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Varying circumstances surrounding opioid toxicity deaths across ethno-racial groups in Ontario, Canada: a population-based descriptive cross-sectional study

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ABSTRACT

Introduction The North American toxic drug crisis has been framed as an epidemic primarily affecting white people. However, evidence suggests that deaths are rising among racialised people. Accordingly, we sought to describe and compare characteristics and circumstances of opioid toxicity deaths across ethno-racial groups.

Methods We conducted a population-based, descriptive cross-sectional study of all individuals who died of accidental opioid toxicity in Ontario, Canada between 1 July 2017 and 30 June 2021. Decedents were categorised as Asian, black, Latin American or white. We summarised decedents' sociodemographic characteristics, circumstances surrounding death and patterns of healthcare utilisation preceding death by ethno-racial group, and used standardised differences (SDs) to draw comparisons.

Results Overall, 6687 Ontarians died of opioid toxicity, of whom 275 were Asian (4.1%), 238 were black (3.6%), 53 were Latin American (0.8%), 5222 were white (78.1%) and 899 (13.4%) had an unknown ethno-racial identity. Black people (median age: 35 years; SD: 0.40) and Asian people (median age: 37 years; SD: 0.30) generally died younger than white people (median age: 40 years), and there was greater male predominance in deaths among Asian people (86.2%; SD: 0.30), Latin American people (83.0%; SD: 0.21) and black people (80.3%; SD: 0.14) relative to white people (74.6%). Cocaine contributed to more deaths among black people (55.9%; SD: 0.37) and Asian people (45.1%; SD: 0.15) compared with white people (37.6%). Racialised people had a lower prevalence of opioid agonist treatment in the 5 years preceding death (black people: 27.9%, SD: 0.73; Asian people: 51.1%, SD: 0.22; white people: 61.9%).

Conclusions There are marked differences in the risk factors, context and patterns of drug involvement in opioid toxicity deaths across ethno-racial groups, and substantial disparities exist in access to harm reduction and treatment services. Prevention and response strategies must be tailored and targeted to racialised people.

WHAT IS ALREADY KNOWN ON THIS TOPIC

⇒ The North American drug toxicity crisis has led to a substantial loss of life due to unintentional drug toxicity. When the crisis was primarily driven by the overprescribing of pharmaceutical opioids, the burden of opioid-related deaths was highest among white people. Recent evidence points to rapidly increasing rates of opioid-related death among racialised people, yet there is a lack of research examining how patterns and circumstances surrounding these deaths differ across ethno-racial groups.

WHAT THIS STUDY ADDS

⇒ The risk factors, circumstances and patterns of drug involvement in opioid-involved toxicity deaths differ substantially across ethno-racial groups, and there are stark ethno-racial disparities in the use of harm reduction tools and in access to treatment.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

⇒ Public health practitioners and policymakers should develop and implement culturally informed programmes and policies to address the social drivers and impacts of the crisis, and these initiatives should be led by, tailored for, and targeted to racialised people.

INTRODUCTION

As one of the most complex and longstanding public health crises of the 21st century, the North American drug toxicity crisis has led to an unparalleled loss of life, particularly among young and middle-aged adults.[1 2] In fact, rates of drug toxicity deaths in the USA and Canada are more than double that of any other high-income country except Scotland.[3] Originally attributed to the overprescribing of opioids used to treat pain, the crisis has since shifted to one driven by the contamination

of the unregulated drug supply with highly potent, non-pharmaceutical opioids, including fentanyl and its analogues.[1 2 4] This shift led to a doubling in the number of opioid-involved overdose deaths in the USA between 2010 and 2017,[5] and rapidly rising rates of opioid-related death in Ontario[6] and British Columbia,[7] which are among Canada's hardest-hit provinces, during the same period. The COVID-19 pandemic triggered even greater accelerations in rates of opioid-related death in both Canada and the USA,[8 9] largely because of changes in the unregulated drug supply and reductions in the availability of treatment and support services for people who use drugs.[9]

To date, the toxic drug crisis in North America, particularly as it relates to opioid-involved toxicities, has largely been framed as an epidemic affecting white people.[10–12] Yet, between the late 1970s and the mid-1990s, when heroin was the primary cause of most opioid-related deaths in the USA, the rate of opioid mortality was higher among black people compared with white people.[13] As prescription opioids overtook heroin as the dominant cause of opioid-related deaths in the mid-1990s, the rate of overdose death grew rapidly on a population level. However, the increase was most dramatic among white people, arising from the heavy marketing of prescription opioids to prescribers in predominantly white suburban and rural communities.[13–15] Discourse around the crisis was subsequently centred on white communities, and in turn, opioid use disorder was framed as a biomedical disease that could be treated. Although some non-white groups, particularly Indigenous people,[16] also experienced rapid increases in drug-related mortality during this time, these communities faced discourse around criminality and a punitive response, in stark contrast to the approach adopted in white communities.[14] This is evidenced by the over-representation of black, Hispanic and Indigenous people in drug-related arrests and incarceration.[17–19]

The USA is experiencing yet another demographic shift in opioid-related deaths, with substantial increases in mortality among black people, especially those residing in large metropolitan areas,[20] as well as Indigenous people.[21] This shift coincided with the introduction of fentanyl and its analogues to the unregulated drug supply. Although several studies have reported on the changing trends in the racial distribution of opioid toxicity deaths,[13 21–24] there is a lack of research comparing the patterns and circumstances surrounding opioid-related deaths by race. Accordingly, we sought to describe and compare sociodemographic characteristics, circumstances surrounding death and patterns of healthcare utilisation preceding death among people who died of opioid toxicity in Ontario, Canada, a highly ethnically diverse region where 3% of the population identifies as Indigenous,[25] 29% of people identify as a 'visible minority' (ie, neither white or Indigenous), and nearly two-thirds of 'visible minorities' are immigrants.[26]

MATERIALS AND METHODS

Study design and setting

We conducted a population-based descriptive cross-sectional study of people who died of opioid toxicity in Ontario between 1 July 2017 and 30 June 2021. In Ontario, medical coroners investigate deaths arising from unnatural causes, as well as natural deaths that occur suddenly or unexpectedly, to determine the cause of death. Opioid toxicity deaths are defined as those arising from acute intoxication resulting from the direct contribution of an opioid, either alone or in combination with other drugs or substances. Suspected opioid toxicity deaths are defined on the basis of evidence at the scene or in post-mortem toxicology, but where a final conclusion on the cause is pending.[27] Deaths in which opioids were present but did not directly arise from acute toxicity, as well as those related to complications of long-term opioid use, are not included in this definition.

Data sources

We obtained data from ICES (formerly the Institute for Clinical Evaluative Sciences), an independent, non-profit research institute with legal status that allows for the collection and analysis of administrative healthcare and demographic data. We identified people who died of opioid toxicity using the Drug and Drug/Alcohol Related Death Database, which contains records from coroners' investigations of all opioid toxicity deaths in Ontario. The database captures sociodemographic information and details about the manner and circumstances surrounding death. We leveraged several other databases to ascertain additional sociodemographic details and information about healthcare utilisation for the cohort, the details of which are outlined in the online supplemental appendix . These datasets were linked using unique encoded identifiers and analysed at ICES.

Study population

We identified all individuals who died of opioid toxicity in Ontario during the study period. We excluded people without a valid Ontario Health Insurance Plan (OHIP) number and those who resided outside of Ontario at the time of death. We further excluded deaths that were suspected, but not confirmed to be due to acute opioid toxicity, deaths that were intentional in nature or in which the manner was undetermined, and those with a missing or unknown ethno-racial identity.

Coroners used a standardised data collection tool to capture information about people who died of opioid toxicity, including their ethno-racial identity, which was selected from a list of 12 options: Arab, black, Chinese, Filipino, Indigenous (including First Nations, Métis, and Inuit), Japanese, Korean, Latin American, South Asian, Southeast Asian, West Asian and white. Where appropriate, coroners could select multiple ethno-racial identities for a given individual. The determination of ethno-racial identity could be made by the deceased's family, friends or other acquaintances, and when this

was not possible, the coroner themselves could make the determination. Therefore, this measure represents the decedent's socially assigned ethno-racial identity.[28] Relative to self-reported measures of ethno-racial identity, socially assigned classifications may more accurately reflect society's perception of the race/ethnicity of an individual. This is important, because external classifications of race and ethnicity serve as the basis for the systematic differences in treatment, opportunities, resources and services that result in socioeconomic and health disparities. As such, measures of socially assigned race are increasingly being used to study health inequities.[28]

We then categorised people into four groups based on the ethno-racial identity determined through the death investigation. First, we grouped all people who were identified as black, regardless of whether they also had another ethno-racial identity. This approach reflects the longstanding practice of North American societies to classify, perceive and treat people with any known black African ancestry as black.[29] Among the remaining individuals, we classified those who were identified as Arab, Chinese, Filipino, Japanese, Korean, South Asian, Southeast Asian or West Asian as Asian, regardless of whether they were also identified as white. We included people who were partly white because of the tendency of society to perceive these mixed-race individuals as non-white.[29] The third group comprised of Latin American people, and the fourth included the remaining individuals identified as white. In alignment with our commitments to Indigenous-led governance and sovereignty of Indigenous data and the principles of ownership, control, access and possession of First Nations' data, the variable representing Indigenous identity was removed from the database of opioid-related deaths before transfer to ICES, precluding us from identifying Indigenous decedents. Resultantly, people who were both Indigenous and another race/ethnicity were retained in the cohort and included in the relevant ethno-racial group as described above, but were not identified as being Indigenous in our data or analyses.

Measures

We measured the quarterly number of opioid toxicity deaths in Ontario by ethno-racial group. We further assessed the sociodemographic characteristics of people who died of opioid toxicity, including age, sex, neighbourhood income quintile, living arrangement at the time of death and history of incarceration. Additionally, we characterised the circumstances surrounding death, including whether a bystander who could intervene was present at the time of the overdose, and among those with a bystander present, whether naloxone was used during the resuscitation attempt. Furthermore, we described the type of opioids that directly contributed to death, the prevalence of non-opioid substances (benzodiazepines, stimulants and alcohol) that directly contributed to death or were detected in post-mortem toxicology, the incident location, whether the incident took place at the decedent's home and the assumed mode of drug use. To assess patterns of healthcare utilisation prior to death, we measured the frequency and type of non-fatal healthcare encounters in the 7, 30, 180 and 365 days prior to death, as well as the prevalence of healthcare encounters for mental health-related diagnoses in the 5 years preceding death. Finally, to examine patterns of diagnosis and access to treatment for opioid use disorder, we measured the prevalence of opioid use disorder within the 5 years prior to death, and the percentage of those with opioid use disorder who were dispensed opioid agonist treatment in the 30 days, 180 days and 5 years before death (see online supplemental table S1 for definitions and diagnosis codes). All measures were stratified by ethno-racial group. However, in accordance with ICES' privacy policy prohibiting the reporting of small cells (counts ≤5) and any related percentages or rates that could result in residual disclosure of small cells, we were limited in the information that we could report on Latin American people. Therefore, in some circumstances, we had to entirely suppress results among Latin American people or aggregate information for the Latin American and Asian groups (we refer to this aggregated group as 'Non-Black People of Colour').

Statistical analysis

In each quarter of the study period, we reported the percentage of opioid toxicity deaths in Ontario by ethno-racial group. We then used descriptive statistics to summarise the sociodemographic characteristics, circumstances surrounding death and patterns of healthcare use before death over the entire study period, and calculated standardised differences (SDs) to compare the characteristics and circumstances of Asian people, black people and Latin American people to those of white people, with values ≥0.10 considered meaningful.[30] All analyses were conducted at ICES using SAS Enterprise Guide, V.7.1 (SAS Institute, Inc, Cary, North Carolina, USA).

Patient and public involvement

We met with several members of a Working Group of African, Caribbean and black community members in support of decriminalisation to help conceptualise this study and identify the research question. We continued to work closely with two members of the Working Group, along with one member of a separate advisory group of individuals with lived/living experience with opioid use, all of whom are coauthors on this study, to help select the measures and contextualise the study findings.

RESULTS

We identified 7590 people who died of opioid toxicity in Ontario between 1 July 2017 and 30 June 2021. We excluded 332 people (4.4%) who did not have a valid OHIP number or resided outside of Ontario at the time of death, 63 deaths (0.8%) that were not confirmed to be due to opioid toxicity, and 508 deaths (6.7%) that were not accidental. Among the remaining 6687 individuals,

275 were Asian (4.1%), 238 were black (3.6%), 53 were Latin American (0.8%), 5222 were white (78.1%) and 899 (13.4%) had an unknown ethno-racial identity and were subsequently excluded. The group of Asian people was comprised of 87 individuals (31.6%) who were Arab or West Asian, 65 people (23.6%) who were East or Southeast Asian, 125 people (45.5%) who were South Asian and ≤5 individuals (≤1.8%) with another ethno-racial identity.

Trends in opioid toxicity deaths

During the third quarter (Q3; July to September) of 2017, white people accounted for 92.6% (n=312) of opioid toxicity deaths in Ontario. By the end of the study period, the proportion of deaths occurring among white people decreased slightly to 90.1%, despite a rise in the absolute number of deaths in this group (n=428 during Q2 2021). During the same period, the proportion of opioid-involved deaths occurring among Non-Black People of Colour (Asian people and Latin American people) increased, rising from 3.6% in Q3 2017 to a peak of 8.5% in Q4 2020, before declining slightly to 5.9% at the end of the study period. The quarterly number of deaths in this group more than doubled over the study period (from n=12 in Q3 2017 to n=28 in Q2 2021). The proportion of deaths among black people did not change appreciably over the study period (3.9% in Q3 2017 to 4.0% in Q2 2021), yet there was a modest rise in the absolute number of deaths in this group (from n=13 in Q3 2017 to n=19 in Q2 2021; figure 1).

Characteristics of people who died of opioid toxicity

Black people (median age: 35 years; SD: 0.40) and Asian people (median age: 37 years; SD: 0.30) were generally younger at death compared with white people (median age: 40 years) (table 1). Although males comprised the majority of deaths across all groups, male predominance was more pronounced among Asian people (86.2%; SD: 0.30), Latin American people (83.0%; SD: 0.21) and black people (80.3%; SD: 0.14) relative to white people (74.6%). Across all ethno-racial groups, opioid toxicity deaths were concentrated among people who resided

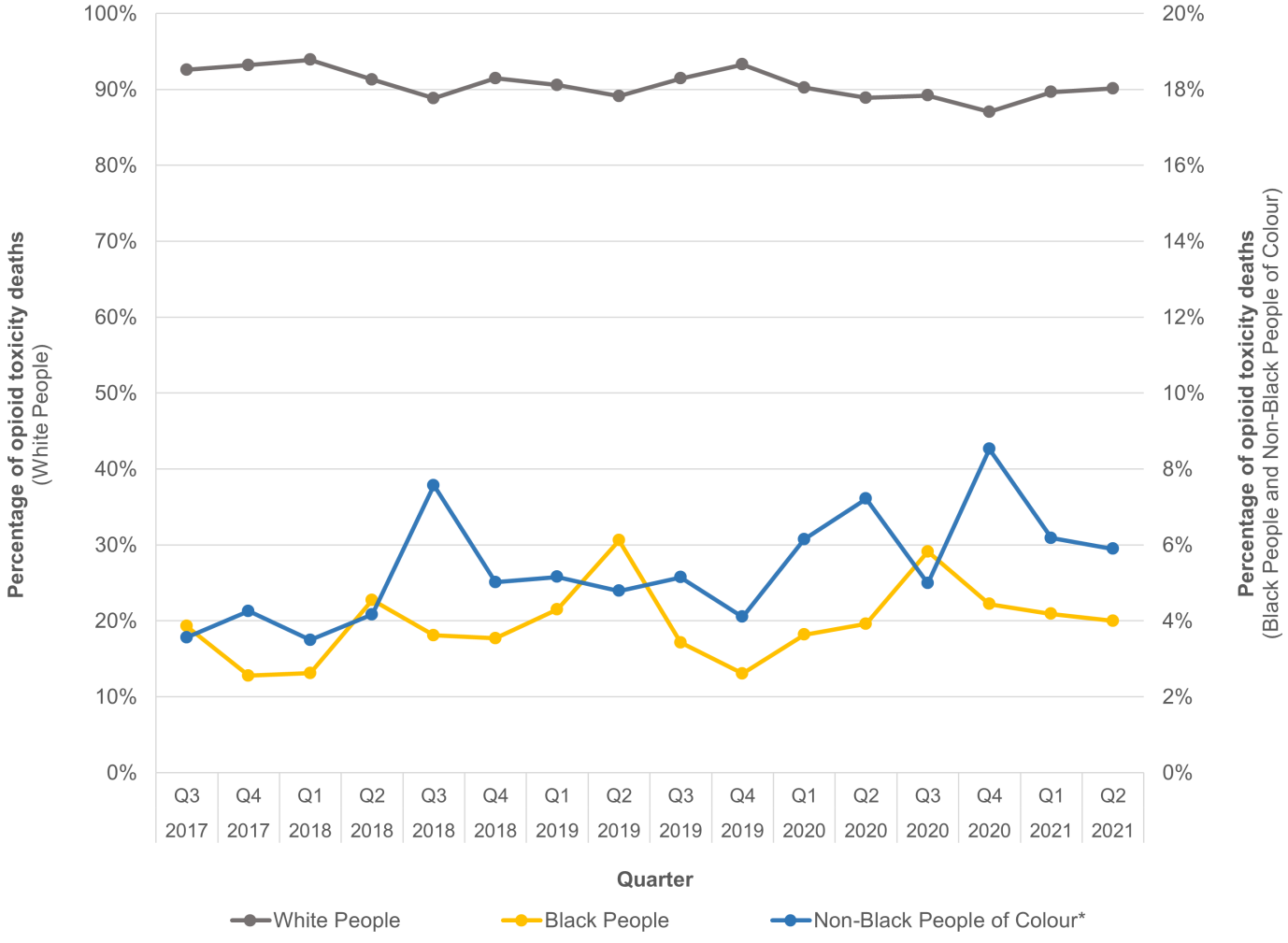

Figure 1 Trends in the distribution of opioid toxicity deaths in Ontario by ethno-racial group, July 2017 to June 2021. Note: data for black people and non-black people of colour are plotted on the secondary Y-axis. *ICES prohibits the reporting of small cells (counts ≤5), as well as any related values (eg, percentages, rates) that would result in residual disclosure of a small cell. therefore, in accordance with institutional policies, data for Asian people and Latin American people were combined for this figure. We refer to this combined group as 'Non-Black People of Colour'. ICES, Institute for Clinical Evaluative Sciences

Table 1 Sociodemographic characteristics of Ontario residents who died of opioid toxicity, by ethno-racial group, July 2017 to June 2021

Characteristics	Asian people	Black people	Latin American people	White people
Total number of individuals	275	238	53	5222
Age, years				
Median (IQR)	37 (29–46)*	35 (28–44)*	39 (31–47)*	40 (31–52)
0–24	28 (10.2%)	26 (10.9%)*	7 (13.2%)*	396 (7.6%)
25–44	177 (64.4%)*	153 (64.3%)*	29 (54.7%)	2742 (52.5%)
45+	70 (25.5%)*	59 (24.8%)*	17 (32.1%)*	2084 (39.9%)
Sex				
Female	38 (13.8%)*	47 (19.7%)*	9 (17.0%)*	1328 (25.4%)
Male	237 (86.2%)*	191 (80.3%)*	44 (83.0%)*	3894 (74.6%)
Income quintile of residence				
Q1 (lowest)	88 (32.0%)*	112 (47.1%)*	25 (47.2%)*	2044 (39.1%)
Q2	72 (26.2%)	53 (22.3%)	11 (20.8%)	1175 (22.5%)
Q3	60 (21.8%)*	45 (18.9%)	10 (18.9%)	802 (15.4%)
Q4	32 (11.6%)	13 (5.5%)*	1–5 (1.9%–9.4%)†	604 (11.6%)
Q5 (highest)	21 (7.6%)*	13 (5.5%)*	1–5 (1.9%–9.4%)†	522 (10.0%)
Missing	2 (0.7%)	2 (0.8%)	0 (0.0%)	75 (1.4%)
Living arrangement				
Private dwelling	226 (82.2%)*	165 (69.3%)	47 (88.7%)*	3781 (72.4%)
Other collective dwelling	6 (2.2%)*	12 (5.0%)*	1–5 (1.9%–9.4%)†	470 (9.0%)
Experiencing homelessness	26 (9.5%)*	47 (19.7%)*	1–5 (1.9%–9.4%)†	683 (13.1%)
Other	1–5 (0.4%–1.8%)†	1–5 (0.4%–2.1%)†	0 (0.0%)	79 (1.5%)
Unknown	12–16 (4.4%–5.8%)†	9–13 (3.8%–5.5%)†	0 (0.0%)	209 (4.0%)
Previously incarcerated	43 (15.6%)*	65 (27.3%)*	10 (18.9%)	1061 (20.3%)
Released from incarceration in last 4 weeks	19 (6.9%)	16 (6.7%)	1–5 (1.9%–9.4%)†	373 (7.1%)

*A standardised difference ≥0.10 when compared with white people.
†ICES prohibits the reporting of small cells (counts ≤5), as well as any related values (eg, percentages, rates) that would result in residual disclosure of a small cell. Therefore, in accordance with institutional policies, ranges have been provided in these cases.
ICES, Institute for Clinical Evaluative Sciences.

in low-income neighbourhoods. However, this was most pronounced among Latin American (SD: 0.17) and black (SD: 0.16) people, with nearly 50% of individuals in each group residing in neighbourhoods in the lowest quintile of income, compared with 39.1% of white people. Notably, Asian people were less likely than white people to reside in the lowest-income neighbourhoods (32.0% vs 39.1%; SD: 0.14) and more likely than white people to reside in middle-income areas (21.8% vs 15.4%; SD: 0.16). We observed similar patterns in the percentage of people experiencing homelessness, with a higher prevalence among black people compared with white people (19.7% vs 13.1%; SD: 0.18), and a lower prevalence among Asian people (9.5%; SD: 0.11). Relative to white people (20.3%), prior incarceration was more common among black people (27.3%; SD: 0.16) and less common among Asian people (15.6%; SD: 0.12). However, ethno-racial differences in the percentage of people released from incarceration in the month before death were minor.

Circumstances surrounding opioid toxicity deaths

Whether alone or in combination with pharmaceutical opioids, non-pharmaceutical opioids contributed to a larger proportion of deaths among black people compared with white people (92.4% vs 83.2%; SD:

0.28) (table 2). Accordingly, pharmaceutical opioids, including those indicated for pain and for opioid agonist treatment, were less frequently involved in the deaths of black people relative to white people (13.4% vs 30.0%; SD: 0.41). With regards to non-opioid substances involved in deaths, cocaine directly contributed to more than half of the deaths among black people (55.9%; SD: 0.37) and almost half among Asian people (45.1%; SD: 0.15), substantially higher than that among white people (37.6%). In contrast, non-pharmaceutical benzodiazepines were less frequently detected in opioid-involved deaths among black people compared with white people (14.7% vs 20.6%; SD: 0.15), but there was no difference in the prevalence between Asian people (20.0%; SD: 0.01) and white people.

Approximately half of all deaths across ethno-racial groups occurred at a private residence (Asian people: 58.2%; black people: 53.4%; white people: 56.9%) (table 2). However, black people less commonly died at home compared with white people (55.9% vs 70.6%; SD: 0.31). Moreover, black people (8.0%; SD: 0.14) and Asian people (7.6%; SD: 0.13) more frequently experienced the fatal toxicity incident outdoors compared with white people (4.6%). Additionally, although a similar proportion of deaths across all ethno-racial groups occurred while a bystander was present (Asian people: 17.5%; black people: 17.6%; white people: 18.4%), naloxone was less commonly administered to black (40.5%; SD: 0.18) and Asian (41.7%; SD: 0.16) people compared with white people (49.4%). Finally, although most people had missing information on the assumed mode of drug use, inhalation was more common among Asian people relative to white people (20.7% vs 13.3%; SD: 0.20).

Healthcare encounters preceding death

Compared with white people (27.6%), black people (22.7%; SD: 0.11) and Asian people (22.5%; SD: 0.12) less frequently accessed healthcare in the week prior to death, and these differences were even more pronounced in the month prior to death (black people: 45.0%, SD: 0.19; Asian people: 48.7%, SD: 0.12; white people: 54.5%) (figure 2). Specifically, black people were less likely than white people to visit outpatient care in the week (16.0% vs 21.7%; SD: 0.15) and month (31.9% vs 46.4%; SD: 0.30) before death, whereas Asian people were less likely than white people to have hospital-based interactions, including emergency department visits in the week (3.6% vs 6.5%; SD: 0.13) before death. Both Asian people and black people were less likely than white people to experience a hospital-treated opioid toxicity incident in the 6 months and 1 year prior to death (online supplemental table S2).

Across all groups, most people had a healthcare encounter for a mental health-related diagnosis in the 5 years preceding death, although this was less common among Asian people (80.0%; SD: 0.32) and black people (84.5%; SD: 0.20) compared with white people (91.1%) (table 3). Notably, while over two-thirds of white people (67.9%) had an indication of opioid use disorder in the 5 years before death, only half of black people (51.3%; SD: 0.34) and Asian people (47.6%; SD: 0.42) had the same indication. Furthermore, among those with opioid use disorder, there were pronounced ethno-racial disparities in the dispensing of opioid agonist treatment, with 27.9% of black people (SD: 0.73) and 51.1% of Asian people (SD: 0.22) having received treatment in the 5 years before death, compared with 61.9% of white people.

DISCUSSION

Between July 2017 and June 2021, the number of opioid toxicity deaths in Ontario increased across all ethno-racial groups. Although white people accounted for the highest proportion of deaths, this trend showed a slight decline over the study period, while the percentage of deaths affecting Non-Black People of Colour (Asian people and Latin American people) increased considerably and remained relatively stable among black people. Moreover, there were marked ethno-racial differences in patterns of opioid toxicity death by key demographic and clinical characteristics, as well as in the circumstances surrounding death, including the types of opioid and non-opioid substances involved, the incident location and the prevalence of naloxone use. Notably, we observed considerable ethno-racial disparities in healthcare access during the week and month prior to death, and in rates of diagnosis and treatment for opioid use disorder, particularly among black people. These findings have important implications for determining the best approaches to tailoring and providing access to prevention, treatment and harm reduction services that meet the needs of different ethno-racial groups.

Comparison with other studies

The number of opioid toxicity deaths among Non-Black People of Colour (Asian people and Latin American people) in Ontario more than doubled over the study period, and this population accounted for nearly 6% of deaths by the second quarter of 2021. Notably, a recent report from the Fraser Health region of British Columbia revealed a tripling in the number of drug toxicity deaths among South Asian people,[31] a group that accounted for almost 40% of Non-Black People of Colour in our study. Among black people, we observed a modest increase in the number of opioid toxicity deaths across the study period, and this group represented 4% of deaths by the second quarter of 2021. These findings differ slightly from recent data indicating that the most pronounced increases in overdose deaths in the USA have occurred among Black people.[22 23 32] Moreover, we discovered distinct ethno-racial differences in the characteristics of Ontarians who died of opioid toxicity. On average, Asian and black people died 3–5 years younger than white people, and there was greater male predominance in deaths among racialised people relative to white people. Similar findings were reported among South

Table 2 Circumstances surrounding death among Ontario residents who died of opioid toxicity, by ethno-racial group, July 2017 to June 2021

Circumstance	Asian people (n=275)	Black people (n=238)	White people (n=5222)
Sources of opioids directly contributing to death			
Pharmaceutical opioids only	40 (14.5%)	18 (7.6%)*	875 (16.8%)
Non-pharmaceutical opioids only	212 (77.1%)	207 (87.0%)*	3916 (75.0%)
Both pharmaceutical and non-pharmaceutical opioids	23 (8.4%)	13 (5.5%)*	431 (8.3%)
Types of opioids directly contributing to death†			
Pharmaceutical opioids	72 (26.2%)	32 (13.4%)*	1568 (30.0%)
Opioids indicated to treat pain	50 (18.2%)	25 (10.5%)*	1004 (19.2%)
Opioid agonist therapy	28 (10.2%)	9 (3.8%)*	649 (12.4%)
Non-pharmaceutical opioids	235 (85.5%)	220 (92.4%)*	4347 (83.2%)
Fentanyl and fentanyl analogues	227 (82.5%)	215 (90.3%)*	4315 (82.6%)
Heroin	14 (5.1%)	14 (5.9%)	220 (4.2%)
Other substances directly contributing to death†			
Benzodiazepines	34 (12.4%)	22 (9.2%)	538 (10.3%)
Non-pharmaceutical benzodiazepines	18 (6.5%)*	13 (5.5%)	207 (4.0%)
Stimulants	145 (52.7%)	158 (66.4%)*	2747 (52.6%)
Non-pharmaceutical stimulants	144 (52.4%)	158 (66.4%)*	2725 (52.2%)
Methamphetamines	40 (14.5%)*	47 (19.7%)	1203 (23.0%)
Cocaine	124 (45.1%)*	133 (55.9%)*	1964 (37.6%)
Alcohol (ethanol)	34 (12.4%)	33 (13.9%)	604 (11.6%)
Other substances detected in deaths†			
Benzodiazepines	110 (40.0%)*	67 (28.2%)*	2384 (45.7%)
Non-pharmaceutical benzodiazepines	55 (20.0%)	35 (14.7%)*	1074 (20.6%)
Stimulants	181 (65.8%)	202 (84.9%)*	3667 (70.2%)
Non-pharmaceutical stimulants	176 (64.0%)	200 (84.0%)*	3555 (68.1%)
Methamphetamines	50 (18.2%)*	72 (30.3%)	1612 (30.9%)
Cocaine	154 (56.0%)	169 (71.0%)*	2691 (51.5%)
Incident location			
Private residence	160 (58.2%)	127 (53.4%)	2973 (56.9%)
Outdoors	21 (7.6%)*	19 (8.0%)*	240 (4.6%)
Hotel/motel/inn	7 (2.5%)*	9 (3.8%)	231 (4.4%)
Rooming house	8 (2.9%)	14 (5.9%)	214 (4.1%)
Shelter/supportive living	7 (2.5%)	9 (3.8%)	131 (2.5%)
Public indoor space	9 (3.3%)*	7 (2.9%)	90 (1.7%)
Other	11 (4.0%)	9 (3.8%)	164 (3.1%)
Unknown	52 (18.9%)	44 (18.5%)	1179 (22.6%)
Incident took place at decedent's home	187 (68.0%)	133 (55.9%)*	3687 (70.6%)
Bystander present	48 (17.5%)	42 (17.6%)	961 (18.4%)

Continued

Table 2 Continued

Circumstance	Asian people (n=275)	Black people (n=238)	White people (n=5222)
Naloxone used during resuscitation (*among those for whom a bystander was present*)	20 (41.7%)*	17 (40.5%)*	475 (49.4%)
Mode of drug use			
Inhalation only	57 (20.7%)*	33 (13.9%)	697 (13.3%)
Injection only	13 (4.7%)	9 (3.8%)*	313 (6.0%)
Inhalation and injection	1–5 (0.4%–1.8%)‡	1–5 (0.4%–2.1%)‡	85 (1.6%)
Other	14 (5.1%)*	18 (7.6%)	516 (9.9%)
Unknown	186–190 (67.6%–69.1%)‡	173–177 (72.7%–74.4%)‡	3610 (69.1%)

Data for Latin American people (n=53) were excluded from this table in accordance with ICES' privacy policy prohibiting the reporting of small cells (counts ≤5) and any related percentages or rates that would result in residual disclosure of small cells.
*Indicates a standardised difference ≥0.10 when compared with white people.
†Categories are not mutually exclusive. Some deaths were due to multidrug toxicity, in which more than one substance contributes to an individual's death.
‡ICES prohibits the reporting of small cells (counts ≤5), as well as any related values (eg, percentages, rates) that would result in residual disclosure of a small cell. Therefore, in accordance with institutional policies, ranges have been provided in these cases.
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Asian people who died of drug toxicity in the Fraser Health region,[31] and among black and Hispanic people who died of opioid toxicity in Kentucky.[24] Furthermore, we observed that black and Latin American people were more likely than white people to reside in the lowest income neighbourhoods, while Asian people were more likely than white people to live in middle-income neighbourhoods. These findings illustrate that the context and risk factors for substance use and overdose are population-specific and region-specific, and emphasise the intersectional nature of the drug toxicity crisis. To effectively address the crisis, discourse and research must move beyond the historical focus on white people as the sole or primary group impacted, and root causes, such as economic and material disadvantage, substandard living and working conditions, poverty, and adverse childhood experiences,[33] must be tackled across society.

Relative to white people, fatal toxicity incidents among black people in Ontario were more likely to arise from opioids with a non-pharmaceutical source, and deaths among both black and Asian people were substantially more likely to involve cocaine. Notably, the USA has seen a recent rise in mortality due to combined opioid and cocaine toxicity, and these increases have disproportionately affected black, Hispanic and Asian Americans.[34 35] Ethno-racial differences in cocaine involvement in opioid toxicity deaths may only be partially explained by variations in the prevalence of cocaine use across groups, as a US study found that although the percentage of people reporting past-year cocaine use was similar across ethno-racial groups, the rate of cocaine overdose death among black people was more than double that of white people.[36] Future work must investigate whether other factors, such as the frequency of cocaine use, route of administration or type of cocaine used, can, at least in part, explain the differences we observed in cocaine involvement in deaths across groups. Additionally, qualitative research is needed to uncover the drivers of combined opioid and cocaine use among racialised people, and the degree to which combined use is intentional versus inadvertent. Furthermore, given the high involvement of non-pharmaceutical opioids and non-opioid substances in opioid toxicity deaths among racialised people, there is an urgent need for research to understand patterns of drug access and use across ethno-racial groups, and for governments to fund equitable and low-barrier access to drug checking services, safe spaces to use drugs and a safe supply of drugs. In addition, these results highlight the need for overdose prevention and harm reduction measures that are targeted to all people who use drugs, not just those who primarily use opioids.

Black and Asian people in our study were less frequently administered naloxone, even though the likelihood of a bystander being present was similar across ethno-racial groups. This finding may be partially explained by the patterns we observed in cocaine involvement in deaths, as stimulant use may mask symptoms of opioid overdose. Further, people who intend to primarily use stimulants may not expect or recognise symptoms of opioid toxicity, which may reduce the likelihood of these individuals or bystanders carrying or administering naloxone.[35] Another barrier may stem from stigma and a resultant lack of communication around substance use in racialised communities. For instance, the analysis of drug toxicity deaths among South Asian people in British Columbia revealed that decedents' loved ones were often unaware that they used unregulated substances. Consequently, naloxone kits were rarely available in the home, and families seldom recognised the overdose or understood how to respond.[31] Furthermore, racialised people face many barriers accessing harm reduction services, such as the persistence of culturally embedded notions of stigma

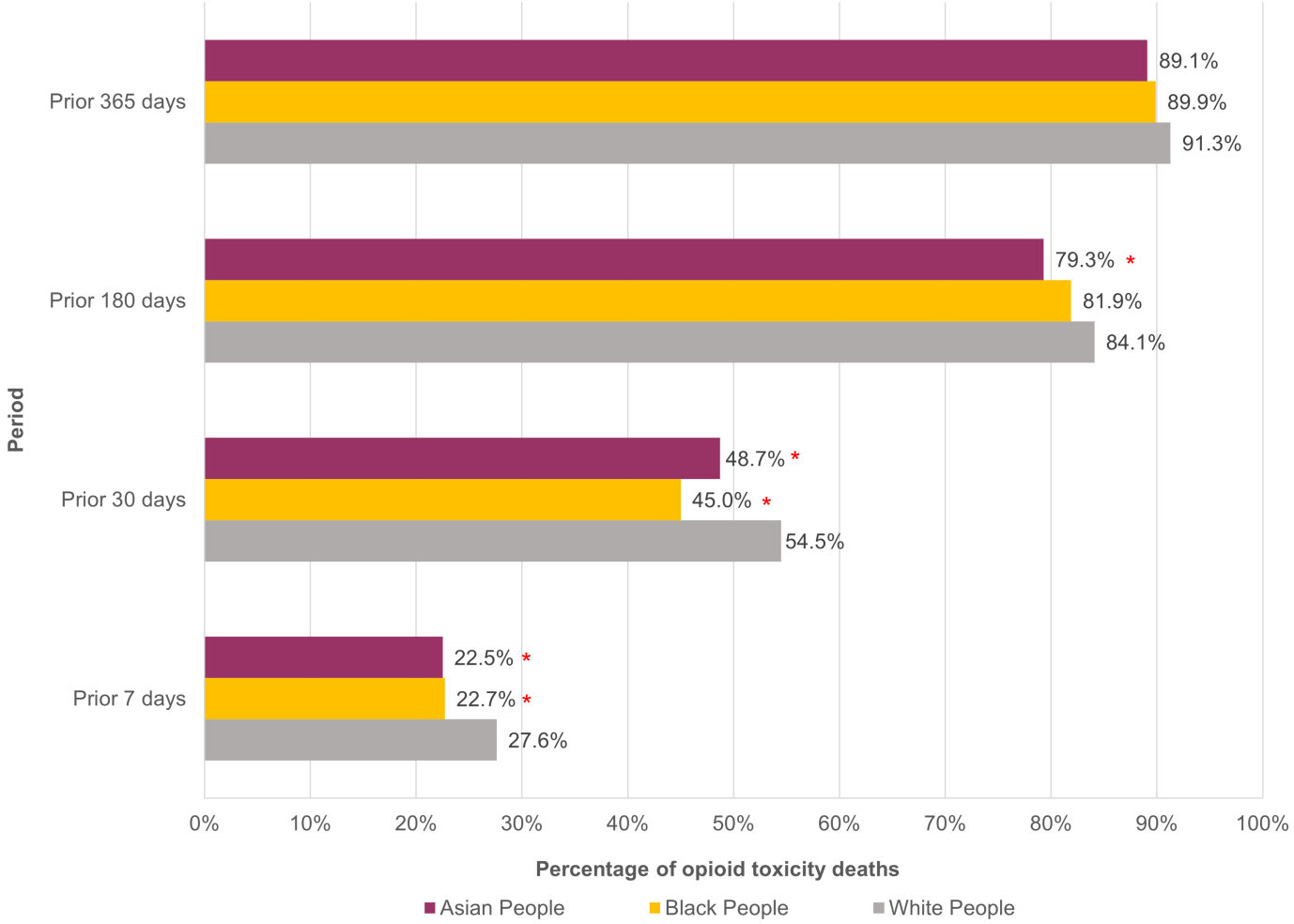

Figure 2 Prevalence of healthcare utilisation prior to death among Ontario residents who died of opioid toxicity, by ethno-racial group, July 2017 to June 2021. Note: data for Latin American people (n=53) were excluded from this figure in accordance with ICES' privacy policy prohibiting the reporting of small cells (counts ≤5) and any related percentages or rates that would result in residual disclosure of small cells. *Indicates a standardised difference ≥0.10 when compared with white people. ICES, Institute for Clinical Evaluative Sciences.

and shame surrounding substance use, addiction and harm reduction; lack of diversity among service users and providers; displays of overt racism within services; limited outreach of, and lack of representation in, promotional campaigns for services; and regular police presence near services.[37 38] Resultantly, racialised people who use drugs are less likely than white people to have received or used naloxone or to have received overdose prevention training.[39 40] These findings support the need for allocation of specific funding for harm reduction facilities in racialised communities that are accessible, culturally appropriate and are led or staffed by, tailored for, and targeted to members of those communities.

Over two-thirds of white decedents in our study had a history of opioid use disorder, compared with approximately half of those who were black or Asian. These findings may suggest that a substantial proportion of opioid toxicity deaths among racialised people affect those using opioids intermittently, or they could reflect an underdiagnosis of opioid use disorder among racialised people. Notably, less than two-thirds of white people with opioid use disorder received opioid agonist treatment in the 5 years before death, and this treatment gap was even larger for Asian people and black people, among whom approximately half and one-quarter of individuals, respectively, had received treatment. Therefore, our findings are likely also suggestive of substantial ethno-racial disparities in access to healthcare more generally, and in the diagnosis and treatment of opioid use disorder specifically. In particular, the differences we observed in healthcare utilisation were primarily driven by lower rates of outpatient care among black people, fewer hospital-based interactions among Asian people, and lower rates of prior hospital-treated opioid toxicity incidents among both black and Asian people. These findings likely reflect patterns of healthcare use among these groups more generally, and as such, prevention and harm reduction initiatives must take this into account in the planning of outreach and support strategies for racialised people. Moreover, our data build on US studies that have demonstrated significant disparities in rates of treatment for opioid use disorder by race and ethnicity, with white

Table 3 Clinical characteristics among Ontario residents who died of opioid toxicity, by ethno-racial group, July 2017 to June 2021

Characteristics	Asian people (n=275)	Black people (n=238)	White people (n=5222)
History of a healthcare encounter for a mental health-related diagnosis (prior 5 years)	220 (80.0%)*	201 (84.5%)*	4757 (91.1%)
Emergency department visit or hospitalisation	129 (46.9%)*	127 (53.4%)	2804 (53.7%)
Community health centre visit	15 (5.5%)*	16 (6.7%)*	543 (10.4%)
Another outpatient visit	212 (77.1%)*	189 (79.4%)*	4633 (88.7%)
Indication of opioid use disorder (prior 5 years)	131 (47.6%)*	122 (51.3%)*	3544 (67.9%)
Dispensed opioid agonist treatment prior to death†			
Prior 30 days	29 (22.1%)	6 (4.9%)*	768 (21.7%)
Prior 180 days	41 (31.3%)	11 (9.0%)*	1260 (35.6%)
Prior 5 years	67 (51.1%)*	34 (27.9%)*	2194 (61.9%)

Data for Latin American people (n=53) were excluded from this table in accordance with ICES' privacy policy prohibiting the reporting of small cells (counts ≤5) and any related percentages or rates that would result in residual disclosure of small cells.
*A standardised difference ≥0.10 when compared with white people.
†Measured among people with an indication of opioid use disorder within the 5 years prior to death.
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people being more likely to be treated.[41–43] These disparities are likely multifactorial, and drivers may include a lack of confidence in the medical system and treatment process arising from higher rates of incarceration and societal marginalisation faced by racialised people who use drugs; cultural and language barriers; and limited ethno-racial diversity in the medical system and in promotional materials for treatment.[18 44 45] In addition, US studies have shown that racialised neighbourhoods have less treatment facilities and fewer options for treatment,[46–48] and there are well-documented disparities in the prescribing of opioids by race and ethnicity.[11 49] These systemic factors, along with fears of stigma, rejection, discrimination and social judgement are likely responsible for the differences we observed in healthcare use more generally and in opioid use disorder diagnosis and treatment more specifically across groups. Our results emphasise the need for a multipronged response to the drug toxicity crisis that incorporates input from racialised communities and includes strategies such as decriminalisation, building diversity in the healthcare and harm reduction workforce, enhancing access to treatment and harm reduction facilities, and community-led initiatives to reduce stigma around substance use and boost education on naloxone.

Strengths and limitations

This study has several strengths, including its use of medical coroner's data to identify all opioid toxicity deaths in Ontario, and the use of linked administrative data to allow for a comprehensive investigation of the characteristics and circumstances surrounding death. Furthermore, the study was conducted in a multicultural setting, which enhances its generalisability to culturally similar regions with diverse populations. However, several limitations warrant discussion. First, misclassification and under-reporting of ethno-racial identity is possible because this information was missing for approximately 13% of the cohort and relied on details gathered by the coroner during the death investigation. Moreover, socially ascribed ethno-racial classifications may not reflect culturally embedded notions and patterns of substance use and treatment as accurately as classifications based on self-identified race. Although our use of coroner's records precluded the measurement of self-identified race, the coroner's process of determining ethno-racial identity involved talking to the deceased's family, friends and acquaintances, and as such, our measure of ethno-racial identity likely aligns closely with self-identified race/ethnicity. Second, because of the small number of Latin American people in our study, we had to aggregate data across diverse cultural backgrounds for some analyses, which may have masked some variation in the patterns and circumstances of death. Relatedly, there are also distinct cultural differences across ethnic groups within a given race; however, the approach taken in our analyses prevented us from highlighting any heterogeneity in findings within the groups of Asian, black and Latin American people. Furthermore, we were unable to include Indigenous people in our analyses, who have faced disproportionately high rates of drug toxicity death, and yet have not been prioritised in the response to the crisis.[50] Future studies should use ethno-racial identities that are more reflective of modern Canadian society. Third, we did not have access to population data

by ethno-racial group, and therefore we were unable to estimate rates of opioid-involved death by ethno-racial group. Moreover, we did not have access to data on the sexual identities of people in our cohort, and therefore we cannot comment on circumstances surrounding opioid toxicity deaths among people with intersecting marginalised identities. Finally, we relied on prior healthcare encounters related to opioid use disorder and claims for opioid agonist treatment to identify people with an indication of diagnosed opioid use disorder. However, not everyone with opioid use disorder will seek diagnosis and treatment, and there may be variations in the recording of this diagnosis, both of which may particularly impact racialised people. Therefore, it is likely that we have not identified all people with opioid use disorder, and the data we present may be underestimated.

Conclusions and policy implications

In Ontario, circumstances surrounding opioid toxicity deaths differ substantially by ethno-racial group, with deaths among racialised people predominantly affecting younger males with a lower prevalence of opioid use disorder. Furthermore, relative to white people, deaths among racialised people in Ontario are more likely to arise from the use of non-pharmaceutical opioids such as fentanyl and its analogues, commonly involve cocaine, and less frequently involve attempts to administer naloxone. Notably, black and Asian people with opioid use disorder are considerably less likely to receive opioid agonist treatment compared with white people. To reduce drug toxicity deaths, there is a need for integration of black, brown and Indigenous people into the discourse surrounding the opioid overdose crisis, including the development of culturally informed policies and programmes that address the social drivers and impacts of the crisis, and are led by, tailored for and targeted to racialised people.

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Patient and public involvement Patients and/or the public were involved in the design, or conduct, or reporting or dissemination plans of this research. Refer to the Methods section for further details.

Patient consent for publication Not applicable.

Ethics approval The use of the data in this project is authorised under section 45 of Ontario's Personal Health Information Protection Act (PHIPA) and does not require review by a Research Ethics Board. ICES is a prescribed entity under PHIPA, and section 45 authorises ICES to collect and analyse personal health information, without consent, for health system evaluation, monitoring and improvement. The use of the data in this project has also been approved by ICES' Privacy and Legal Office.

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Data availability statement Data may be obtained from a third party and are not publicly available. The dataset from this study is held securely in coded form at ICES. Although legal data sharing agreements between ICES and data providers (eg, healthcare organisations and government) prohibit ICES from making the dataset publicly available, access may be granted to those who meet prespecified criteria for confidential access, available at www.ices.on.ca/DAS (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.

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