clinical advancements were evolving over the decade covered by this study, and therefore not consistently applied into the care of all 148 patients. Therefore, the severity of frostbite could not be incorporated into our analysis but may have been a greater factor in producing complications in some cases compared to any of the biopsychosocial factors examined.

5. Conclusions

Cold weather injuries cause extreme pain and not infrequently result in acute and subacute complications with lasting disfigurement and morbidity. Biopsychosocial factors including SUDs and homelessness are independent predictors of unstable recovery trajectories in frostbite patients resulting in unplanned

readmission. SUDs and even a premorbid history of drug and/or alcohol use without clear evidence of disorder are independent predictors of amputations. Clinicians caring for frostbite patients with these conditions should consider these factors as part of their treatment planning and discharge decisions, with poor outcome prevention in mind. There may be a role for greater attention to psychiatric stabilization and substance use management during the early aftermath of a cold weather injury to improve adherence for the sake of better physical outcomes. Shoring up more stable disposition planning for homeless frostbite victims, even if just for the period of wound care, healing, and management of complications may decrease morbidity. Additional hospital, public health, and community resources may be needed to prevent these vulnerable patients from having significant complications and placing an even higher burden on healthcare systems.

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Author contributions

Conceptualization: Frederick W. Endorf, Rachel M. Nygaard.
Data curation: Cynthia DiGiandomenico, Deepak Alapati, Rachel M. Nygaard, Yee Xiong.
Formal analysis: Courtney S. Rasimas, Cynthia DiGiandomenico, Deepak Alapati, Joseph J. Rasimas, Rachel M. Nygaard, Yee Xiong.
Investigation: Cynthia DiGiandomenico, Deepak Alapati, Yee Xiong.
Methodology: Frederick W. Endorf, Joseph J. Rasimas, Rachel M. Nygaard.
Project administration: Frederick W. Endorf, Rachel M. Nygaard.
Supervision: Joseph J. Rasimas.
Validation: Rachel M. Nygaard.
Writing – original draft: Frederick W. Endorf, Rachel M. Nygaard, Yee Xiong.
Writing – review & editing: Courtney S. Rasimas, Cynthia DiGiandomenico, Deepak Alapati, Frederick W. Endorf, Joseph J. Rasimas.

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This is Exhibit "H" referred to in the Affidavit of Dr. Sandy Dong, affirmed this 15th day of September, 2023

CHRISTOPHER WIEBE
LAWYER

Edmonton Coalition on Housing and Homelessness
200, 12120-106 Avenue Edmonton Alberta T5N 0Z2
www.ecohh.ca

News Release

2022 June 13

Edmontonians invited to mourn deaths due to homelessness

Continuing a practice begun in 2006, Edmontonians will gather on June 15 to honour and grieve 453 people who have died due to homelessness.

The service, presented by Edmonton Coalition on Housing and Homelessness (ECOHH), has not been held for two years due to the pandemic so is for people who died in 2019, 2020, and 2021.

“This has always been a painful event,” says organizer Susan Watson. “No one should see their life cut short because they have been without safe, healthy housing. Too often people die much too young when they are in such circumstances. The alarming increase in deaths is terrible and should call us to action.”

Prior to 2016, identified deaths were about 50 each year. There was a significant increase in 2016, to over 100 people. The figures of 2019 (99) and 2020 (132) remain about that level. The number of people identified for 2021 increases to 222.

“The memorial service is a time to grieve the people–our family, friends, neighbours–who are no longer with us, a time to gather together in our sorrow and support each other in our loses, while we focus on everything we loved and appreciated about those who have died,” explains organizer Jim Gurnett.

“But we need to be leaving the event asking what can be done to end this shameful reality in our city.”

The event takes place at Homeless Memorial Plaza, a small park north of City Hall on 103A Avenue at 100 Street, and begins at 2 pm. It is a public event and all are welcome. Following a short service with prayers and music, there will be a time for each person to place a flower on the sculpture in the park. Light refreshments will be available after.

In the years from 2005 to 2018, a total of 802 people were remembered at the services. The addition of those from the past three years means 1255 identified people have now died over the past 17 years with homelessness as a significant factor.

The process used to identify people is the same each year–a wide range of organizations that work with people struggling to have housing security share names of people who have experienced significant difficulty to have adequate housing and have died. Names are cross-referenced to eliminate duplications. People have not in most cases died directly on the street from homelessness (for example, weather exposure or assault) but have died where there is a determination they would have not died as soon if they consistently had adequate housing. Names of people who have died are not released.

2021

Age	All Ages	<20	20-29	30-39	40-49	50-59	60-69	70+	Unknown
Male	144	3	7	19	27	38	23	7	20
Female	78	1	10	22	7	18	7	3	10
Total	**222**								

2020

Age	All Ages	<20	20-29	30-39	40-49	50-59	60-69	70+	Unknown
Male	90	0	5	18	22	19	14	9	3
Female	42	0	7	5	8	11	5	4	2
Total	**132**								

2019	All Ages								
Age		<20	20-29	30-39	40-49	50-59	60-69	70+	unknown
Male	71	**0**	6	7	14	22	15	3	4
Female	28	0	4	4	8	4	6	0	2
Total	**99**								

2021 - 222 people died
2020 - 132 people died
2019 - 99 people died
2018 - 96 people died
2017 - 107 people died
2016 - 106 people died
2015 - 51 people died
2014 - 47 people died
2013 - 40 people died
2012 - 45 people died
2011 - 43 people died
2010 - 57 people died
2009 - 46 people died
2008 - 47 people died
2007 - 44 people died
2006 - 41 people died
2005 - 32 people died

Local News

Edmonton memorial honours 156 deaths from homelessness in 2022

Lauren Boothby

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24 Comments

People lay flowers at Edmonton's homeless memorial statue during a service to remember Edmontonians lost to homelessness on Wednesday, June 7, 2023. The service, presented by Edmonton Coalition on Housing and Homelessness (ECOHH), recognized the lives of 156 people who died in 2022 directly or indirectly from the consequences of homelessness. PHOTO BY DAVID BLOOM /Postmedia

Edmontonians gathered Wednesday to honour the lives of 156 people who died due to homelessness in this city in 2022.

More than 200 people attended the annual memorial held by the Edmonton Coalition on Housing and Homelessness (ECOHH) at the Homeless Memorial Plaza, located in a small park north of city hall on 103A Avenue. Mourners placed flowers on the memorial to remember family and friends who died during the service. Along with speeches, there was prayer, smudging, bagpipes, singing, and drumming by Nehiyawak Singers.

The coalition tracks deaths alongside agencies supporting people who are struggling to find housing security. Organizer Susan Watson said deaths have been increasing since the first memorial in 2006. This day, she said, they gathered to remember family members and friends who didn't have somewhere warm, safe and comfortable to live.

"They did not have a place to which they could go at the end of the day and not be afraid. They did not have a place to call home," she said while speaking to the crowd.

"This memorial speaks to the harsh realities of poverty, the dangers of living on the streets, and a desperate need for love and hope in our lives … We wish no lives were lost because of homelessness. The stark reality, however, is that the numbers have been increasing."

As of last Monday, there were 3,112 people in Edmonton experiencing homelessness, according to Homeward Trust.

The number of Edmontonians who have died related to homelessness peaked in 2021 at 222 deaths, according to the coalition's count, which cross-references names with housing agencies to remove duplicates. However, deaths remain elevated since 2016 before such time annual deaths hovered around 50.

Alberta's office of the chief medical examiner's death count for 2022 is similar to the coalition's numbers. As of the end of April, the examiner's office had confirmed 145 people with no fixed address died in Edmonton in 2022, and 188 in 2021. The office says these figures are not final and will change as more cause-of-death investigations close, which can take an average of nine months or longer, and may be updated with new information.

'They're invisible'

David Johnson came to remember several people he knows, including two people who died in the last nine days. He became unhoused himself during the COVID-19 pandemic where he was forced to live in his car, and said it took more than one year to get permanent housing.

Johnson said it was wonderful to see people come Wednesday to honour unhoused Edmontonians.

"It's important because, we see the tents and the tarps, but homeless people — they're invisible. People try to ignore them," he told Postmedia. "Look at your neighbours — they shouldn't be living this way."

Jerry McFeeters, who was formerly homeless, said he came to honour the city's fallen brothers and sisters who are Indigenous, and others, regardless of where they came from.

He knows 17 homeless people personally who have died since 2020.

"There have been so many homeless people who are never ever coming back from this winter," he said. "People are still dying in the street."

The opioid epidemic and housing still need to be addressed in this city, McFeeters said.

“If we start working with addressing those two core elements, we will change our community again,” he said. “We need inclusion. We need to have some awareness that people are still dying out there. We won’t forget these people that are here, and our ceremonies help connect us to healing and getting people back to a place of personal health.”

McFeeters was glad to see representation from Edmonton city council including the mayor, the public, and from street outreach and social services groups.

Representatives from Edmonton Fire Rescue Services and Edmonton Police Service were also in attendance.

lboothby@postmedia.com

@laurby

COMMENTS

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This is Exhibit "I" referred to in the Affidavit of Dr. Sandy Dong, affirmed this 15th day of September, 2023

CHRISTOPHER WIEBE
LAWYER

JAMA | Original Investigation

Population-Level Health Effects of Involuntary Displacement of People Experiencing Unsheltered Homelessness Who Inject Drugs in US Cities

Joshua A. Barocas, MD; Samantha K. Nall, MPH; Sarah Axelrath, MD; Courtney Pladsen, DNP; Alaina Boyer, BS; Alex H. Kral, PhD; Ashley A. Meehan, MPH; Alexandra Savinkina, MSPH; David Peery, JD; Michael Bien, MPH; Christine Agnew-Brune, PhD; Jesse Goldshear, MPH; Joey Chiang, MD; Benjamin P. Linas, MD; Gregg Gonsalves, PhD; Ricky N. Bluthenthal, PhD; Emily Mosites, PhD; for the NHBS Study Group

IMPORTANCE At least 500 000 people in the US experience homelessness nightly. More than 30% of people experiencing homelessness also have a substance use disorder. Involuntary displacement is a common practice in responding to unsheltered people experiencing homelessness. Understanding the health implications of displacement (eg, "sweeps," "clearings," "cleanups") is important, especially as they relate to key substance use disorder outcomes.

OBJECTIVE To estimate the long-term health effects of involuntary displacement of people experiencing homelessness who inject drugs in 23 US cities.

DESIGN, SETTING, AND PARTICIPANTS A closed cohort microsimulation model that simulates the natural history of injection drug use and health outcomes among people experiencing homelessness who inject drugs in 23 US cities. The model was populated with city-level data from the Centers for Disease Control and Prevention's National HIV Behavioral Surveillance system and published data to make representative cohorts of people experiencing homelessness who inject drugs in those cities.

MAIN OUTCOMES AND MEASURES Projected outcomes included overdose mortality, serious injection–related infections and mortality related to serious injection–related infections, hospitalizations, initiations of medications for opioid use disorder, and life-years lived over a 10-year period for 2 scenarios: "no displacement" and "continual involuntary displacement." The population-attributable fraction of continual displacement to mortality was estimated among this population.

RESULTS Models estimated between 974 and 2175 additional overdose deaths per 10 000 people experiencing homelessness at 10 years in scenarios in which people experiencing homelessness who inject drugs were continually involuntarily displaced compared with no displacement. Between 611 and 1360 additional people experiencing homelessness who inject drugs per 10 000 people were estimated to be hospitalized with continual involuntary displacement, and there will be an estimated 3140 to 8812 fewer initiations of medications for opioid use disorder per 10 000 people. Continual involuntary displacement may contribute to between 15.6% and 24.4% of additional deaths among unsheltered people experiencing homelessness who inject drugs over a 10-year period.

CONCLUSION AND RELEVANCE Involuntary displacement of people experiencing homelessness may substantially increase drug-related morbidity and mortality. These findings have implications for the practice of involuntary displacement, as well as policies such as access to housing and supportive services, that could mitigate these harms.

Viewpoint and Editorial

Supplemental content

Author Affiliations: Author affiliations are listed at the end of this article.

Group Information: The members of the NHBS Study Group appear in Supplement 2.

Corresponding Author: Joshua A. Barocas, MD, University of Colorado School of Medicine, 12631 E 17th Ave, Eighth Floor, Academic Office 1, Mailstop B180, Aurora, CO 80045 (Joshua.Barocas@CUAnschutz.edu).

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More than 500 000 people in the US experience homelessness nightly.[1] After decreasing between 2007 and 2016, estimates of homelessness have steadily increased since 2017.[2] Approximately two-thirds of people who are chronically homeless[3] are unsheltered (ie, lack physical shelter).[2]

Although local shelters attempt to provide refuge and resources to people experiencing homelessness, shelters alone are inadequate to meet the needs of the population. Although temporary emergency shelter is a vital component of the social safety net, it is not a sufficient substitute for safe and affordable long-term housing.

Across the US, involuntary displacement that forces people experiencing homelessness to regularly relocate from one temporary location to another is common. Involuntary displacement may be operationalized or labeled differently depending on the city. Sometimes referred to as "sweeps," "clearings," or "cleanups," displacement is often done without connecting people to services or housing and without regard for past trauma.[4] People experiencing homelessness are often forced to disperse away from services, resulting in loss of personal belongings, medications, identification cards, and social support.[5] Involuntary displacement may disproportionately impact people experiencing homelessness who use nonprescribed drugs[6] because it can affect access to sterile injection equipment, naloxone, and medications for opioid use disorder (MOUD).[7,8] Decreased access to support services and lifesaving medications may increase overdose risk and death.[9] This modeling study aimed to better understand the potential long-term health effects of involuntary displacement among unsheltered people experiencing homelessness who inject drugs in 23 US cities.

Key Points

Question What are the long-term health effects of involuntary displacement of people experiencing homelessness who inject drugs in US cities?

Findings This simulation modeling study of 23 US cities projects that involuntary displacement of people experiencing homelessness may yield substantial increases in morbidity and mortality over a 10-year period. Involuntary displacement is estimated to worsen overdose and hospitalizations, decrease initiations of medications for opioid use disorder, and contribute to deaths among people experiencing homelessness who inject drugs.

Meaning Ceasing involuntary displacement of people experiencing homelessness may mitigate some health-related harms associated with homelessness.

Methods

Model Description

A closed cohort microsimulation model was developed, validated, and calibrated to simulate the heterogeneous natural histories of injection drug use among people experiencing homelessness in 23 US cities. We sought to estimate the effect of involuntary displacement on overdose and serious injection-related bacterial infections (SIRIs), including infective endocarditis and severe skin and soft tissue infections, which account for substantial burden of the health effects among this population (**Figure 1**).[10]

A simulated individual enters the model and is randomly assigned an age, sex, and history of injection drug use. Among those who have a history of any injection drug use, the model then assigns a current injection status and injection-related behaviors. Injection status and behaviors, in turn, govern risk of overdose and injection-related infections. Individuals progress on a weekly timestep through a series of modules in which they encounter probabilities of SIRI and overdose (referred to as *sequelae*), hospitalization, and outpatient care. An individual's progression through these modules affects the transition probabilities among injection-related health states and the probability of death.

The model was used to simulate separate cohorts from 23 US cities because these cities participated in the 2018 cycle for the National HIV Behavioral Surveillance (NHBS), which focused on people who inject drugs (NHBS cities are listed in Supplement 1). NHBS is a comprehensive system for biobehavioral surveillance conducted since 2003 among populations with high a prevalence of HIV in annual rotating cycles. For each city, model cohorts were stratified by sex, age, and injection behavior profile (eTable 1 in Supplement 1). Only individuals with current injection drug use were at risk of sequelae. Probabilities of overdose, infective endocarditis, and severe skin and soft tissue infection risk were derived by age, sex, and injection behavior profile for each city. Individuals who developed sequelae had a probability of being hospitalized and treated. Individuals encountered probabilities of linking to outpatient care, which include MOUD with buprenorphine and methadone (eTable 2 in Supplement 1). Linkage to MOUD could happen after a hospitalization for sequelae or via a "background" mechanism. The background mechanism simulated the observation that some individuals link to outpatient addiction care spontaneously and without prior hospitalization.

In the model, individuals in each city faced a risk of death from sequelae as well as from age- and sex-related causes (ie, competing causes of death). The probability of overdose-associated mortality by age, sex, injection behavior profile (assuming intravenous opioid use), and probability of overdose was derived. Infective endocarditis and skin and soft tissue infection were both characterized as untreated, in treatment, or resolved, with mortality risk being lower when characterized as being in treatment or resolved. Probabilities of non–drug-related death from other causes by sex, age, and injection behavior profile were applied.

Model Parameterization and Calibration

A total of 23 separate cohorts were parameterized after calibration (see eTables 4-26 in Supplement 1 for city-specific calibration results); inputs were derived with city-level data wherever possible. Other inputs were derived from national estimates from primary data and published literature when

city-specific data were not available. Parameter source types (eg, city-specific) are summarized in the **Table**, and eTable 27 in Supplement 1 includes a complete list of sources for each parameter for each city.

City-level data obtained from NHBS[11] were used to inform the cohort characteristics. In this survey, people also provided their housing status (eg, homeless in the past 12 months) and cohorts were limited to those who reported homelessness. This meant that the entirety of the cohorts used to inform the model were people experiencing homelessness who had recent (past 12 months) injection drug use or a history of injection drug use. The individuals who reported that they had not injected drugs in the past 12 months were used to inform the "no current use" health state. Those who reported recent or active injection drug use were used to inform the "low frequency" and "high frequency" drug use health state cohorts. City-specific parameter estimates are included in eTable 27 in Supplement 1.

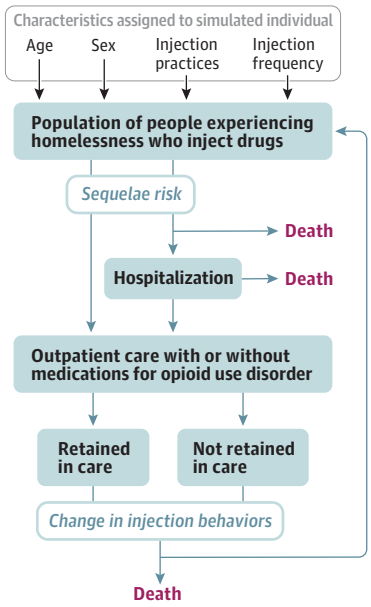
Both city- and national-level sources for overdose were used. We estimated the rates of fatal overdose from 2018 Centers for Disease Control and Prevention WONDER (Wide-ranging Online Data for Epidemiologic Research) data.[12] A combination of nationally representative published literature and NHBS city-specific sources were used to estimate the risk of nonfatal overdose. We used published literature that was not city-specific for SIRI estimates.[13-16]

"Community linkage" was derived from estimates from McLaughlin et al[17] and Krawczyk et al.[18] Based on these previous findings, people experiencing homelessness are approximately 0.46 times as likely as housed individuals to be linked to a health care provider. An assumption was made that all clinicians could prescribe MOUD (buprenorphine), although access to MOUD in the US is likely more limited. As such, a weekly probability of 0.81% linking to a clinician was calculated. MOUD use in 2021 from NHBS city-level data was used to estimate the probability of acceptance conditional on linkage to care.

US age- and sex-adjusted mortality from the National Vital Statistics System[19] was used (with overdose removed) to derive the competing risks mortality. The increased risk of death among people experiencing homelessness was accounted for by using age group–standardized mortality ratios from the study by Nicholas et al.[20]

The model was deterministically calibrated separately for each city to fit clinically relevant outcomes: percentage of deaths attributable to overdose, 1-year nonfatal overdose, life expectancy, and 6-month retention in MOUD treatment. Data from 2 US cities were used (Boston, MA, and Denver, CO) to develop the calibration target of 25% to 33% of deaths attributable to overdose.[10,21] City-specific data from NHBS were used to develop the target for the percentage of people experiencing homelessness who experienced a nonfatal overdose in the previous year, which ranged from 15% to 51%. Several sources were used, including a systematic review, to develop a calibration target for mean life expectancy being approximately 50 to 59 years among this population.[22-24] Finally, multiple published studies estimated that 6-month MOUD retention among people experiencing homelessness is between 18% and 30%,[25,26] which is why this range was chosen as a calibration target. These data were used to estimate feasible ranges of parameter values and the model was then calibrated within those ranges to fit simulated outputs to observed targets. Simulated values were within 15% absolute error of observed targets.

Figure 1. Model Schematic for Natural History of Injection Drug Use and Related Sequelae Among People Experiencing Homelessness



Using the model parameters specified in the Table, a microsimulation of the heterogeneous natural history of injection drug use among people experiencing homelessness was used. The schematic demonstrates how individuals "move through" different modules in the model related to sequelae of injection drug use, health care access, behavioral changes, and mortality. A comprehensive model description is included in Supplement 1.

Model Analyses

The model was used to generate potential health outcomes by 2028 for each city assuming, in the base case, that population was not subjected to continual involuntary displacement. Population-level health outcomes for each city were projected per 10 000 unsheltered people experiencing homelessness, including overdose mortality, SIRIs and SIRI-related mortality, hospitalizations, and initiations of MOUD. Mean per-person health outcomes, including mean number of total overdoses (fatal and nonfatal) and mean life-years lived over the 10-year period, were also projected. The population modeled was people experiencing homelessness who inject drugs or who have ever injected drugs.

A counterfactual simulation for each city was performed to assess the association of "continual involuntary displacement" on health outcomes. The policy of continual involuntary displacement was modeled as having a persistent risk of being forced to relocate with a disruption in health services. Operationally, in the model, this was simulated by a change in overdose probability, MOUD treatment initiation, and receptive syringe sharing. Because these are changes to individual probabilities, continual involuntary displacement was modeled such that everyone in the model was at risk of

Table. Model Parameters, Data Type Used to Inform Parameters, and Sampling Distributions for Probabilistic Sensitivity Analyses

Parameters	Data types[a]	PSA distribution[b]
Cohort characteristics among people experiencing homelessness who inject drugs		
Background mortality	National homeless, US Census	
Infection prevalence based on injection frequency	National inject, primary national inject, US Census	
Injection frequency stratified by age	City	
Proportion male	City	
Male age (mean/SD)	City	Normal
Female age (mean/SD)	City	Normal
Minimum age (mean/SD)	US Census	Normal
Needle sharing prevalence	City	Uniform
Skin cleaning prevalence	City	Uniform
Sequelae of drug use parameters		
Combined overdose prevalence (high)	National inject, national homeless, primary national homeless	Uniform
Combined overdose prevalence (low)	National injection, national homeless, primary national homeless	Uniform
Fatal overdose prevalence	National inject, national homeless	Uniform
IE prevalence	National inject	Uniform
Overdose history multipliers	National inject	Uniform
Infection history multiplier	National inject	Uniform
Mortality, untreated SSTI	National inject	Uniform
Mortality, inpatient SSTI	National inject	Uniform
Mortality, untreated IE	National inject	Uniform
Mortality, inpatient IE	National inject	Uniform
Mortality, inpatient overdose	National inject	Uniform
Inpatient parameters		
Inpatient linkage (SSTI)	National inject	Uniform
Inpatient linkage (IE)	National inject	Uniform
Inpatient linkage (overdose)	National inject	Uniform
Discharge against medical advice	National inject	Uniform
Inpatient SSTI duration (mean/STD)	National inject	
Inpatient IE duration (mean/SD)	National inject	
Outpatient parameters		
Linkage from inpatient to outpatient, with MOUD	National inject	Uniform
Background linkage to outpatient care	National inject	Uniform
MOUD acceptance	City, primary national homeless	Uniform
Unlinkage from care, with MOUD	National inject, national homeless	Uniform
Unlinkage from care, without MOUD	National inject, national homeless	Uniform
Transition probabilities		
Injection frequency transition probabilities	National inject, national homeless, primary national inject	Uniform
Needle sharing transition probabilities	National inject, primary national homeless	Uniform

Abbreviations: IE, infective endocarditis; MOUD, medications for opioid use disorder; SSTI, skin and soft tissue infection.

[a] Data types were defined as follows: city, primary data from 2018 National HIV Behavioral Surveillance data on people who inject drugs and people experiencing homelessness in the last year from each of the 23 US cities being analyzed; national inject, data specific to people who inject drugs from published literature; national homeless, data specific to people experiencing homelessness from published literature; primary national inject, primary data from cohort studies, randomized clinical trials, and case-control studies about people who inject drugs processed to develop input parameters; primary national homeless, primary data from cohort studies, randomized clinical trials, case-control studies about people experiencing homelessness processed to develop input parameters; and US Census, primary data from US Census processed to develop input parameters.

[b] Probabilistic sensitivity analysis (PSA) was performed to characterize parameter uncertainty and create credible intervals for outcome estimates. The model was programmed to utilize normal, uniform, and log-normal distributions for PSA. Parameters with empty cells in the PSA distribution column were not included in the probabilistic sensitivity analysis.

displacement, but the experience of an individual was unique. This did not mean that displacement happened on a weekly basis, but that probabilities were applied to individuals based on the cycle length (weekly). These changes did not abate over time. Empirical data collected from people experiencing homelessness who inject drugs in 2 cities in which data were

available (Los Angeles and San Francisco, California) were used to estimate the changes to model parameters to reflect the association of outcomes with displacement (eTable 3 in Supplement 1).[9,27] For example, people who reported being forcibly displaced in the past 30 days had an adjusted odds ratio (aOR) of 2.50 (95% CI, 1.28-4.90) for nonfatal overdose compared with people who had not been displaced in the past 30 days. This aOR was then applied as a multiplier to the base case overdose probabilities. Similarly, people displaced in the past 30 days were less likely to initiate MOUD than people without recent displacement (aOR, 0.62 [95% CI, 0.42-0.89]). This was applied as a multiplier to the probability of initiation of MOUD. Finally, people who were displaced in the past 30 days were at higher odds of receptive needle/syringe sharing compared with people who were not displaced (aOR, 2.26 [95% CI, 1.18-4.32]). This was applied as a multiplier to the transition probabilities that characterize needle/syringe sharing in the model. Each of these multipliers was applied to the probabilities for each city and the simulation was run for 10 years. These outcomes were compared with those of the "no continual displacement" scenario and the percent change was calculated.

To estimate the potential contribution of continual displacement to mortality, the no displacement model fits for each city were run for 10 years, from 2019 to 2028, with each being compared with the counterfactual model scenario over that period. The population-attributable fraction (PAF) of displacement was calculated by comparing the number of deaths from all causes occurring over 10 years as

$$\text{PAF} = 100 - 100 \times (\text{deaths in base case/deaths in counterfactual}).$$

Sensitivity analyses were also performed on outcomes for a 5-year period.

Sensitivity Analyses

Because there was uncertainty regarding the empirical data used to inform the population cohorts and model parameters, particularly those related to the outcomes of displacement, probabilistic sensitivity analyses were performed to generate quantitative estimates of uncertainty in select simulated outcomes. For each probabilistic sensitivity analysis, 1000 simulations were performed on a cohort of 1000 people. Displacement parameters were included in the probabilistic sensitivity analyses. For each of the 23 cities, based on unpublished results and expert opinion, the displacement parameters varied through a range of 0.5 to 2.0 times the base case input and drew from a uniform distribution; 99.5% credible intervals (CrIs) were generated using probabilistic sensitivity analyses.

Because the OR estimates are crucial to the study findings, a number of deterministic sensitivity analyses on the displacement parameters were performed because displacement practices across the US may vary. First, for each city, scenarios were modeled in which 1 of the 3 displacement parameters—overdose risk, syringe sharing probability, or MOUD—was unchanged with displacement, while the other 2 were affected by displacement. Additionally, for each city, a 3-way deterministic sensitivity analysis was performed using the upper and lower bounds of the 95% CIs from the study by Chiang et al[9] on the aORs that were used for the primary analysis. All 3 parameters were varied simultaneously for a "worst-case" and a "best-case" scenario. For the best-case scenario, lower bounds for overdose and syringe sharing parameter estimates and the upper bound for MOUD initiation were used. For the worst-case scenario, the upper bound for overdose and syringe sharing estimates and the lower bound for MOUD initiation were used.

The Consolidated Health Economic Evaluation Reporting Standards guided writing of this article (eTables 58-59 in Supplement 1).

Results

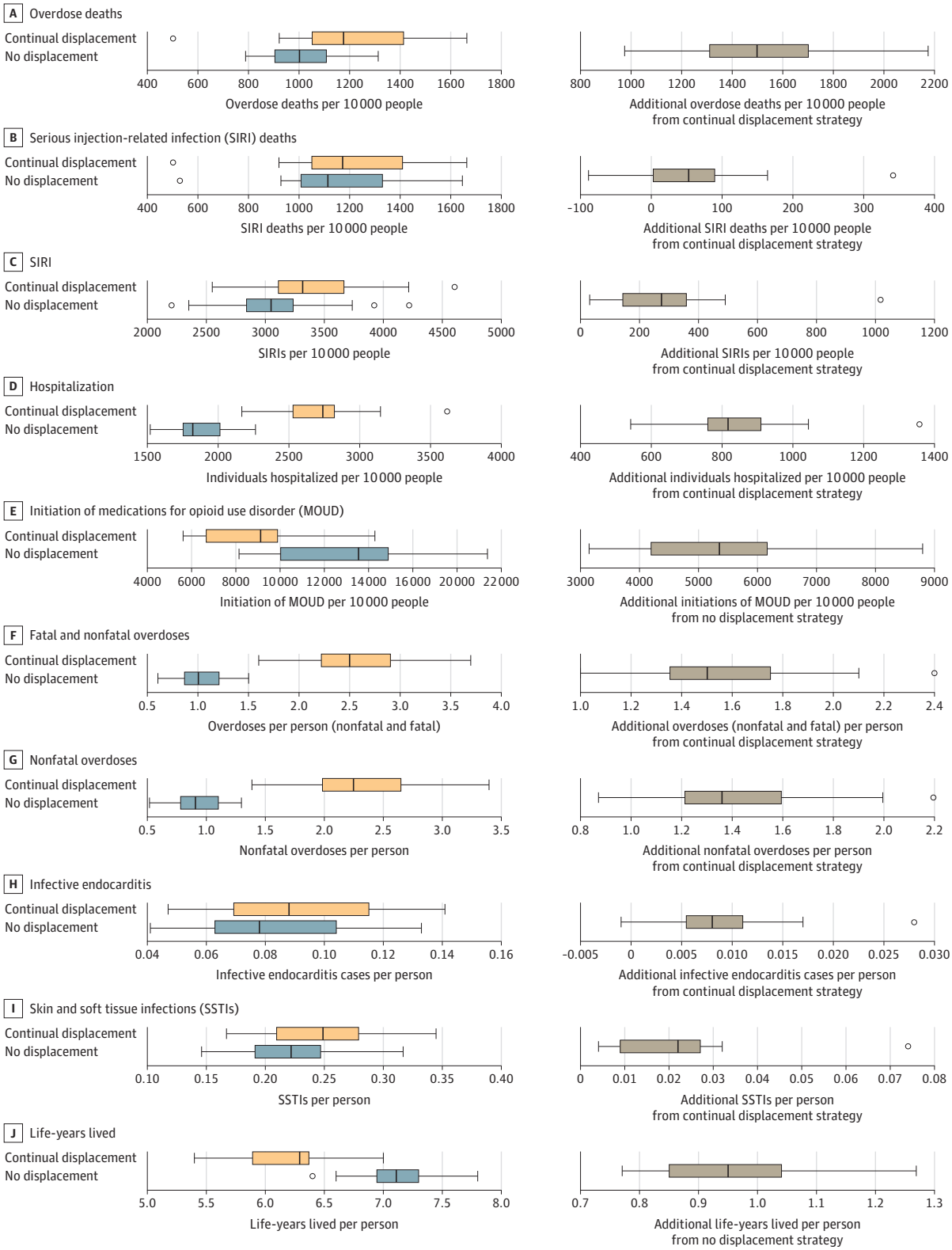
In the no displacement strategy over a 10-year period, the model predicted between 795 (99% CrI, 0-4198) and 1313 (99% CrI, 0-7433) overdose deaths per 10 000 unsheltered people experiencing homelessness who inject drugs, depending on the city. Furthermore, the model predicted 2204 (99% CrI, 637-5160) to 4220 (99% CrI, 597-5754) SIRIs and 528 (99% CrI, 70-1085) to 1647 (99% CrI, 0-2085) SIRI-related deaths per 10 000 unsheltered people experiencing homelessness who inject drugs, depending on the city. Also, per 10 000 unsheltered people experiencing homelessness who inject drugs, there was an estimated 1520 (99% CrI, 1089-3170) to 2263 (99% CrI, 826-4742) people hospitalized by city and between 7700 (99% CrI, 5319-8779) and 21 731 (99% CrI, 14 512-24 778) initiations of MOUD by city.

In the no displacement strategy over the 10-year period, the mean estimated number of total overdoses varied by city, ranging from 0.6 (99% CrI, 0.04-1.4) to 1.5 (99% CrI, 0-4.2) per person. The mean estimated nonfatal overdoses ranged from 0.52 (99% CrI, 0.05-1.1) to 1.3 (99% CrI, 0-3.5) per person. Depending on the city, individuals lived between 6.4 (99% CrI, 3.0-7.9) and 7.8 (99% CrI, 5.9-8.6) years of the possible 10 years.

At the population level, the model predicted between 1851 (99% CrI, 1163-7958) and 3379 (99% CrI, 1715-8676) overdose deaths per 10 000 unsheltered people experiencing homelessness who inject drugs across cities for the continual displacement strategy (compared with 795 to 1313 per 10 000 in the no displacement strategy). The mean number of total overdoses per person in each city ranged from 1.6 (99% CrI, 0-3.8) to 3.7 (99% CrI, 0.5-6.0). Unsheltered people experiencing homelessness who inject drugs lived a mean of 5.4 (99% CrI, 0.6-6.7) to 7.0 (99% CrI, 4.4-8.1) years of the possible 10 years in the no displacement strategy (eTables 28-50 in Supplement 1).

The ranges of outcomes for each strategy as well as the differences between the 2 strategies are shown in **Figure 2**. Differences delineated by city are included in eFigure 1 in Supplement 1. At the population level, the model predicted between 974 and 2175 additional overdose deaths per 10 000 people experiencing homelessness who inject drugs, depending on the city, in the continual involuntary displacement strategy compared with no displacement. In 17 of 23

Figure 2. Ten-Year Modeled Clinical Outcomes for "No Displacement" and "Continual Involuntary Displacement" Strategies



Plots on the left show the ranges of the absolute numbers for each clinical outcome for the "no displacement" and "continual involuntary displacement" strategies and plots on the right show the absolute differences for each clinical outcome between the 2 strategies (medians noted with black lines). Boxes denote first to third quartiles. Whiskers extend to extreme observed values with 1.5 × the IQR of the nearer quartile. Circles denote outside values. An individual could have more than 1 MOUD initiation.

cities, SIRIs and SIRI-related mortality were estimated to be higher in the continual involuntary displacement strategy compared with the no displacement strategy (eFigure 1 in Supplement 1). In those cities with decreases in SIRIs and SIRI-related mortality, the model predicted particularly large increases in overdose-related mortality, which likely account for the SIRI decreases (ie, people die before they get infections). Compared with no displacement, the number of people hospitalized in each city was predicted to be higher in the continual displacement strategy, while initiations of MOUD were lower. eTable 51 in Supplement 1 denotes the percent differences between the 2 strategies, which are relative differences calculated as follows.

$$\frac{(\text{Outcome}_{\text{no displacement}} - \text{Outcome}_{\text{continual displacement}})}{([\text{Outcome}_{\text{no displacement}} + \text{Outcome}_{\text{continual displacement}}]/2)} \times 100$$

Using this equation, the model predicted between a 71% and 94% within-city increase in overdose mortality in the continual involuntary displacement strategy compared with no displacement.

The model estimated potential all-cause mortality PAF estimates for all 23 cities. Continual involuntary displacement could contribute up to 24.4% (99% CrI, 22.9%-27.5%) of deaths among unsheltered people experiencing homelessness who inject drugs over a 10-year period compared with no displacement (eFigure 2 in Supplement 1).

Results of the deterministic sensitivity analyses in which displacement parameters were varied did not qualitatively change the findings (eTables 52-56 and eFigures 3-7 in Supplement 1). Changing the time period to 5 years (eTable 57 and eFigure 8 in Supplement 1) worsened SIRI mortality across the cities, but did not otherwise qualitatively change outcomes. The probabilistic sensitivity analyses demonstrated wide variation in the possible results (eTables 28-50 and eFigure 2 in Supplement 1), but all in the direction of worse health outcomes predicted for displacement.

Discussion

Based on these results, continual involuntary displacement of unsheltered people experiencing homelessness who inject drugs was associated with increased overdose and SIRI-related mortality and decreased 10-year life expectancy by 2028. Overall, the PAF of continual displacement to all-cause mortality among unsheltered people experiencing homelessness who inject drugs may reach as high as 25% by 2028.

As in all modeling studies, these estimates should serve as a broad guide rather than as a predictive tool and can be used to inform policy discussions and future research to reduce harm among this vulnerable population. It was projected that continual involuntary displacement could be associated with one-fourth of all deaths among people experiencing homelessness who inject drugs by 2028. Given the limitations of the underlying data used to inform this projection, it is not possible to know the actual effect of displacement in the next 10 years given the changing sociopolitical landscape, environmental conditions, and health care system.

Displacement also comes with costs.[28,29] The main cost drivers are "encampment clearance," "encampment prevention," "outreach and housing navigation," labor costs, and additional health care hospitalizations, which are incurred largely by public insurance, including Medicaid. According to a 2015 analysis,[30] a hospitalization for injection-related infective endocarditis in Miami may cost up to $180 000 and a hospitalization for skin and soft tissue infection may cost up to $100 000. In that same cohort of 349 people, over the course of 1 year, there were 35 cases of injection-related infective endocarditis and 170 severe skin and soft tissue infections among people experiencing homelessness who inject drugs. Using model estimates of the current study, displacement in Miami could result in an additional $1.6 million in SIRI-related hospitalization costs over the next 10 years in addition to the costs of the sweeps themselves.

Limitations

This study has several potential limitations related to data quality and availability, as well as uncertainty, inherent in modeling studies. First, there are several assumptions on which the analysis is based, each of which could introduce biases. It was assumed that some parameter inputs were city specific, whereas others were more generalizable. Also, the empirical data used to estimate the changes to displacement model parameters were derived from a small subset of cities and might not be reflective of all cities included in the model. The population from which the displacement parameters were drawn is not necessarily representative of all people experiencing homelessness who inject drugs in the US. Second, the nature of the inputs to the model make it difficult to prove causality rather than association. An attempt to address this limitation was made by performing both deterministic and probabilistic sensitivity analyses. However, available data on forced displacement are limited. Although data are imperfect and the absolute effect of displacement policies are uncertain, no feasible scenario was found in which displacement was beneficial, or even neutral, to health outcomes.

Third, some of the associated effects on overdose reflect the fact that displaced individuals were also less likely to be receiving MOUD. Both outcomes were modeled independently, which may have led to an overestimation. It was also assumed that displacement did not abate over the course of the simulation. In reality, individuals may go through periods of stability in which displacement is not a threat, either because they are temporarily housed, have received support services, or have found a stable outdoor space. In such cases, the effect of displacement may have been overestimated. The model did not capture potential health outcomes other than overdoses and SIRIs, nor did it capture costs or quality of life. The analysis may be limited in that it did not stratify outcomes by race, even though there are increasing disparities in homelessness, overdoses, and SIRIs by race.[1,16,31] Future work should stratify outcomes by race, particularly because of the social and structural context in which different racial groups experience homelessness and drug use.

Fourth, this was a closed cohort simulation that assumed that individuals who were homeless at the beginning of the simulation remained homeless throughout. This is a strong assumption that may bias the results toward worse outcomes. However, this is likely balanced with the fact that the model did not account for people who became newly homeless or newly initiated drug use. A manual calibration approach was used because the model was not structured, nor did it have the computational ability, to undertake an optimized calibration approach (eg, joint distribution sampling). As such, bias may have been introduced in the analysis, but a standardized approach to the manual calibration was developed to minimize such bias (Supplement 1). Fifth, the probabilistic sensitivity analyses showed that under different assumptions about parameter values, some of the city-based outcomes had wide ranges, with estimates for some outcomes in which CrIs overlapped between the status quo and continual displacement scenarios. This draws attention to the need for better data and additional research on this vulnerable population and on how to improve health outcomes. In the absence of high-quality data, modeling studies such as this can provide information on the ranges of possible risks that can be useful to decision-makers considering such policies and potential interventions to mitigate risk.

Conclusions

Involuntary displacement of people experiencing homelessness may substantially increase drug-related morbidity and mortality. These findings have implications for the practice of involuntary displacement, as well as policies such as access to housing and supportive services that could mitigate these harms.

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Author Affiliations: University of Colorado Anschutz Medical Campus, Department of Medicine, Aurora (Barocas, Nall); Colorado Coalition for the Homeless, Denver (Axelrath); National Health Care for the Homeless Council, Nashville, Tennessee (Pladsen, Boyer); RTI International, Berkeley, California (Kral); Centers for Disease Control and Prevention, Office of the Deputy Director for Infectious Diseases, Atlanta, Georgia (Meehan, Mosites); Yale School of Public Health, New Haven, Connecticut (Savinkina, Gonsalves); Miami Coalition to Advance Racial Equity, Miami, Florida (Peery); National Foundation for the Centers for Disease Control and Prevention, Atlanta, Georgia (Bien); Centers for Disease Control and Prevention, Division of HIV Prevention, Atlanta, Georgia (Agnew-Brune); University of Southern California Keck School of Medicine, Department of Population and Public Health Sciences, Los Angeles (Goldshear); University of Washington School of Medicine, Internal Medicine, Seattle (Chiang); Boston Medical Center and Boston University School of Medicine, Boston, Massachusetts (Linas); University of Southern California Keck School of Medicine, Department of Population and Public Health Sciences and the Institute for Prevention Research, Los Angeles (Bluthenthal).

Author Contributions: Drs Barocas and Mosites had full access to all of the data in the study and take responsibility for the integrity of the data and the accuracy of the data analysis.
Concept and design: Barocas, Nall, Axelrath, Pladsen, Boyer, Kral, Savinkina, Bien, Linas, Mosites.
Acquisition, analysis, or interpretation of data: Barocas, Nall, Axelrath, Pladsen, Kral, Meehan, Savinkina, Peery, Agnew-Brune, Goldshear, Chiang, Gonsalves, Bluthenthal, Mosites.
Drafting of the manuscript: Barocas, Nall, Axelrath, Pladsen, Boyer, Goldshear, Linas, Mosites.
Critical revision of the manuscript for important intellectual content: Barocas, Nall, Axelrath, Pladsen, Boyer, Kral, Meehan, Savinkina, Peery, Bien, Agnew-Brune, Chiang, Linas, Gonsalves, Bluthenthal, Mosites.
Statistical analysis: Barocas, Nall, Chiang, Linas, Mosites.
Obtained funding: Barocas, Kral.
Administrative, technical, or material support: Barocas, Nall, Pladsen, Boyer, Meehan, Savinkina, Peery, Agnew-Brune, Gonsalves, Bluthenthal, Mosites.
Supervision: Barocas, Chiang.
Other - subject matter expertise: Bien.

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