

Rapid review of the impacts of "Big Events" on people who use drugs and delivery of harm reduction and drug treatment services: Implications for strengthening systems in response to COVID-19.

Preliminary findings update

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Background

In December 2019, a pneumonia outbreak in China led to the isolation of the novel coronavirus severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2).¹ This novel coronavirus is associated with a broad spectrum of clinical symptoms, designated by the World Health Organization (WHO) as coronavirus disease 2019 (COVID-19). COVID-19 was declared a global pandemic by WHO in March 2020.² In Canada, the public health response has included the declaration of provincial health emergencies; SARS-CoV-2 case-finding and testing; closures of schools and non-essential businesses; bans on social gatherings; restructuring of health and social services to minimize physical interactions; and promotion of “physical distancing” between people outside of the home.

The potential for COVID-19 to disproportionately affect marginalized population groups such as people who use drugs was rapidly recognized, both in terms of increased risk of SARS-CoV-2 exposure, and in the broader case of unmet needs due to changes in the capacity of health and social services to carry out their usual functions. Many people who use drugs, particularly those with substance use disorders and/or mental illness, have limited incomes and rely on low-threshold services to meet essential needs including food, shelter, and medicines. Regular access to harm reduction services (e.g. needle and syringes programs) is critical to minimize the risk of drug-related harms such as overdose and blood-borne viral infections. However, many of these services have closed or introduced restrictions to accommodate physical distancing requirements.³⁻⁵ Women who use drugs may be particularly affected by service closures given gender-related barriers to accessing services and exposure to gendered violence.^{6,7}

In addition to difficulties accessing services, the closure of national borders to limit the spread of the infection has significant implications for people who use drugs. Border closures have interrupted global illicit drug supply chains, with uncertain effects for drug availability, prices, and purity.^{8,9}

The impacts of these changes are still emerging, but pathways to increased risk can be hypothesized. Changes to drug supply chains may increase overdose risk and drug market violence, while limited access to harm reduction services may lead to riskier drug use behaviors

associated with HIV and hepatitis C virus (HCV) infection. Reductions in drug availability may be associated with increased treatment seeking,^{10,11} but treatment initiation may be difficult given service disruptions.

Using a “Big Events” lens to assess possible impacts of the COVID-19 pandemic on people who use drugs

The term “Big Events” is used to refer to environmental, economic, and other major disruptions that create social instability and increase vulnerability to drug-related harms through profound changes to drug use risk environments.¹² Big Events can include natural disasters, political transitions, and economic recessions, and the literature has largely focused on the outcome of HIV incidence in people who inject drugs. Under the Big Events model, an increase in HIV incidence may be rapidly evident due to direct impacts of an Event on the capacity of people who inject drugs to prevent infection (e.g. through closure of needle and syringe programs). Alternatively, the Big Event in question may cause social changes that have downstream impact on HIV that are not seen for several years (e.g. through loss of income, increased competition for social welfare resources, and/or disruption of community norms that lead to greater initiation of injecting drug use). In others still, there may be no noticeable impact of a given Event on HIV in people who inject drugs. The factors that lead to these differing outcomes are unclear. Although HIV has been the focus of much of the Big Events literature, other drug-related outcomes such as overdose and shifts in use patterns can also be explored using this lens.¹²

Studies of previous Big Events can provide insight into possible short- and medium-term effects on people who use drugs and the operation of harm reduction and drug treatment services. This literature therefore constitutes an important evidence base for informing responses to the COVID-19 pandemic, as well as preparing for future Big Events. We aimed to review original research studies of Big Events with relevance to the COVID-19 pandemic to assess the impacts on:

- 1) risk behaviors and drug-related harms among people who use drugs, and
- 2) the delivery of harm reduction and drug treatment services.

Methods

This review is registered with PROSPERO (registration no. CRD42020185079), and the protocol is published at <https://osf.io/a8qtd/>. The design of the review was informed by the Selecting Approaches for Rapid Reviews (STARR) tool¹³ and a consideration of evidence synthesis approaches used in mixed methods syntheses.¹⁴

Population

Included studies focused on people using illicit drugs (other than cannabis). Studies of people using cannabis, tobacco and/or alcohol without illicit drugs, or in which outcomes specific to illicit drug use could not be ascertained, were excluded.

Included Big Events

To support rapid completion, the review was limited to categories of Big Events of particular relevance to the COVID-19 pandemic. These were:

- Recent respiratory infection pandemics (e.g. SARS, MERS, H1N1). Although these were limited in geographic spread and impact on health and social services relative to COVID-19, they may hold lessons for risk behaviors and service delivery in a pandemic context.
- Natural disasters (e.g. Hurricane Katrina). Research in the wake of severe weather events has examined the impact of these disruptions on risk behaviors and service provider responses.
- Economic crises (e.g. Global Financial Crisis). COVID-19 is a health and an economic crisis, with the latter having implications for drug use initiation and longer-term response planning.

Additionally, we included studies relating to the Australian heroin shortage of 2001. This was a sharp, time-limited drug market shock (as opposed to a shift in drug availability that might occur more slowly and represent a “new normal”) with well-documented consequences for drug-related risk, harms, and service delivery. Drug market shocks have not previously been conceptualized as Big Events, although they have been studied as outcomes of other Big Events (e.g. in the aftermath of Hurricane Katrina). Unlike other Big Events, the effects of a drug

market shock are largely confined to people who use drugs. Despite not meeting the usual definition of a Big Event, given the well-documented consequences of the shortage for drug markets, drug use, and related behaviors, and emerging reports of drug market disruption due to COVID-19, we considered the heroin shortage literature to have potentially important implications for COVID-19 responses. During study screening, we decided to also include studies reporting on other heroin shortages if they provided information on our outcomes of interest.

Outcomes

Preliminary searches demonstrated that a broad range of outcomes with implications for COVID-19 responses have been examined in the Big Events literature. We defined two categories of outcomes of interest: 1) changes in drug-related risks and harms following Big Events (indicative examples of outcomes in this category: ER visits, overdoses, drug market violence, initiation of injecting among people who use drugs, increased frequency or amount of drug use by individuals) and 2) challenges and responses in harm reduction and drug treatment service delivery following a Big Event (indicative examples of outcomes in this category: changes in treatment demand or utilization; resource shortages; service adaptations; changes to clinical guidance). We extracted data for any outcome that fit within these two categories. Outcomes could be assessed cross-sectionally following a Big Event, or longitudinally with pre- and post-Event data collection.

Search strategy

The search strategy was designed to facilitate rapid completion while ensuring a high level of retrieval of relevant studies. Search strings were developed with reference to those used in previous reviews on epidemiology of drug-related harms by team members, and by comparing results to previous ad hoc searches of the Big Events literature to ensure capture of known studies. Search terms are provided in the Appendix. Searches were limited to the PubMed database as test searches found that additional databases (Embase, PsycInfo) did not identify new studies. Two other restrictions were pre-specified due to time and resource constraints: studies must have been published in English or French, and in the peer-reviewed literature (i.e. no grey literature searches).

Inclusion criteria

Preliminary searches suggest that an inclusive approach was needed to adequately capture data. As such, we included quantitative, qualitative, and mixed methods studies of any design that focused on the outcomes of a Big Event as defined above, and included data on at least one of the outcome categories listed above.

Study selection

Screening and study selection were completed using Covidence,¹⁵ a web-based tool that provides a clear audit trail of inclusion and exclusion decisions. Titles and abstracts of identified publications were screened independently by two reviewers, with disagreements over inclusion and exclusion resolved through team discussion. Second-stage full-text review was also carried out independently by two reviewers, with disagreements again resolved through team discussion. Reference lists of included studies were checked for additional studies for inclusion.

Quality assessment of included studies

To facilitate rapid completion of the initial phases of the review, study quality assessment has not yet been completed. Quality assessment will be completed for the final report using the Mixed Methods Appraisal Tool, which allows for assessment of quantitative, qualitative and mixed methods studies.¹⁶

Data extraction and synthesis

Data were extracted into a spreadsheet recording study bibliographic details, Big Event details, and findings relating to our outcomes of interest. To maximize efficiency, data for each study were extracted once, then reviewed by another team member to verify accuracy.

Given the mixed methods nature of this review, we used a narrative synthesis approach. Reviews using narrative synthesis have been critiqued as lacking in transparency.¹⁷ To maximize transparency of analysis, we followed Popay et al.'s guidance for completing a narrative synthesis, involving four steps: 1) development of a theoretical model of how or why an intervention works (or in this case, how a Big Event impacts our outcomes of interest); 2) preparation of a preliminary synthesis that organizes and describes patterns in the data; 3)

exploration of relationships in the data; and 4) assessment of robustness of the synthesis.¹⁸ In the development of a theoretical model in this preliminary analysis, we were guided by the model presented by Friedman et al.¹² We created risk pathway maps to represent visually the antecedents and outcomes identified in the literature for each of the Big Event types. A map specific to COVID-19 will be developed as part of the final analysis.

Findings included in this report

This preliminary report contains the results a preliminary synthesis that organizes and describes patterns in the data. We provide a preliminary synthesis that notes the characteristics of included studies, the Big Events and outcomes of interest, and clusters study findings by outcome type. We also include the risk pathway maps for each Big Event type.

The final report will incorporate input from knowledge users (people who use drugs; frontline workers; and policy-makers). This will provide an opportunity to focus the synthesis towards areas and outcomes identified by knowledge users as being most important.

Preliminary results

Overview of included studies

The search identified 116 publications for screening: 115 from the PubMed search, and an additional publication through hand searching of reference lists. After screening and full-text review, 33 publications were included (Figure 1). Although keywords relating to previous respiratory infection pandemics were included in our search, no literature was identified reporting on these in relation to people who use drugs. Of the three remaining categories of Big Events, the largest number of papers related to heroin shortages ($n = 17$) (Figure 2). One of these, from Hungary, reported on the aftermath of a heroin shortage that coincided with economic recession and austerity measures. There were 12 papers reporting on natural disasters, and a further 4 reporting on the aftermath of economic crises.

Figure 1: Study flow diagram

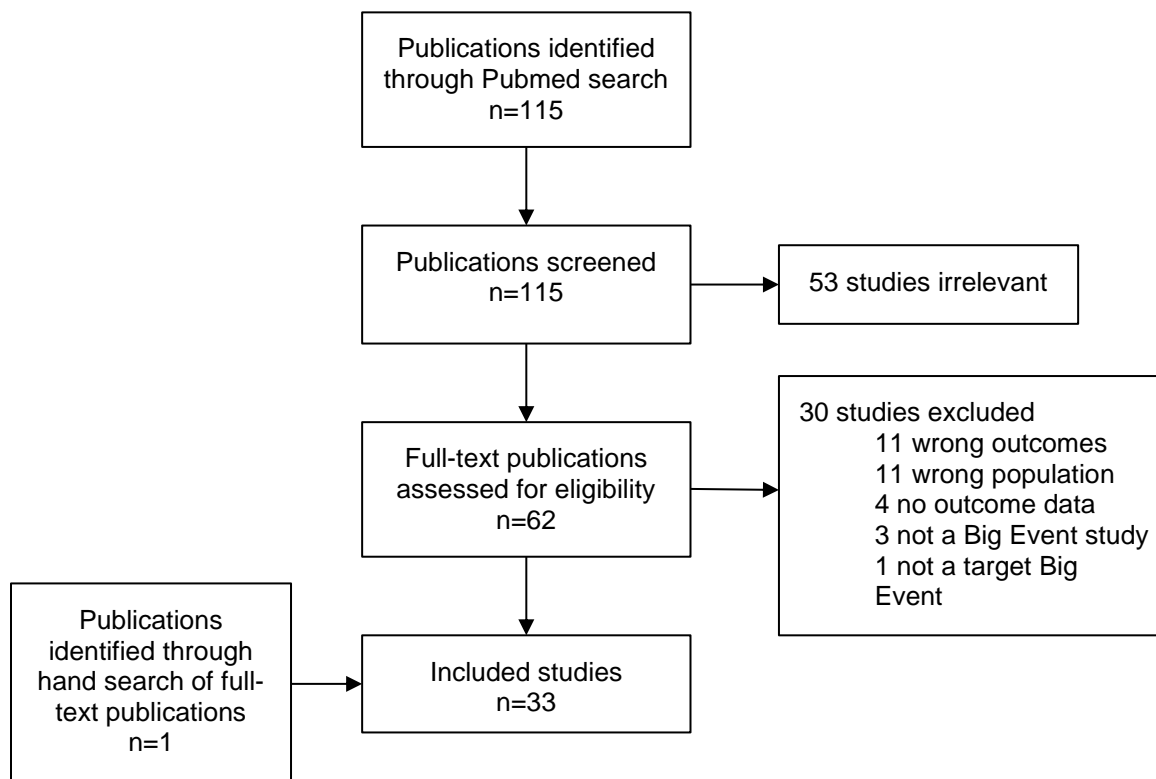
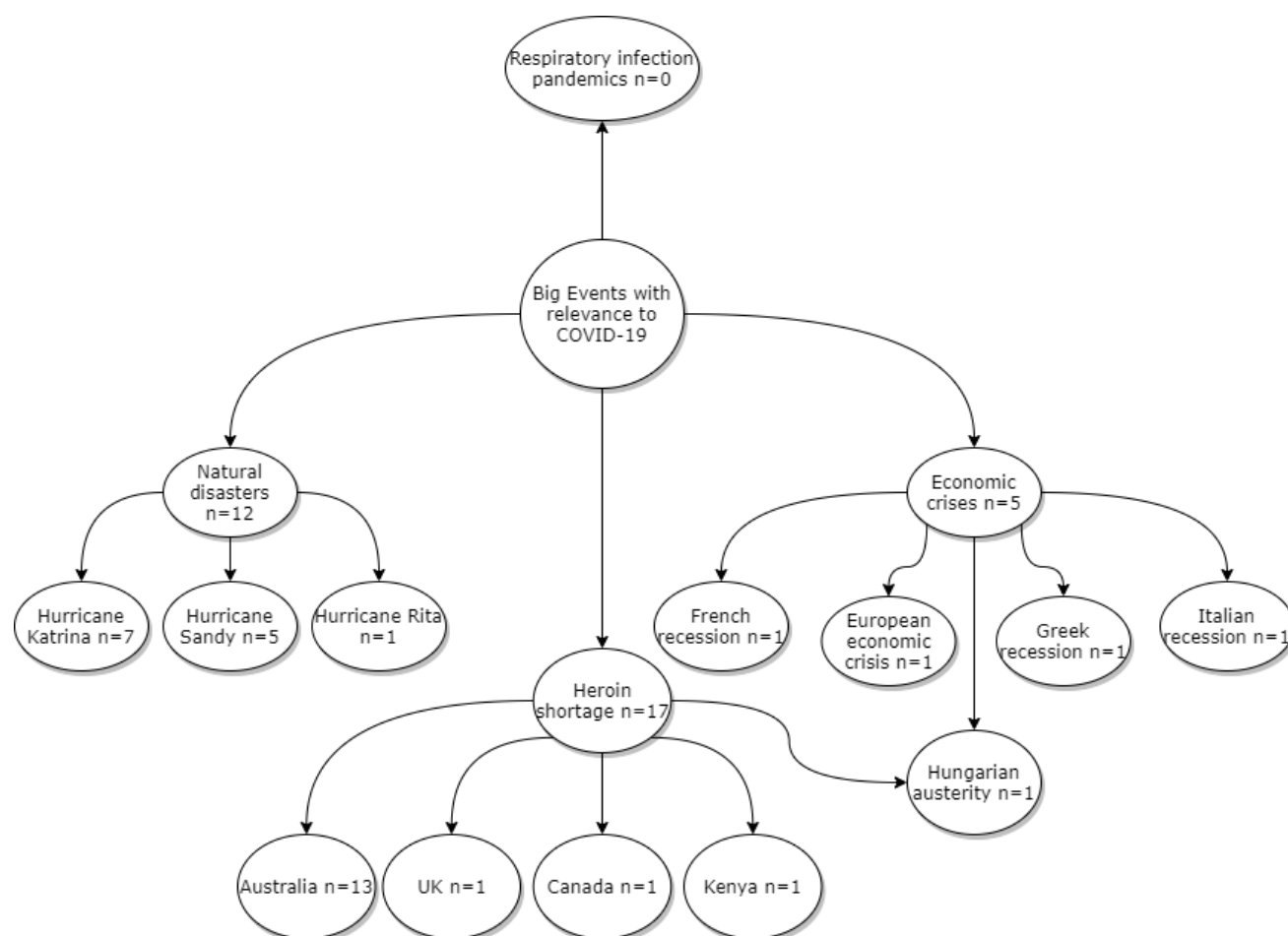


Figure 2: Big Events in included studies



Risk behaviors and drug-related harms among people who use drugs

There were 26 publications providing information on drug-related harms and risk behaviors in the aftermath of a Big Event. Characteristics of included publications are shown in Table 1 (p. 24). Findings from these studies could be grouped into two related themes: disruption of drug markets, and changes in drug-related harms.

Big Events and drug market disruption

Drug market disruptions were reported in the context of natural disasters and (by definition) heroin shortages. Hurricane Katrina disrupted highly organized, highly visible drug selling networks. In the weeks that followed, a more “freelance” approach to drug selling emerged,¹⁹ with significant consequences (discussed below). During the 2001 Australian heroin shortage,

the abrupt restriction in heroin supply led to a rapid decline in availability and purity, while the price of heroin and time needed to acquire it increased.²⁰⁻²² Increases in heroin price were also reported during heroin shortages in the UK and Kenya.^{23,24} The outcomes of these disruptions are discussed below.

Drug market violence. A breakdown of social and community networks around drug markets may increase the likelihood of violence during drug transactions, as the accepted modes of distribution and acquisition are suddenly challenged. This was observed in New Orleans following Hurricane Katrina. In the immediate aftermath of the storm, participants in one study reported chaotic attempts to find and buy drugs and described witnessing people perceived as “weak”, particularly women, having their drugs stolen.²⁵ In the weeks that followed, new actors entered the previously organized, hierarchical drug market and a “freelance” style of drug selling developed, engendering violence and “turf wars” as drug sellers vied for clients.¹⁹ Even as the market stabilized, territorial disputes and deaths related to drug market participation remained commonplace.²⁵

Changes in drugs used. Studies reported on changes in the kinds of drugs used and routes of administration following disruption of drug markets due to Big Events. During the Australian heroin shortage, many people who inject drugs reported using heroin less often and increasing their use of cocaine, benzodiazepines, and cannabis.²¹ Changes in drug possession charges during this time support this finding; heroin possession offences decreased by 45% during the five months following the shortage, while cocaine possession charges increased.²⁶ Similarly, transitions to poly-drug use were common during a heroin shortage in the United Kingdom, with cocaine and alcohol being the most commonly used substances in addition to heroin.²³ Thus, a reduction in the supply of one drug may serve to increase the use of others.²⁷

There may be long-term shifts in the kinds of drugs that are commonly used in a particular geographic area following a Big Event, including in areas not directly affected by the Event. After Hurricane Katrina, many New Orleanians relocated to Houston; by 2007, drug usage in Houston represented an integration of typical “Houstonian” and “New Orleanian” drug preferences, especially among younger users.²⁸ As people returned to New Orleans in the years

that followed the hurricane, they brought new drug tastes, use patterns, and connections with them.²⁵

Drug use initiation and transitions. Reports of drug use initiation and transition from non-injecting to injecting drug use were identified across the different Big Event types. Day laborers that immigrated to New Orleans to help rebuild after Hurricane Katrina reported initiating crack cocaine use due in part to its easy accessibility and high availability, with some escalating to regular use in an effort to cope with feelings of isolation and marginalization.²⁹ This was a group that was not directly affected by the Big Event in question, but their own vulnerability combined with the availability of drugs in the post-disaster context led to substantial drug use.

Transitions to or away from injecting drug use were reported largely in the context of heroin shortages. People who use heroin in Kenya reported switching from smoking to injecting during a shortage in order to compensate for reduced the quality and quantity available.²⁴ During the UK heroin shortage, however, some people who use heroin reported switching to smoking rather than injecting as a protective strategy for their veins when heroin quality appeared to be low or when they could not access sterile equipment.²³ In the Australian context, reduced availability of heroin was linked to reduced initiation of heroin injection;³⁰ however, there was no evidence of changes in overall injecting initiation, and some evidence that people who initiated injecting in this period did so using more readily available methamphetamine.³¹ In Hungary, where a dramatic reduction in heroin availability coincided with a period of economic austerity following the Global Financial Crisis, people who inject drugs switched to injection of new psychoactive substances.³² These studies highlight again that people who use drugs will not necessarily cease drug use if their usual or preferred drugs are not available, but instead will switch to more readily available substances.

Big Events and drug-related harms

Drug use behavior shifts in the wake of Big Events; as Big Events disrupt the functioning of drug markets, people who use drugs must respond rapidly to accommodate these changes, as well as adapting to shifting financial, social, and physical environments.

Frequency of use. People who used illicit drugs in Europe during the 2008 financial crisis reported that increases in free time as well as financial, social, and relational stress contributed to increased drug use.³³ Similarly, low-income New Orleanian evacuees of Hurricane Katrina reported a moderate increase in illicit drug use.³⁴ Some researchers have speculated that in the case of Hurricane Katrina evacuees, increased drug use may represent a coping mechanism to deal with traumatic experiences.³⁵

Risk behaviours. People who inject drugs in New York City reported sharing and re-using equipment, as well as injecting with people they would not normally inject with, due to difficulties accessing sterile syringes and displacement from their usual injecting locations following Hurricane Sandy.³⁶ While Big Events may be acute, the changes in drug use patterns they engender may have long-lasting implications. People that initiated injecting during the Australian heroin shortage were more likely than those with a longer injecting history to maintain poly-drug and syringe-sharing behaviours after the shortage ended.³¹ Similarly, people who use heroin in Kenya reported riskier injection practices and equipment sharing during a heroin shortage; equipment sharing continued after the shortage ended.²⁴

Injection-related harms. The Australian heroin shortage seemed to produce a sustained decline in injecting drug use overall, as evidenced by a decline in needle and syringe distribution³⁷ and no evidence of an increase in injection-related harm at the community level.³⁸ During the heroin shortages in both Australia and the UK, however, people reported increased stimulant injection. People who inject stimulants often do so at a higher frequency relative to opioid injecting, which presents its own risk factors, including venous damage and soft tissue infection.^{23,32}

During the 2001 Australian heroin shortage, there was no immediate change in overall HCV notifications; however, a delayed decrease in HCV notifications may be related to reduced injecting drug use following the shortage.³⁸ In contrast, the 2008 financial crisis in Greece was associated with increased anti-HCV prevalence among people who inject drugs, including new drug injectors, and a dramatic increase in HIV prevalence.³⁹ As noted, riskier injection practices

may holdover after an acute crisis ends; in Kenya, for example, people who use heroin continued to share equipment after the heroin shortage ended.²⁴

In addition to increasing infection risk, Big Events can also affect access to antiviral treatment. In the week following Hurricane Sandy, 43% of HIV-positive interviewees who inject drugs missed HIV medication doses.³⁶

Overdose and mortality rates. During the Australian heroin shortage, both fatal and non-fatal heroin overdoses decreased at the population level, with no recorded increases in overdoses or deaths related to cocaine, methamphetamine, or benzodiazepines.^{22,37} Heroin-related ambulance call-outs also declined.⁴⁰ Drug market changes affected younger people who use drugs the most: heroin-related deaths decreased for 15-24 year olds by 65%, while there was no change in drug-related deaths for other age groups.³⁷ A decline in overdose mortality rates was also observed in western Canada during the Australian heroin shortage, suggesting a wider scope for this Big Event than previously considered.⁴¹ Similarly, mortality risk due to drug-related causes in Italy decreased during the 2008 economic recession, possibly due to reduced purchasing power among people who use drugs.⁴²

Drug-related offending. The Australian heroin shortage was associated with a short-lived increase in burglary and robbery offences, assumed to be linked to the need to generate additional income to support drug purchases.^{21,22,43}

Delivery of harm reduction and drug treatment services

There were twelve publications providing information on the delivery of harm reduction and drug treatment services in the aftermath of a Big Event. Characteristics of included publications are shown in Table 2 (p. 29). Findings were grouped into two themes: the adaptations undertaken by services and clients to prevent or respond to adverse effects of Big Events, and the resources required for services to respond adequately.

Service and client adaptations to prevent or respond to adverse effects of Big Events

Of papers reporting on the operations of services following Big Events, all but one referred to opioid agonist therapy (OAT); the remaining paper described a residential treatment service.³⁵

The impacts of Big Events on service delivery were different between those events that cause widespread disruptions, and those that represent a shock only to the illicit drug market.

Changes in treatment demand. During the Australian heroin shortage, demand for OAT somewhat increased, with a decrease in treatment drop-outs and increases in re-enrolment.^{40,44} In contrast, New Orleanian evacuees following Hurricane Katrina were much more likely to drop out of drug treatment than their non-disaster counterparts.⁴⁵ Disasters like Katrina, in which disruption and displacement occurs across all aspects of life, may be more traumatic than disruptions in drug supply alone, possibly engendering greater physical and psychological impairment and necessitating more intensive responses to retain people in treatment.³⁵ Additionally, drug markets tend to be re-established quite quickly following an acute disaster like a hurricane,^{25,46} obviating the need to seek OAT. This contrasts sharply with the prolonged absence of heroin in the Australian drug market in 2001. In the UK, a heroin shortage produced an increase in methadone usage outside of treatment settings, but not an increase in enrolment in methadone treatment.²³ Similarly, a heroin shortage in Kenya, where drug use is highly stigmatized and treatment is limited, produced accounts of riskier behaviors and withdrawal symptoms rather than treatment uptake.²⁴

Service providers may need to prepare to adapt to changes to drug preferences and use patterns as a result of Big Events. During the Australian heroin shortage, many people who inject drugs reported increasing their use of stimulants, but service providers were not well equipped to deal with non-opiate drug-related harms.²⁷

Clinical guidelines. Acute disasters require quick adaptations from both service providers and clients. In the days immediately before and after Hurricane Sandy, methadone and buprenorphine clinics in New York and New Jersey responded with varying degrees of flexibility.^{46,47} Clinics that were better able to work with or around standard guidelines regarding take-home doses were able to provision their clients during the disaster, highlighting the need for clear emergency protocols that allow for more flexibility in prescribing.^{36,46}

Communication. Natural disasters present a number of barriers to client communication with service providers. Following Hurricane Sandy, some clients were unaware of their clinic's

closure and of any alternative services available to them.⁴⁸ For others, clinic and client loss of electricity precluded contact by cell phone. As many as a third of those clients that suffered communication constraints dropped out of treatment for some length of time.^{46,47} Thus, provisions to ensure communication with current clients were key following Hurricanes Katrina and Sandy.^{46,48,49} Furthermore, the need for cross-coverage agreements between clinics, and especially for a centralized patient database to verify dosage, was discussed in response to both hurricanes.^{45,47,48}

Resourcing

Resources to consider following a Big Event are manifold. Service providers and clients cannot undertake any of the key adaptations outlined above without adequate resources, which range from concrete concerns like funding and staffing to longer-term initiatives such as specific training and disaster preparedness.

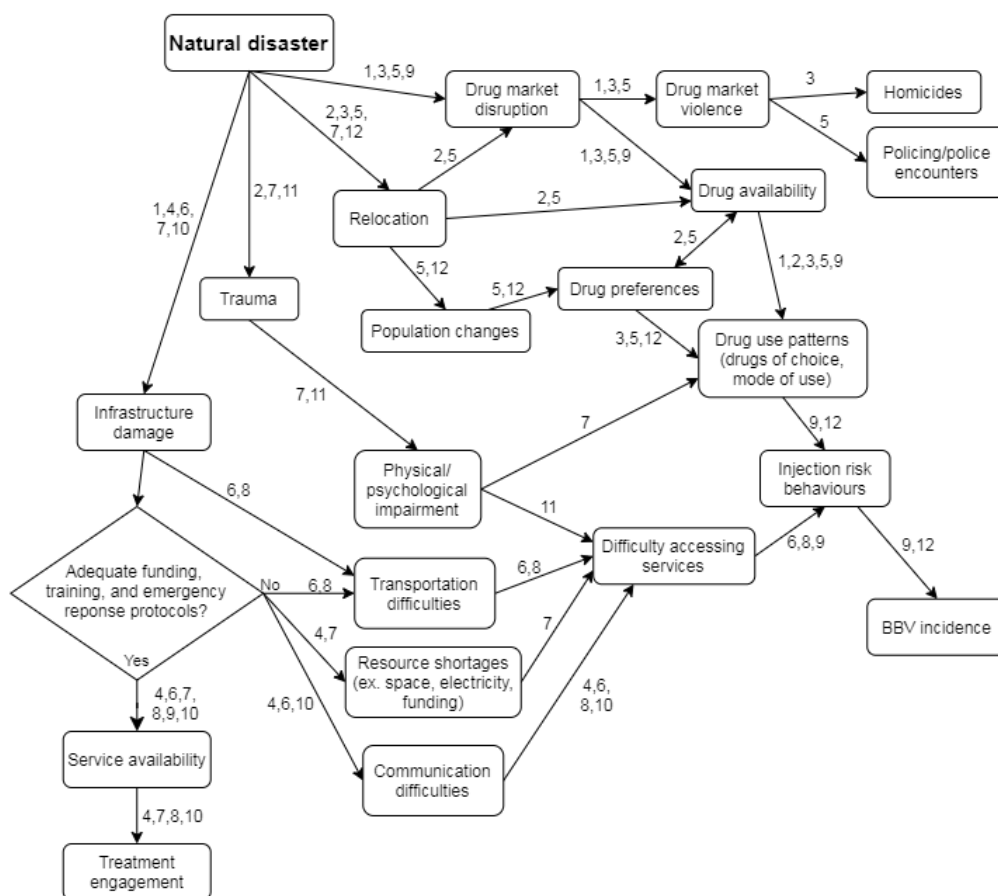
Funding. Funding for low-threshold treatment and harm-reduction services is an ongoing issue that can be exacerbated by poor economic conditions, and Big Events can highlight underlying, systemic funding issues. Austerity measures imposed in Hungary following the Global Financial Crisis necessitated shutdowns and restrictions of harm reduction services, including reduced operating hours and number of syringes distributed per contact. In a single year, the number of syringes distributed dropped by 35%, despite a stable level of demand for syringe exchange programs.³² In Athens, Greece, coverage of needle and syringe programs and OAT was persistently low (and HCV prevalence high), and ecological evidence suggest that the onset of economic recession in this context triggered an HIV outbreak.³⁹

Physical resources. In addition to funding, sufficient staffing, space, and transportation for staff and clients are the fundamentals of service provision⁴⁶⁻⁴⁸ A lack of staff and space both contribute to longer wait times at clinics. Following Hurricane Sandy, transportation issues disproportionately affected methadone maintenance clients who were required to attend the clinic for daily dosing.⁴⁷ Patients reported withdrawal symptoms and illicit substance use when transportation issues made it difficult or impossible for clients to reach their prescribing clinic.⁴⁶

Inability to contact or access clinics, prescribers, or usual medication supplies may mean that clients have to initiate their own strategies to cope, such as taking a smaller daily dose.⁴⁹

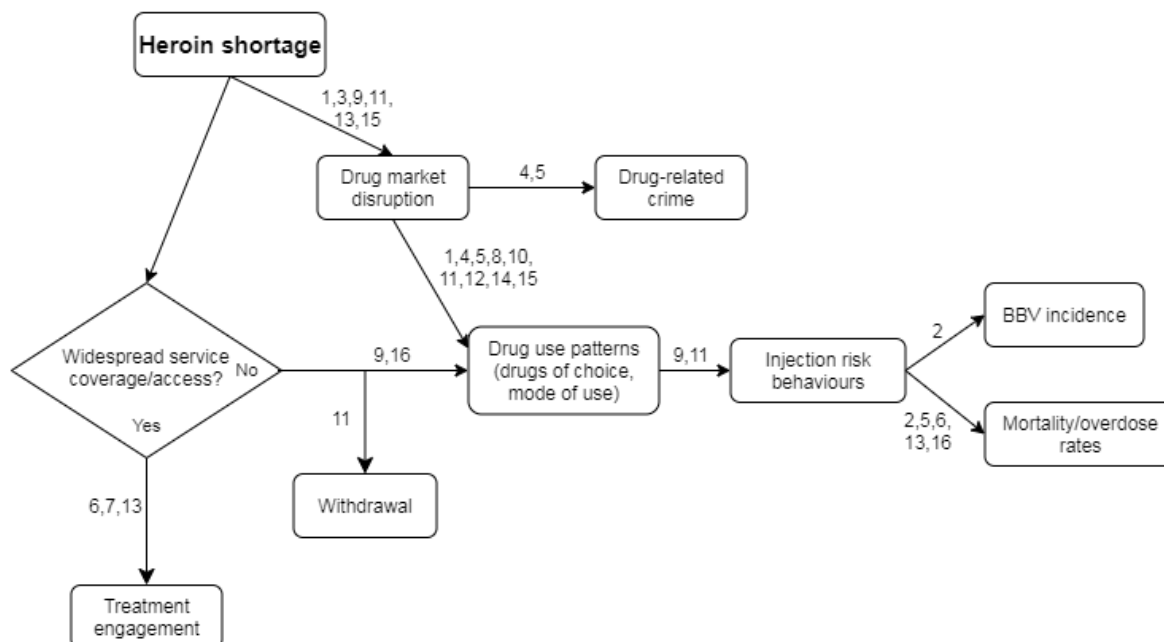
Human resources and training. Big Events may be traumatic for a variety of reasons, including displacement, social isolation, and grief. There may be a need for service provider training on responding to trauma, both for clients and for staff themselves.³⁵ Traumatized clients may increase their substance use in order to cope with their disaster experiences, as was reported by Hurricane Katrina evacuees.⁴⁵ Staff may also be experiencing trauma, and struggle to additionally address clients' needs.³⁵ Following some kinds of Big Events, the population accessing a service may change due to displacement or new initiates to drug use, for example. Cultural sensitivity training was identified as useful in the context of service providers responding to New Orleanian evacuees after Hurricane Katrina.⁴⁵

Pathways to risk following Big Events



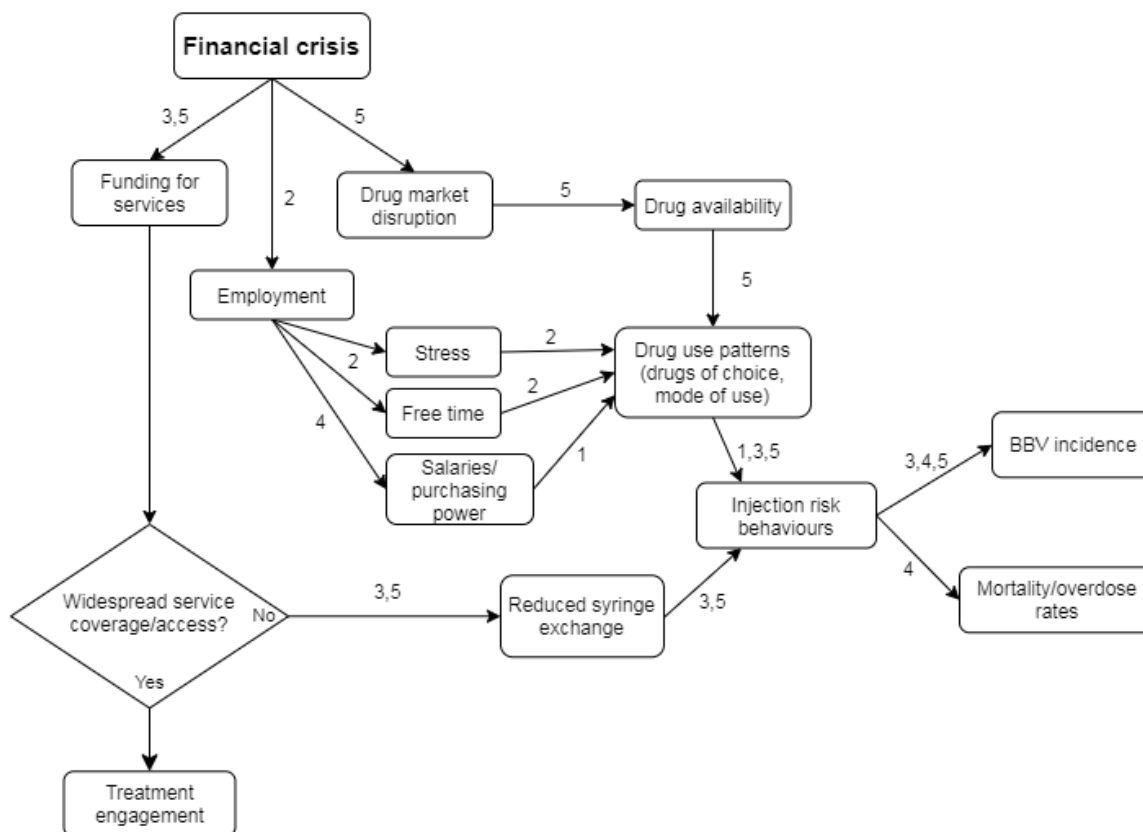
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Implications for COVID-19 responses

The evidence reviewed here relates to various Big Events. Not all of the effects of Big Events identified in the reviews studies are directly relevant to COVID-19 responding. However, many findings have translatable implications for not only how services can respond to COVID-19, but how they can increase their preparedness for future Big Events of varying kinds. Some immediate implications for services arising from this review follow.

The need for flexibility to support people who use drugs to reduce risk

Changes in drug market dynamics, suppliers, types of drugs used, and polydrug use can all potentiate drug-related risk and harms. Coupled with factors that are relevant the current context, such as reduced access to supervised injection sites and confinement, which may increase the likelihood of being alone while using drugs, there are clear indicators that overdose is a major concern during this period. While it is the case that the Australian heroin shortage was associated with a significant reduction in overdose mortality, this was in a setting with limited access to non-heroin opioids, which is not the case in the contemporary context. Recent overdose mortality statistics bear out the supposition that people who use drugs are at increased risk at this time.⁵⁰ National clinical guidance has been issued to support OAT via telemedicine.⁵¹ Additionally, in British Columbia, clinicians may prescribe pharmaceuticals to people with substance use disorders so that they may physically distance and/or self-isolate and avoid risk during the pandemic.⁵² There is an ongoing need to identify and implement strategies such as these to reduce overdose risk.

Several studies noted that disruptions to the operation of harm reduction services were associated with reduced access to and use of sterile needles and syringes, increasing the risk of HCV and HIV incidence among people who inject drugs. It is best practice for needle and syringe programs (NSPs) to offer as many needle-syringes for clients as requested,⁵³ particularly if services are operating under reduced hours or limiting client numbers. The use of flexible NSP models such as mobile or outreach models is likely to increase client access. NSPs offering mobile or outreach services will need to ensure that procedures are in place to support physical distancing.

Several studies identified a need for services to be responsive to trauma caused by natural disasters and displacement. In the COVID-19 context, this likely translates to being responsive to mental health problems and, potentially, grief and loss. Impacts on homelessness and violence are as yet unclear, but these may also be issues for service providers to be aware of and responsive to.

Preparedness plans

Several of the publications reporting on natural disasters noted the importance of emergency preparedness planning for harm reduction and drug treatment services, and we reiterate this here. Critically, we note that despite several previous respiratory infection pandemics in recent years (albeit with more limited geographic spread), we did not identify any publications reporting on how harm reduction and drug treatment service providers should prepare for such an event. Services in natural disaster-prone environments may already have plans in place for such events, but there is a clear need for services to consider and plan for the broader range of emergencies that may occur and to which they must be able to flexibly and rapidly respond. Services that already have such plans in place may wish to publish these, along with the process of their development, to support other services in developing their own plans. Given the importance of communicating with clients to maintain continuity of care as identified by several studies, preparedness plans should include measures to ensure that up-to-date contact details are maintained, or alternative strategies are in place to maintain contact (e.g. obtaining client permission to pass on messages to known contacts). Higher-level preparedness plans (e.g. as developed by provincial governments) should include people who use drugs and other marginalized groups, such as people who are homeless, as priority populations.

Considerations for women, Indigenous peoples, and visible minorities who use drugs

Few studies considered the impact of Big Events specifically on women. There is thus limited evidence to inform women-specific and gender-sensitive COVID-19 responses for women who use drugs. It seems likely that women who use drugs are at particular risk of harm during this time. Women who use drugs are vulnerable to gender-based violence within their social milieu, and scarcity of drugs is likely to exacerbate conflict and risks of exploitation and/or victimization

(see, for example, Dunlap et al.²⁵). There is a critical need to understand these dynamics and ensure that harm reduction and drug treatment providers are appropriately engaging women who use drugs.

None of the identified studies considered outcomes or experiences specifically of Indigenous persons during or after Big Events. This is a significant gap given the overrepresentation of Indigenous peoples among those who are most vulnerable to COVID-19 including people who use drugs and/or who are homeless.

The reviewed literature touched on particular impacts of displacement on Black Hurricane Katrina evacuees, noting that services that were available to this group were not always culturally sensitive. Although population displacement is not a major feature of the COVID-19 pandemic, given disruptions to how services are operating, it is feasible that the demography of a service's clients may change, and this may require adjustments to ensure culturally and linguistically appropriate service provision.

Limitations

Study quality assessment

An assessment of study quality has not been included in this report; this will be undertaken for updated iterations of the knowledge synthesis.

Consultation with knowledge users

Formal consultation with knowledge users will occur over the next 3-4 months as part of work to further develop and finalise this knowledge synthesis. Groups for consultation will include service providers, decision makers and people who use drugs.

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Tables

Table 1: Characteristics of included publications contributing information on drug-related risks and harms

First author, year	Country	Big Event studied	Population	Study design and methods	Included outcomes
Ben Lakhdar, 2011 ⁵⁴	France	Economic crisis	People who use drugs in France	Quantitative, longitudinal review of national data; qualitative interviews	Changes in drug use patterns.
Bennett, 2011 ¹⁹	USA	Hurricane Katrina	Low-income people who use and sell drugs and were evacuated from New Orleans	Cross-sectional, qualitative observations, focus groups, and interviews	Changes in the New Orleans drug market and drug use patterns. Drug market violence linked to changing market conditions.
Bruguera, 2018 ³³	England, Spain, and Poland	Economic crisis	People attending substance treatment services in England, Catalonia, and Poland	Cross-sectional, qualitative interviews	Changes in drug use patterns.
Cepeda, 2010 ³⁴	USA	Hurricane Katrina	Low-income Black people who use drugs and were evacuated from New Orleans to Houston	Qualitative interviews	Changes in drug use patterns.

First author, year	Country	Big Event studied	Population	Study design and methods	Included outcomes
Day, 2003 ²¹	Australia	Heroin shortage	People who inject drugs in Australia	Cross-sectional, qualitative interviews	Changes in drug market and drug use patterns. Drug market violence linked to changing market conditions.
Day, 2005 ³⁸	Australia	Heroin shortage	People who inject drugs in Australia	Administrative time series data	Changes in HCV notifications. Changes in hospital visits for injection-related problems.
Day, 2006 ²⁰	Australia	Heroin shortage	People who inject drugs in Australia	Administrative time series data; qualitative interviews with health and law enforcement key informants	Changes in drug availability, purity, and price.
Degenhardt, 2005 ⁴³	Australia	Heroin shortage	People seeking treatment for heroin dependence in Australia	Serial cross-sectional interviews with people who inject drugs; administrative time series data	Changes in drug use patterns. Changes in drug-related crime.
Degenhardt, 2005 ³⁷	Australia	Heroin shortage	People who inject drugs in Australia; people entering treatment for heroin dependence	Serial cross-sectional interviews with people who inject drugs; administrative time series data	Changes in drug use patterns. Changes in drug-related mortality and crime. Changes in treatment-seeking for heroin dependence.

First author, year	Country	Big Event studied	Population	Study design and methods	Included outcomes
Degenhardt, 2005 ³⁰	Australia	Heroin shortage	People in treatment for drug dependence	Administrative time series data	Changes in drug-related mortality.
Dunlap, 2012 ²⁵	USA	Hurricane Katrina	People who use and sell drugs in New Orleans	Longitudinal, qualitative observations, focus groups, and interviews	Changes in the New Orleans drug market and drug use patterns. Drug market violence linked to changing market conditions.
Gilmour, 2006 ²⁶	Australia	Heroin shortage	People charged with cocaine or heroin possession in Australia	Administrative time series data	Changes in drug use patterns.
Harris, 2015 ²³	UK	Heroin shortage	People who inject drugs in London	Qualitative interviews	Changes to drug use patterns and drug market.
Horyniak, 2015 ³¹	Australia	Heroin shortage	People who inject drugs in Melbourne	Cross-sectional quantitative interviews	Changes in drug use patterns.
Kotarba, 2010 ²⁸	USA	Hurricane Katrina	People who use and/or sell drugs in New Orleans relocated to Houston	Longitudinal, qualitative observations, and interviews	Changes in Houston drug market and drug use patterns following the entry of New Orleanian evacuees. Drug market violence linked to changing market conditions.

First author, year	Country	Big Event studied	Population	Study design and methods	Included outcomes
Mital, 2016 ²⁴	Kenya	Heroin shortage	People who use heroin in Kenya	Cross-sectional, qualitative interviews	Changes to drug use patterns and drug market. Changes in blood borne virus risk behaviors.
Paraskevis, 2013 ³⁹	Greece	Economic crisis	People who inject drugs in Athens	Longitudinal, quantitative	Changes in blood borne virus incidence. Changes in drug use risk behaviors.
Pavarin, 2020 ⁴²	Italy	Economic crisis	People who use cocaine in northern Italy	Archival, retrospective cohort	Changes to overdose rates. Changes to drug use patterns.
Pong, 2010 ⁵⁵	Australia	Heroin shortage	Mothers who use drugs at the Royal Hospital for Women in New South Wales	Administrative time series data	Changes in drug use patterns.
Pouget, 2015 ³⁶	USA	Hurricane Sandy	People who inject drugs in New York City	Qualitative interviews	Changes to drug-related risks/harms. Changes to drug market.
Smithson, 2004 ⁴⁰	Australia	Heroin shortage	People using heroin	Administrative time series data	Changes in drug market. Changes in overdose rates. Changes in treatment-seeking.

First author, year	Country	Big Event studied	Population	Study design and methods	Included outcomes
Tarjan, 2015 ³²	Hungary	Economic crisis	People who inject drugs in Hungary	Serial cross-sectional survey data; administrative time series data	Changes in drug use patterns. Changes to HCV incidence.
Topp, 2003 ²⁷	Australia	Heroin shortage	People who inject drugs in Australia	Serial cross-sectional quantitative interviews	Changes in drug use patterns.
Valdez, 2010 ²⁹	USA	Hurricane Katrina	Latino immigrant day labourers in New Orleans	Qualitative interviews	Risk of drug use initiation. Risk of BBV.
Weatherburn, 2003 ²²	Australia	Heroin shortage	People who use heroin in south-western Sydney	Administrative data time series and quantitative interviews	Changes in drug use patterns and in drug market.
Wood, 2008 ⁴¹	Canada	Heroin shortage	People who inject drugs in Vancouver	Administrative time series data, longitudinal survey data	Changes in drug-related mortality. Changes in drug use patterns.

Table 2: Characteristics of included publications contributing information on harm reduction and drug treatment service delivery

First author, year	Country	Big Event studied	Population	Study design and methods	Included outcomes
Degenhardt, 2005 ⁴⁴	Australia	Heroin shortage	People entering treatment for opioid dependence in New South Wales	Longitudinal, retrospective	Treatment entry and retention.
Mital, 2016 ²⁴	Kenya	Heroin shortage	People who use heroin in Kenya	Cross-sectional, qualitative interviews	Treatment access.
Pong, 2010 ⁵⁵	Australia	Heroin shortage	Mothers who use drugs at the Royal Hospital for Women in New South Wales	Administrative time series data	Changes in withdrawal treatment for newborns.
Gupta, 2017 ⁴⁸	USA	Hurricane Sandy	Staff from two opioid maintenance programs in New York City	Qualitative interviews; review of local electronic health record data including urine toxicology and retention rates	Resources shortages (lack of space). Changes in clinical guidance (take-home doses).
Matusow, 2018 ⁴⁶	USA	Hurricane Sandy	Opioid treatment program staff and clients in New York and New Jersey. People not in treatment who use drugs in New York and New Jersey.	Qualitative interviews; review of emergency plans	Changes in clinical guidance (take-home doses). Resource shortages (transportation, communication). Changes in drug use patterns as a result of clinical shortages.

First author, year	Country	Big Event studied	Population	Study design and methods	Included outcomes
Maxwell, 2009 ⁴⁵	USA	Hurricanes Katrina & Rita	Clients and staff of substance misuse treatment programs in Texas	Quantitative analysis of client data; qualitative interviews	Changes in demand for services. Resource shortages (electricity).
McClure, 2014 ⁴⁷	USA	Hurricane Sandy	Providers and administrators of opioid maintenance treatment in New York	Qualitative interviews	Changes in service operations. Resource shortages (physical space).
Paraskevis, 2013 ³⁹	Greece	Economic crisis	People who inject drugs in Athens	Longitudinal, quantitative national health data	Resource shortages (syringe exchange services).
Pouget, 2015 ³⁶	USA	Hurricane Sandy	People who inject drugs in New York City	Qualitative interviews	Changes in clinical guidance (take-home doses). Changes in drug use patterns as a result of clinical shortages.
Tarjan, 2015 ³²	Hungary	Economic crisis	People who inject drugs in Hungary	Longitudinal, quantitative review of national data	Resource shortages (syringe exchange services).

First author, year	Country	Big Event studied	Population	Study design and methods	Included outcomes
Tofighi, 2014 ⁴⁹	USA	Hurricane Sandy	Clients of Bellevue Hospital Center's buprenorphine clinic in New York City	Semi-structured survey	Changes to service operations. Resource shortages (buprenorphine). Changes in drug use patterns as a result of clinical shortages.
Toriello, 2007 ³⁵	USA	Hurricane Katrina	Clients and staff of the Bridge House treatment centre in New Orleans	Longitudinal, descriptive	Changes in demand for services (client impairment). Resource shortages (staff health/morale).

Appendix: Search terms

Searches were completed in PubMed in three steps:

1. All terms in Group 1, combined with OR
2. All terms in Group 2, combined with OR
3. Searches #1 and #2, combined with AND

Group 1: Big Event-related terms

Big events (N.B. title/abstract keyword)
recession (title keyword)
austerity (title keyword)
economic crisis (title keyword)
financial crisis (title keyword)
GFC (title keyword)
unemployment (title keyword)
hurricane (title keyword)
tsunami (title keyword)
tornado (title keyword)
earthquake (title keyword)
H1N1 (title keyword)
SARS (title keyword)
MERS (title keyword)
heroin shortage (N.B. title/abstract keyword)
heroin drought (N.B. title/abstract keyword)
disaster context (title keyword)
Natural disasters [mesh term]
Flood (title keyword)
economic recession [mesh term]
cyclone (title keyword)
complex emergencies (title keyword)
SARS virus [mesh term]
severe acute respiratory syndrome [mesh term]
middle east respiratory syndrome (title keyword)
natural disaster (title keyword)
disaster preparedness (title keyword)
pandemic preparedness (title keyword)
H5N1 (title keyword)

Group 2: drug-related terms

Illicit drugs [mesh term]

cocaine [mesh term]
crack cocaine [mesh term]
crack (title keyword)
cocaine (title keyword)
heroin (title keyword)
abuse, heroin [mesh term] N.B. did not additionally search for dependence, heroin or addiction, heroin (or similar terms with other drugs) as mesh terms as these return identical results to abuse, [drug].
methamphetamine [mesh term]
methamphetamine (title keyword)
abuse, amphetamine [mesh term]
amphetamine (title keyword)
people who inject drugs (title keyword)
people who use drugs (title keyword)
opiate substitution treatment [mesh term]
methadone maintenance (title keyword)
buprenorphine maintenance (title keyword)
opioid substitution (title keyword)
opioid replacement (title keyword)
opioid agonist (title keyword)
substance abuse, intravenous [mesh term]
injecting drug (title keyword)
injection drug (title keyword)
crack cocaine (title keyword)
people who inject drugs (title keyword) N.B. this was an automated suggested by the PubMed browser that was included as it provided new results not picked up by "people who inject drugs"
residential rehabilitation (title keyword)
therapeutic community (title keyword)
Substance abuse treatment centers [mesh term]
community, therapeutic [mesh term]
harm reduction [mesh term]
needle and syringe (title keyword)
needle exchange programs [mesh term]
needle exchange (title keyword)
syringe exchange (title keyword)
supervised inject* (title keyword)
safer inject* (title keyword)
supervised consumption (title keyword)
safer consumption (title keyword)
safe supply (title keyword)
overdose prevention (title keyword)
harm reduction (title keyword)
substance abuse disorders (title keyword)
opioid treatment program (title keyword)
substance use (title keyword)

drug and alcohol treatment (title keyword)
drug abuse (title keyword)