# Opioid Intervention Strategies in Surrey, British Columbia:

## An Evaluation of the Trends and Treatments


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## Executive Summary

In the past few years, the Province of British Columbia has experienced a substantial increase in the number of opioid-related overdoses and deaths. In absolute numbers, illicit drug overdose deaths related to opioid use increased from 294 in 2010 to 1,489 in 2018. Much of this appears due to the introduction of synthetic narcotics such as oxycontin and fentanyl. The situation became sufficiently dire that the Province declared a public health emergency in 2016 (Otterstatter et al. (2018)).

Second only to downtown Vancouver, the City of Surrey has faced the brunt of that increase. City Centre —a traditional core area of Surrey—has been a prime focal point for those addicted to synthetic narcotics. Recently, the area around 135A Street has seen a dramatic spike in the number of homeless people and the creation of a "tent city." Parallel with this, overdoses, opioid-related deaths and petty crime in the area placed a strain on the City's emergency response services.

In late 2016, the City of Surrey created a "City Centre Response Plan" (CCRP) to address the effects of that crisis. The plan was targeted at the City Centre area with the focus being on and around 135A Street. The CCRP was comprised of three key components: an enhanced service presence based on the *Surrey Outreach Team* (SOT); the Introduction of *SafePoint*, a safe supervised consumption site; and, the initiation of an *Emergency Housing First* program. The plan was implemented in three phases starting January 1, 2017.

The question this study addresses is, to what degree have the interventions had an impact on opioid-related overdoses, deaths and rates of property crime in the targeted area?

Overall, the results of the CCRP intervention are best judged as being ambiguous. While the number of overdoses has deceased in the area, so too did overdoses in the rest of the City. On the other hand, the number of opioid-related ***deaths decreased in the Central Core*** while they continued to rise elsewhere, suggesting that the CCRP might have had some impact along that dimension. Property crimes remained relatively stable both before and after the introduction of the CCRP throughout the entire City.

Complicating matters is the fact that many of the overall trends, both before and after the introduction of the CCRP in City Centre, are mirrored in other parts of Surrey—in areas that had pre-existing high and low rates of opioid-related events. Consequently, it is difficult to identify what impact the CCRP might have had in the targeted area in contrast to broader social trends and other, macro-policy interventions introduced by the City and other levels of government.

In summary, among the key findings, we would note the following.

### OVERDOSES

- The Core Area census tracts (CTs) experienced slightly more than two-fifths of the total number of recorded overdoses over the entire four-year period.

- The relative distribution of overdoses remained reasonably consistent across risk areas although the percentage distribution went up slightly in "Low" risk areas and down slightly in the "High" and "Very High" risk areas.
- The adjacent CTs accounted for an additional 11% of the reported overdoses, with the remainder being spread across the rest of the City
- In general, there was an increase in overdose rates across the entire city from before 2017 to a peak in 2017. In contrast, the Central Core and adjacent CTs saw a slight decline in rates in phase two of the CCRP (Period 2).
- Overall, there was a decrease in overdoses throughout the City in the final six months of 2018. This corresponds to the implementation of phase three of the CCRP (the housing phase). It should be noted, however, that this pattern was replicated throughout the City and not just in the Central Core.

## OPIOID-RELATED DEATHS

- There was a dramatic increase in deaths across the three-year period 2016-2018 which was disproportionate to the increased incidence of overdoses.
- As with overdoses, the proportion of deaths increased in the "Low" risk areas relative to the "Very High" risk and Core areas.
- The two Central Core CTs had the highest overall death rates across all periods examined.
- In the City as a whole, all three intervention periods saw higher deaths per month than occurred in the pre-intervention period.
- While the overall death rate increased in the Core and adjacent CTs in the intervention period, none of the core CTs experienced the consistent pattern of increases in deaths that was seen in the rest of the City.

## PROPERTY CRIMES

- In the aggregate, the recorded number of property crimes decreased by about 11% in the period after January 1, 2017.
- The distribution of property crimes across drug-risk areas remained proportionately consistent. It is also the case that those areas that had the highest incidences and rates of property crime also had the highest likelihood of opioid-related overdoses and deaths.

## Background

Canada has seen a major increase in synthetic opioid use over the past few years (Fischer et al. 2006). In 2017, the national rate for opioid-related deaths was approximately 10.9 per 100,000 population, or about 4,000 deaths in total. In the first six months of 2018, the death rate had increased to an estimated 11.2 per 100,000.[1] . This puts us second only to the United States in terms of known use and deaths (United Nations 2018). British Columbia has experienced the brunt of that pattern with the estimated death rate of 30.9 per 100,000 population for 2017 and 30.6 in 2018. In absolute numbers, illicit drug overdose deaths increased from 294 in 2010 to 1,489 in 2018. The increase in both reported overdose cases and deaths in British Columbia led the Province to declare a public health emergency in 2016 (Otterstatter et al. 2018).

Much of the increase in opioid fatalities can be attributed to the introduction of new types of synthetic narcotics such as oxycontin and fentanyl. Fentanyl, for example, is a stronger analgesic than traditional opioid painkillers (up to 100 times stronger than morphine) and when incorporated into a time-released patch was initially considered minimally addictive. Drugs such as oxycontin and fentanyl were initially available through a prescription only. In recent years, however, they and analogous compounds have become a major component of the illicit drug trade.

Users initially learned how to extract and concentrate fentanyl from patches and, more recently, it and several derivatives, such as carfentanil, have become available on the black market in powder and pill form. It has been determined that nearly all street "heroin" sold in Vancouver contains fentanyl (Woo 2018). Regardless, it has been estimated that about one-third of those having died recently due to opioid overdoses had a prescription (Gomes et al. 2018), although current restrictions on opioid-for-pain prescriptions appear to be changing that pattern (Smolina et al. 2019).

Not only are increases in overdoses and deaths associated with opioid abuse, rates of property crime are typically believed to increase as users seek the financial resources to support their habits. Second only to Vancouver, the City of Surrey has faced the brunt of the consequences of that shift in drug use. A traditional core area of Surrey—City Centre —has experienced an inordinate increase in social problems including opioid abuse. In the past couple of years, the area around 135A Street has seen a dramatic spike in the number of homeless people and the creation of a "tent city." Handling the concentration of homelessness, overdoses, opioid-related deaths and petty crime has placed a strain on the City's emergency services.

In 2016, the City of Surrey drew up a "City Centre Response Plan" (CCRP) to help mitigate the effects of that strain, particularly in the City Centre area. The plan was implemented from January 1, 2017 to date. While there are many issues the CCRP tries to address, the questions this report addresses are limited in focus. Specifically, to what degree has that intervention had an impact on opioid-related overdoses, deaths and rates of property crime in the targeted area?

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[1] https://www.canada.ca/en/health-canada/services/substance-use/problematic-prescription-drug-use/opioids/data-surveillance-research/harms-deaths.html

## Surrey City Centre Response Plan

The Surrey *City Centre Response Plan* (CCRP) was brought forward and endorsed by City Council in December 2016, to address several issues relating to the public safety situation in the area around 135A Street. At the time, opioid-related overdoses and deaths were spiking, and the area was experiencing a substantial influx of homeless people, many of whom were living in tents on and around 135A Street. Concerns were raised that, among other things, a lack of adequate housing was conflating drug abuse issues.

The Surrey CCRP consisted of three basic components:

1. An enhanced service presence based on the *Surrey Outreach Team* (SOT),
2. The Introduction of *SafePoint*, a safe supervised consumption site; and,
3. The initiation of an *Emergency Housing First* program.

The Surrey Outreach Team was established in January 2017 as a pilot project and consisted of twelve Surrey RCMP officers who are on site and service the area 24 hours a day, seven days a week, along with four Bylaw officers who were available ten hours a day.[2] The SOT worked out of a construction trailer located on 135A Street. In collaboration with the police officers there are members of Fraser Health and Emergency Health Services to assist in the outreach process. Overall, the outreach team brings together general policing, bylaw enforcement, ambulance, fire, and social services to work with individuals who have settled in the area.

Surrey's first supervised injection site, SafePoint, was opened in June 2017 on 135A Street next to the Gateway Shelter. Safepoint is managed by the Lookout Emergency Aid organization and is open 16 hours a day. The facility is staffed by four individuals including a registered nurse. Subsequently, the Quibble Creek Sobering and Assessment Centre opened for service on 94A Street adjacent to Surrey Memorial Hospital.

Staff at the City of Surrey began working with BC Housing in the early part of 2017 to address the shortage of accommodation for an entrenched group of homeless individuals within the City. In mid-2017, the Province established a Rapid Response to Homelessness program that involved a partnership between the Province, municipal governments and non-profit housing organizations. Following from that partnership, the Surrey identified potential sites to establish 40 to 50 housing units. Emergency Housing was opened in June 2018 and consisted of a series of modular units to accommodate 200 individuals.

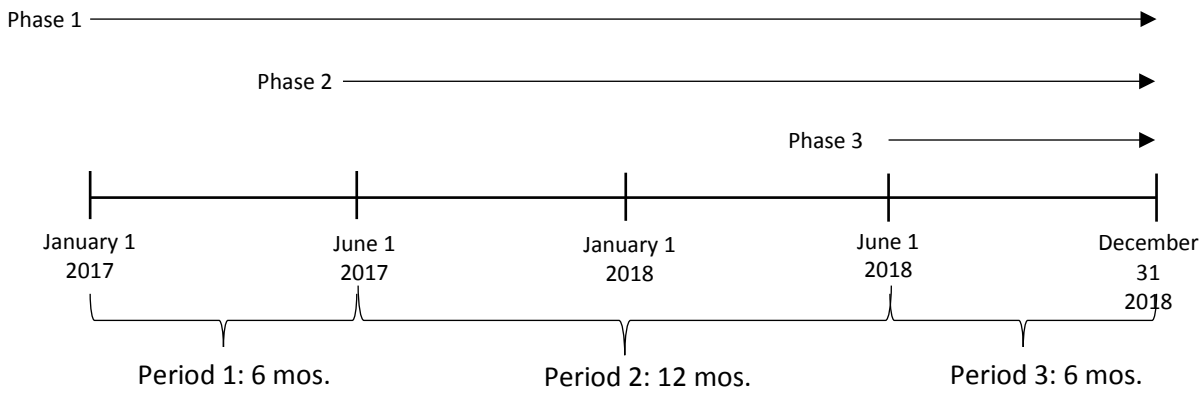
To summarize, there are three key intervention phases on which this analysis focuses:

1. January, 2017: Initiation of SOT Surrey Outreach Team
2. June, 2017: Initiation of SafePoint, a supervised consumption site
3. June 2018: Creation of Workforce Housing for 200 people

A graphic depiction of the timelines for these three phases is presented in Figure 1.

[2] The SOT worked primarily in the area from 104th to 108th Avenues between City Parkway and King George Boulevard. They operated out of a Command Centre on 135A Street.

**FIGURE 1: TIMELINES FOR PROJECT IMPLEMENTATION**




# Method

## TARGET AREAS

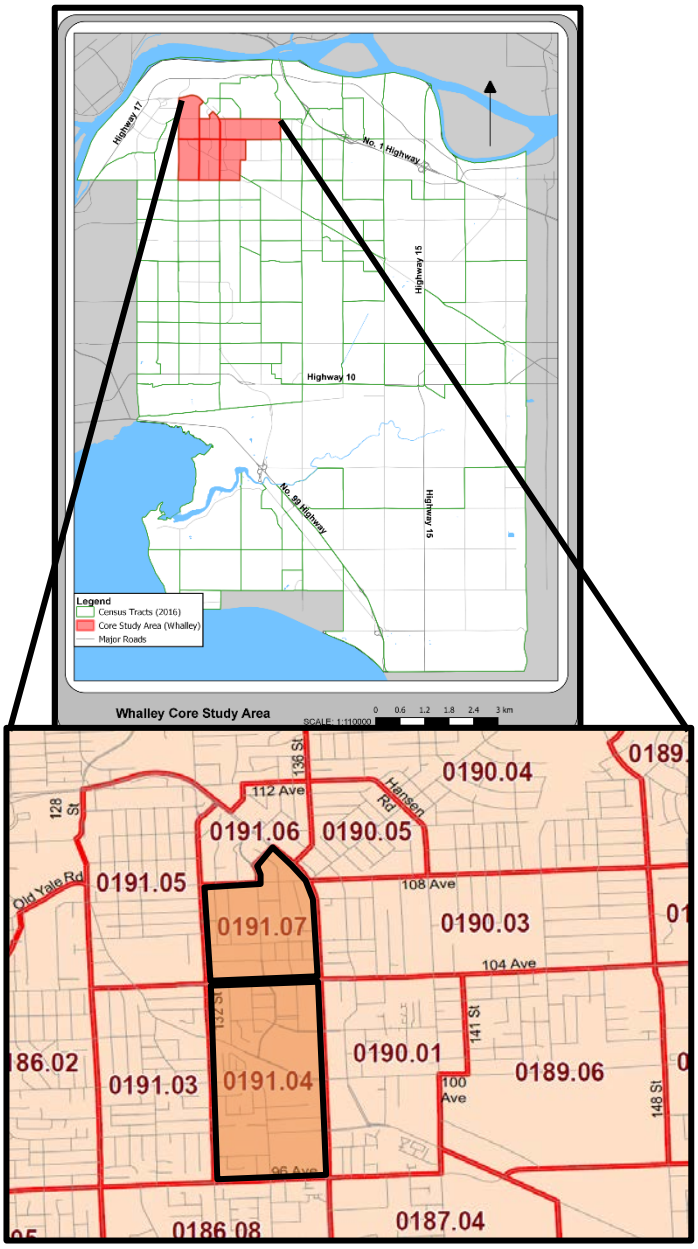
Prior analysis by emergency responders in the City of Surrey noted that several "hotspots" existed within the City where opioid overdoses and opioid-related deaths appeared to be concentrated. The area with the highest concentration corresponded with the primary City Centre region of Surrey, largely corresponding to the historical boundaries of Whalley.

For Census purposes, Statistics Canada breaks down the geographical areas of cities into units known as census tracts (CTs) that generally follow neighbourhoods or reasonably homogeneous areas bounded by major roads or key physical features such as rivers. The boundaries of CTs are determined by a committee of local specialists such as town planners, educators or health officials. Typically, CTs have a population of between 2,500 and 8,000 people.

The primary census tracts relating to City Centre are identified in Figure 2. Overall, the City of Surrey was broken into 95 census tracts in the 2016 Census. For the purposes of this analysis, the key CTs that correspond to both the City Centre and the region with the highest concentration of opioid-related incidents are the six CTs labelled 191.03, 191.04, 191.05, 191.07 to the west of King George Blvd and the tracts 190.01 and 190.03 to the east of King George Blvd. The two primary, or Core, CTs on which we will focus are **191.07** and **191.04**. These are indicated by the darker orange fill in Figure 2. The first tract (**191.07**), is bounded roughly by 108 Avenue in the north and 104 Avenue in the south, and 132 Street in the west and King George Blvd in the east. The second tract (**191.04**), is immediately south of 191.07 and is bounded by 104 Avenue in the north and 96 Avenue in the south, and again, 132 Street in the west and King George Blvd in the east.

The remaining four CTs (191.03, 191.05, 190.01 and 190.03) are immediately adjacent areas that we will use as comparators along with the remainder of the City. These four adjacent areas were selected because they too had higher than average numbers of opioid-related overdose incidents.

**FIGURE 2: DISTRIBUTION OF CENSUS TRACTSWITH THE CITY OF SURREY WITH CORE STUDY AREA HIGHLIGHTED**




It was because of the confluence of several factors—the extremely high incidence of opioid-related incidents, a large influx of homeless people and high property crime rates—that the City of Surrey created a formal City Centre Response Plan (CCRP) commencing in January 1, 2017.

## IDENTIFYING "HOTSPOTS"

It is not uncommon in much geographical analysis to identify so-called "hotspots" or locations of extreme events. These may range from highly localized concentrations of disease in epidemiology to high crime locations in criminology. Nominally, these locations coincide with the notion of outliers in general statistical analysis. As with the concept of an outlier, there is no formal academic

definition of a hotspot although there are several conventions or rules of thumb that one might apply.

A robust statistical approach to distributing regions is found in John Tukey's box plot approach. Here, we divide the data into quartiles and define outliers as 1.5 times the interquartile range (IQR) beyond the median or second quartile. Specifically, this report uses the data on reported opioid overdoses prior to 2017 to provide a baseline. For the years 2015 and 2016 the number of reported opioid-related overdoses was determined for each CT and divided by the population of the census tract to establish an overdose rate. Those CTs were then divided into four groups or strata identified as having low, moderate, high or very high overdose rates.

Specifically, the four strata were estimated as follows:

- *Low*: below the first quartile of rates of overdoses
- *Moderate*: first to third quartiles or the interquartile range of rates of overdoses
- *High*: third quartile to 1.5 times the IQR above the median or second quartile of rates of overdoses
- *Very High*: beyond 1.5 times the IQR above the median of rates of overdoses

These ranges are depicted in Figure 3.

**FIGURE 1: BOX PLOT OUTLINING RISK CUT-POINTS**

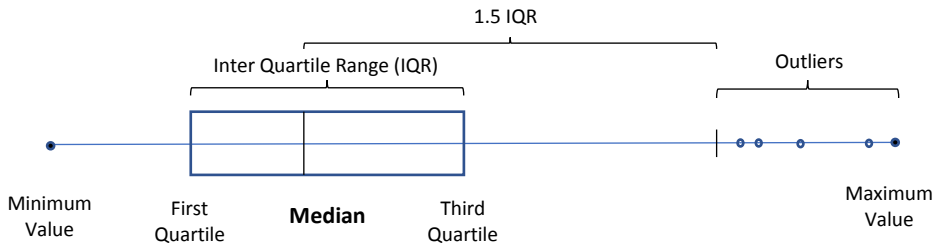
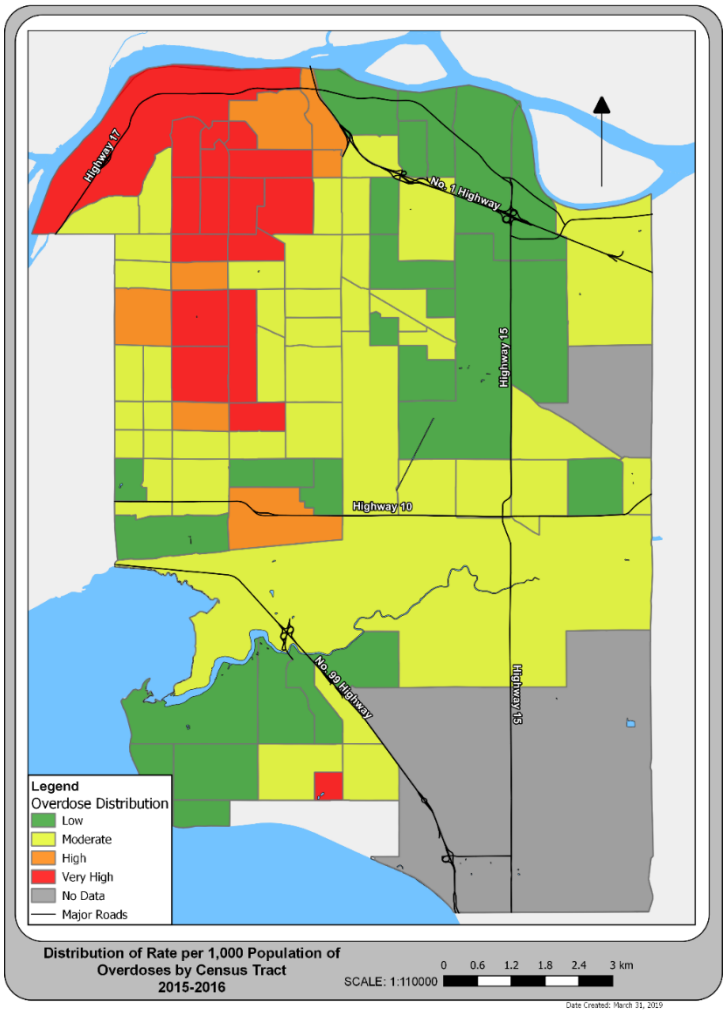


**FIGURE 2: DISTRIBUTION OF OPIOID-RELATED OVERDOSES BY CENSUS TRACT, 2015-2016**




The 95 census tracts within the City of Surrey are mapped out in Figure 4 based on the reported opioid-related overdose rate per 1,000 population.[3] Using the categorizing schema discussed above, 24 CTs were ranked as "Low" (green); 48 as "Moderate" (yellow); 13 as "High" (orange); and, 10 were ranked as "Very high" (red). Most of the "Very High" areas are in the northern portion of the city, astride King George Boulevard.

[3] We used opioid-related overdoses as opposed to death to develop an area "risk" typology because, while aggregate deaths were spiking within the City of Surrey, their incidence in any on subarea was quite small. Consequently, there was a much higher rate of statistical instability across areas. Furthermore, the correlation between rates (and numbers) of overdoses and deaths is extremely high. Thus, rates of overdoses provide an excellent proxy for the likelihood of an area also having high rates of opioid-related deaths.

Population data (denominator) for the rates were drawn from the 2016 Census of Canada.

As can be seen in Figure 4, the hotspots—those areas marked as red or having "very high" overdose rates—are concentrated in the north and west portions of the city. While the primary focus of attention has been the City Centre area where the very highest rates of overdoses were recorded, it is evident that rates of overdoses were also high in those areas along the western sections of Highway 17, and on both sides of King George Boulevard going as far south as 96 Avenue. There is also a local hotspot in the southern border of the City bounded by 20 and 16 Avenues on the north-south axis, and 148 and 152 Streets on the east-west axis. Generally, the remainder of Surrey experienced low to moderate rates of opioid-related overdoses.

Since the primary area of concern has been the spike in opioid-related overdoses and deaths in the City Centre area, one might wonder why our analysis includes the remainder of the City. The answer is that to understand what any impact an intervention in City Centre might have had, we need to compare outcomes with what was happening in the City at large. For example, while emergency housing was being provided in the City Centre area in response to the tent city on 135A Street, numerous Recovery Houses were being established in other areas of the City around the same time in an attempt to help those with drug problems. Most of those were in the hotpots outside City Centre.[4]

Many of those Recovery Houses outside the City Centre area provided services similar to those of the Emergency Housing First program. That is, they provided shelter in a permanent structure, many had onsite naloxone kits, and some of the registered Houses had full or part-time counsellors available. The point being made is that while changes were occurring in the City Centre area, the remainder of the City did not stay static regarding its response to the crisis. As we will see later, the overall question thus becomes whether the impact of the intervention in City Centre is significantly different than what was happening elsewhere in Surrey.

[4] By December 31, 2018, there were 68 service Recovery Houses identified by Surrey Fire Department in the City of Surrey including the 55 that were registered through British Columbia's Assisted Living Registry and were allowed under the City of Surrey's Business License Bylaw (Rehal, J. 2016. "Corporate Report: Recovery Homes Update." edited by Bylaw Enforcement & Licensing Services. Surrey, British Columbia: City of Surrey.) An additional 90 informal or nonregistered Recovery Houses have also come to the attention of the Surrey Fire Department.

# The Broader Context

## SOCIAL CHARACTERISTICS

Surrey is the ninth largest city in Canada having a recorded population count of slightly under 518,000 in the 2016 Census. The landscape is quite varied, encompassing a range of properties from farm lands to suburban residential areas to clusters of retail and industrial development. The City Centre area has become a major downtown core, second only to the City of Vancouver in the lower mainland of British Columbia. As with many other Canadian cities, it is also ethnically and socio-economically diverse.

The geographical distribution of overdoses within the City tends to follow the distribution of several key social-economic characteristics. As with many other large cities, Surrey's primary drug fault lines parallel the social and economic well-being of its residents. Some of the key correlates are presented in Table 1.

Essentially, the overdose rate increases as individual and family income decreases. The highest overdose risk areas also correlate with those areas that have the highest proportions of lone parent households, people living alone and the proportion of low-income households. Those areas also tend to have higher proportions of residents who do not have English as their mother tongue.

**TABLE 1: SELECTED SOCIO-ECONOMIC CHARACTERISTICS AND RATES OF OPIOID-RELATED OVERDOSES**

| | Opioid-related Overdose Rate | | | |
|---|---|---|---|---|
| Characteristic | Low | Moderate | High | Very High |
| Percent population under 14-years | 16.9 | 18.0 | 18.0 | 15.8 |
| Percent population over 65-years | 16.6 | 14.3 | 11.5 | 14.2 |
| Average age | 41.2 | 39.0 | 37.6 | 39.6 |
| Median individual income* | 36,496 | 29,918 | 26,994 | 26,051 |
| Median family income* | 101,130 | 81,194 | 72,620 | 62,802 |
| Percent English as mother tongue* | 56.9 | 46.6 | 44.0 | 44.1 |
| Percent "other" as mother tongue* | 39.5 | 48.5 | 50.4 | 50.4 |
| Percent lone parent households* | 17.9 | 22.0 | 25.0 | 30.2 |
| Percent living alone* | 5.8 | 7.5 | 7.8 | 12.6 |
| Percent low-income households* | 8.3 | 11.3 | 12.9 | 19.3 |

*Statistically significant a $p<.05$

In these respects, Surrey differs little from other Canadian cities or, in fact, other cities throughout the world that have significant illicit drug-use problems.

## OVERDOSES AND DEATHS

Before we focus on the interventions taking place in the target area of City Centre, it is worthwhile examining what was occurring within the City of Surrey as a whole regarding opioid-related incidents during the four-year period under study. Again, the broad context for Surrey's CCRP was that opioid-related overdoses and deaths were spiking during 2015 and 2016. Within the 95 CTs that comprise the City of Surrey, there were 1,584 overdose incidents recorded in 2015 and 2,614

incidents recorded in 2016. The number increased to 2,784 in 2017. At the same time, the number of ascribed opioid-related deaths in 2015 was 82. This would increase to 151 in 2017.[5]

While the latter part of this report will focus on the impact of the CCRP specifically, this section will provide a general overview of what was happening in the City at large over the four-year period of January 1, 2015 to December 31, 2018. Since the CCRP was introduced in January 2017, it is worthwhile taking an overview of what was happening throughout the City before and after the introduction of the CCRP in City Centre.

The number of *overdoses* by risk area is listed in Table 2. For the sake of comparison with the later analysis, the seventeen "Very High" risk areas have been sub divided into the core City Centre and surrounding area (six CTs), and the other eleven "Very High" risk areas.

Together, there were 4,193 overdoses prior to January 1, 2017 and 4,560 afterward. As can be seen, the six CTs that comprise City Centre and the immediately surrounding area experienced the highest absolute number of overdoses. The "Moderate" risk areas ranked second regarding the absolute number of overdoses, but it ought to be recalled that those numbers were distributed over a greater number of CTs (n=47). Two observations regarding Table 2 are most germane: first, in the aggregate, the number of overdoses did not drop post January 1, 2017. Second, the relative distribution of overdoses remained reasonably consistent across the risk categories. The percentage distribution went up slightly in the "Low" risk areas and down slightly in the "Very High" risk areas. The core areas that included City Centre and its surrounding areas saw a proportionate increase in overdoses from 43% prior to January 1, 2017 to 47% afterward.

**TABLE 2: NUMBER AND PERCENT OF OVERDOSES BY PERIOD**

| | Period (Number) | | Period (Percent) | |
|---|---|---|---|---|
| **Risk Category** | **2015-16** | **2017-18** | **2015-16** | **2017-18** |
| Low (n=24) | 154 | 229 | 3.7 | 5.0 |
| Moderate (n=47) | 1,134 | 1,264 | 27.0 | 27.7 |
| High (n=7) | 356 | 306 | 8.5 | 6.7 |
| Very High (n=11) | 747 | 616 | 17.8 | 13.5 |
| Core Area (n=6) | 1,802 | 2,145 | 43.0 | 47.0 |
| Total | 4,193 | 4,560 | 100.0 | 100.0 |

A similar pattern is seen in Table 3 which presents the number of opioid-related *deaths* in Surrey. It should be noted, however, that Table 3 differs from Table 2 in that mortality data were not available for 2015. The mortality data show a slightly different profile than the overdose data. That is, the proportion of deaths increases in the "Low" and "Moderate" risk areas and proportionately decreases in the "Very High" and Core areas. The increase in the "Low" category is partially a

[5] Unfortunately, we did not have access to opioid-related death statistics for 2015. Informal reports suggest they were lower than in 2016. Regardless, it was clear that just as overdoses were on the increase throughout the City, so were opioid-related deaths.

function of the fact that the base number of two ODs in 2016 was so low. Thus, even a small numeric increase would result in a more significant percentage increase.

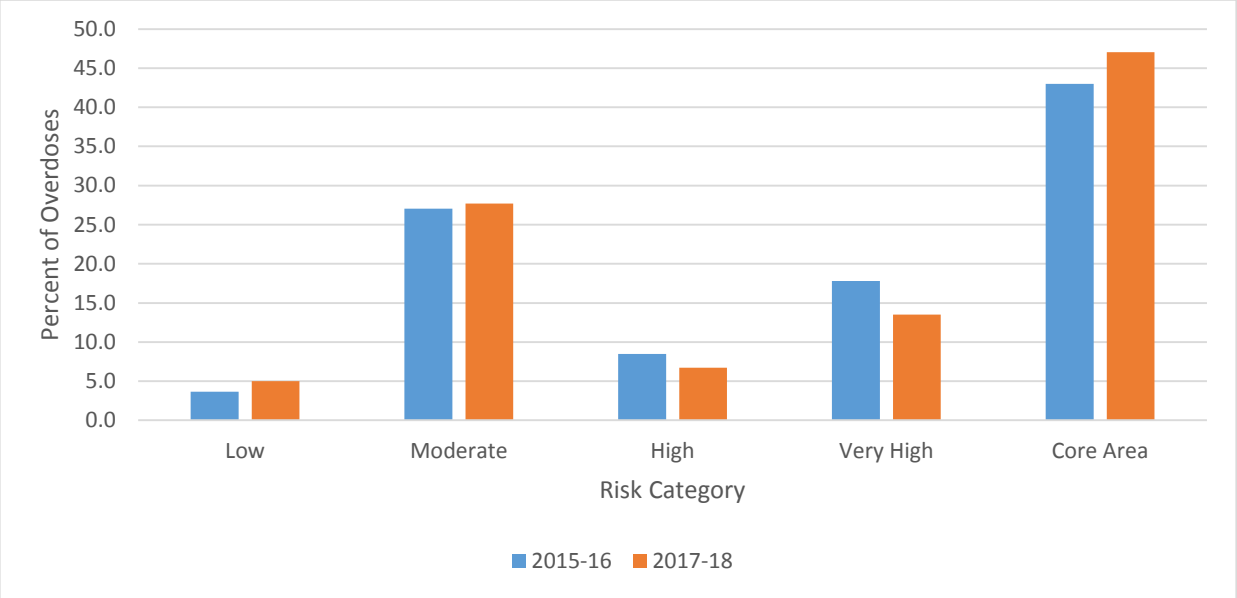
**TABLE 3: NUMBER AND PERCENT OF DEATHS BY PERIOD**

| Risk Category | Period (Number) | | Period (Percent) | |
|---|---|---|---|---|
| | 2016 | 2017-18 | 2016 | 2017-18 |
| Low (n=24) | 2 | 32 | 2.4 | 10.1 |
| Moderate (n=47) | 29 | 121 | 35.4 | 38.2 |
| High (n=7) | 9 | 32 | 11.0 | 10.1 |
| Very High (n=11) | 16 | 49 | 19.5 | 15.5 |
| Core Area (n=6) | 26 | 83 | 31.7 | 26.2 |
| Total | 82 | 317 | 100.0 | 100.0 |

More likely, the proportionate shift to the lesser risk areas may be due to the distribution of resources throughout the City. It is reasonable to hypothesize that more individuals in the "Low" to "Moderate" risk areas were relative novices to opioid use and consequently less likely to be in a supportive group of more knowledgeable fellow users. Furthermore, services such as Recovery Houses and naloxone kits are less likely to be available in those areas. While it is recognized that opiate use is endemic, community resources are generally directed to those areas known to be proportionately more problematic.

For the sake of clarity, the data in Tables 2 and 3 are replicated in the figures below. Figures 5 and 6 represent both the number and percent of opioid-related overdoses by area risk category. Again, the slight drop in the "High" and "Very High" risk areas and the increase in the Core Areas is noticeable. Determining why this shift has occurred is beyond the analytical scope of this report. The change might simply be due to random fluctuation; it might be due to street uses migrating to the City Centre region where social networks and availability might be more accessible; or, it may be due to other systematic factors.

**FIGURE 5: PERCENT OF SURREY DRUG OVERDOSES BY RISK CATEGORY**



The data on opioid-related deaths from Table 3 are graphically illustrated below. Again, these charts are not directly comparable to those depicting the overdose patterns due to the unavailability of data for 2015.

**FIGURE 6: NUMBER OF SURREY DRUG OVERDOSES BY RISK CATEGORY**

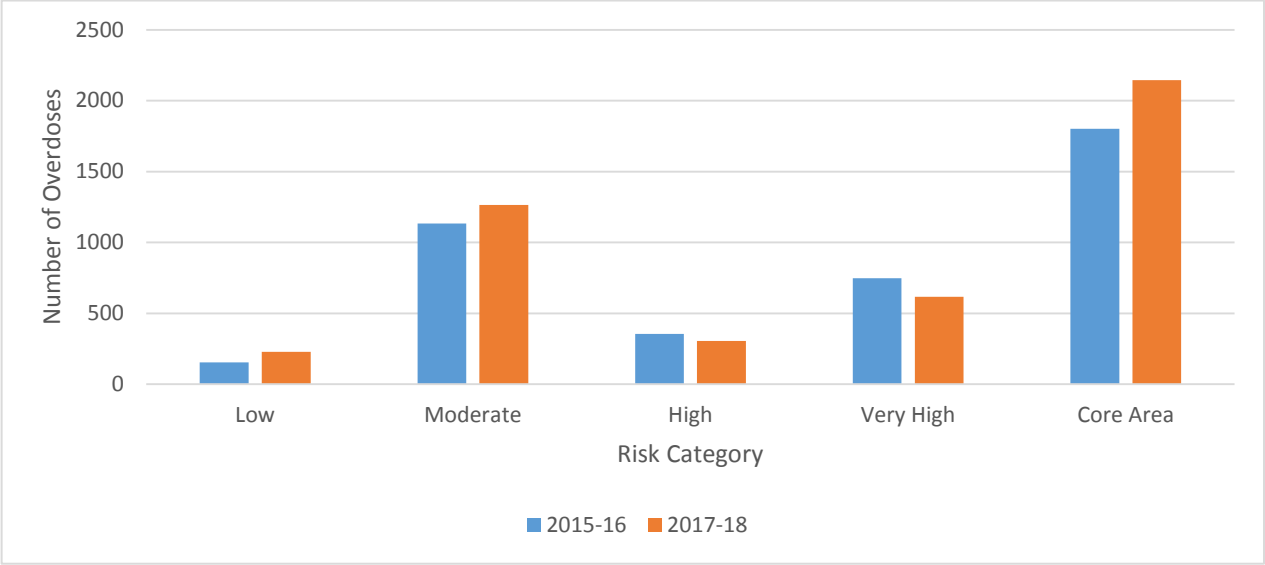
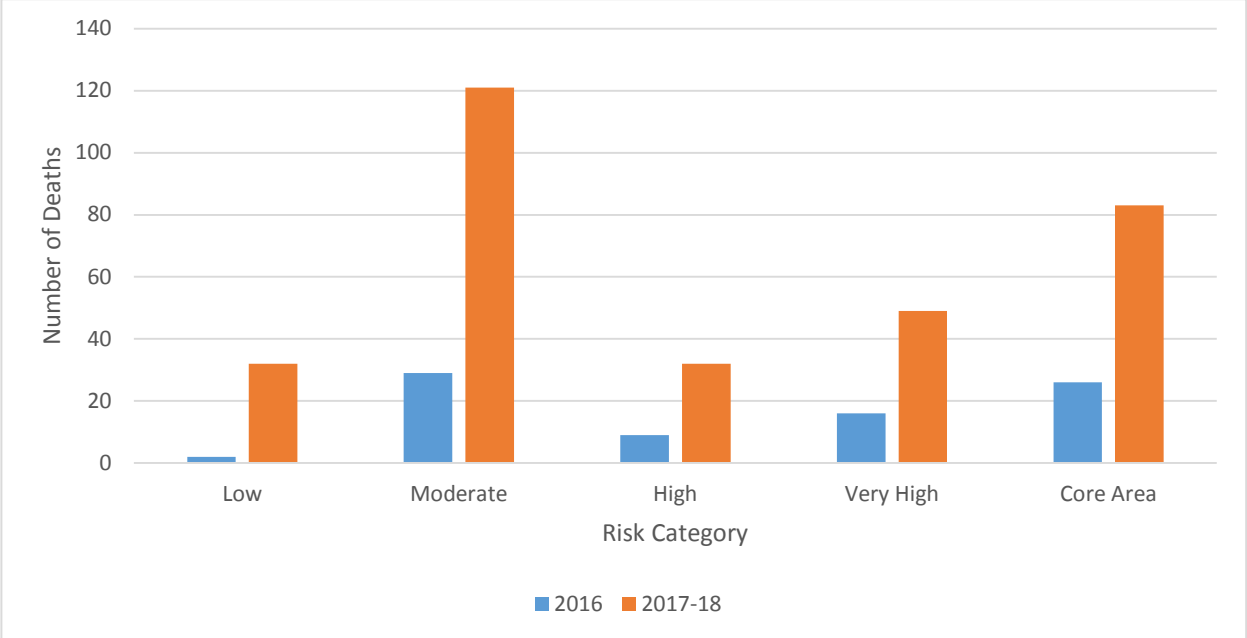


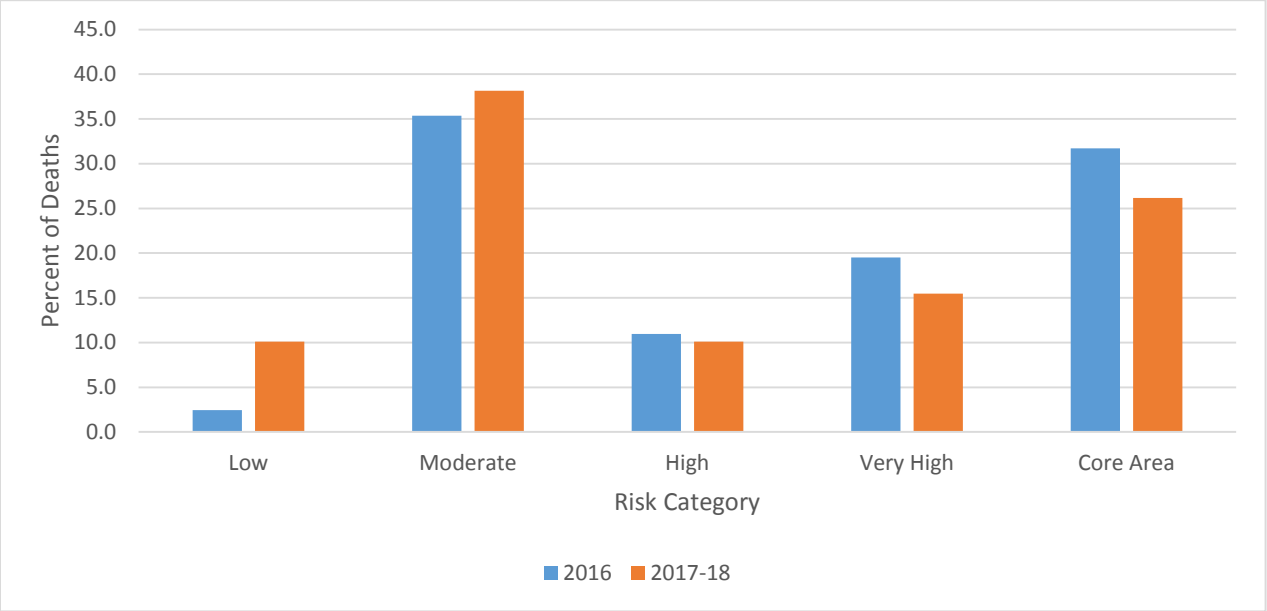

Figure 7 shows the number of deaths both before and after the start of the CCRP intervention. While the before and after time durations are not comparable, it is still evident that there was an increase in deaths post 2017.

**FIGURE 7: NUMBER OF SURREY DRUG DEATHS BY RISK CATEGORY**



This trend is more obvious in Figure 8 where we can examine the proportionate distribution of deaths across risk areas. What becomes clear from Figure 8 is the trend toward proportionately lower deaths in the higher risk areas, and a proportionate increase in the lower and moderate risk areas. One obvious explanation for this is that programs such as the CCRP, along with the availability of Recovery Houses and, likely, naloxone kits, is greater in the high as opposed to the low risk areas. This would be a reasonable outcome where the distribution of resources tends to be greater in those areas perceived as having a greater need. The consequence may be, however, that lower risk areas tend to be de-emphasized.

**FIGURE8: PERCENT OF SURREY DRUG DEATHS BY RISK CATEGORY**




## CRIMES

One of the major concerns with the increases in opioid-related deaths and overdoses is that they are a proxy for an increase in the underlying rate of drug use. This, in turn, is suspected to drive property crime rates as users require increased resources to make their purchases. This is not an unusual conjecture since it is well known that social pathologies tend to cluster along both social and geo-spatial dimensions.[6]

Data on selected crimes within the City of Surrey were collected for the years 2015 to 2018 inclusive. The crime data are limited to a series of property crimes only: break and entering into a business; residential break and enter; shoplifting; and, motor vehicle thefts. Crimes against the

[6] As far back as the 1920s, social scientists were wondering if there were spatial and temporal patterns to criminal and deviant behaviour. Sociologists at the University of Chicago noted that the application of ecological principles to the distribution of anti-social behaviour explained a substantial amount of the variation in the distribution of such behaviours, including drug abuse (see Park (1967); Hawley (1943); Shaw et al. (1929). For a more recent discussion, see Diplock (2016).

person and other offences are not considered in this analysis. On average, there were approximately five known property crimes per day (around 35 per week) within the City.

Once again, the data were divided into two periods: before and after January 1, 2017. The numbers of crimes were sorted according to the overdose-related risk areas and are presented in Table 4.

Unlike the data relating to overdoses and deaths, the recorded number of property crimes *decreased* by about 11% in the period after January 1, 2017. On the other hand, the distribution of crimes stayed remarkably consistent by risk area across the two periods under consideration. Essentially, the aggregate number of crimes did not vary significantly within each of the risk categories. When the data were analysed based on rates within CTs, those areas that had the highest likelihood of overdoses and opioid-related deaths also had the highest incidences and rates of property crime.

**TABLE 4: NUMBER AND PERCENT OF OVERDOSES BY PERIOD**

| Risk Category | Period (Number) | | Period (Percent) | |
|---|---|---|---|---|
| | 2015-16 | 2017-18 | 2015-16 | 2017-18 |
| Low (n=24) | 4,977 | 4,694 | 14.0 | 14.9 |
| Moderate (n=47) | 16,224 | 14,428 | 45.6 | 45.8 |
| High (n=7) | 2,816 | 2,370 | 7.9 | 7.5 |
| Very High (n=11) | 6,268 | 5,094 | 17.6 | 16.2 |
| Core Area (n=6) | 5,289 | 4,940 | 14.9 | 15.7 |
| Total | 35,574 | 31,526 | 100.0 | 100.0 |

The patterns exhibited in Table 4 can be more clearly seen in the following figures. As Figure 9 shows, the number of crimes reported decreased in all the regional risk categories. The proportional distribution, however, remained both substantively and statistically consistent as illustrated in Figure 10.

**FIGURE 9: NUMBER OF PROPERTY CRIMES BY RISK CATEGORY**

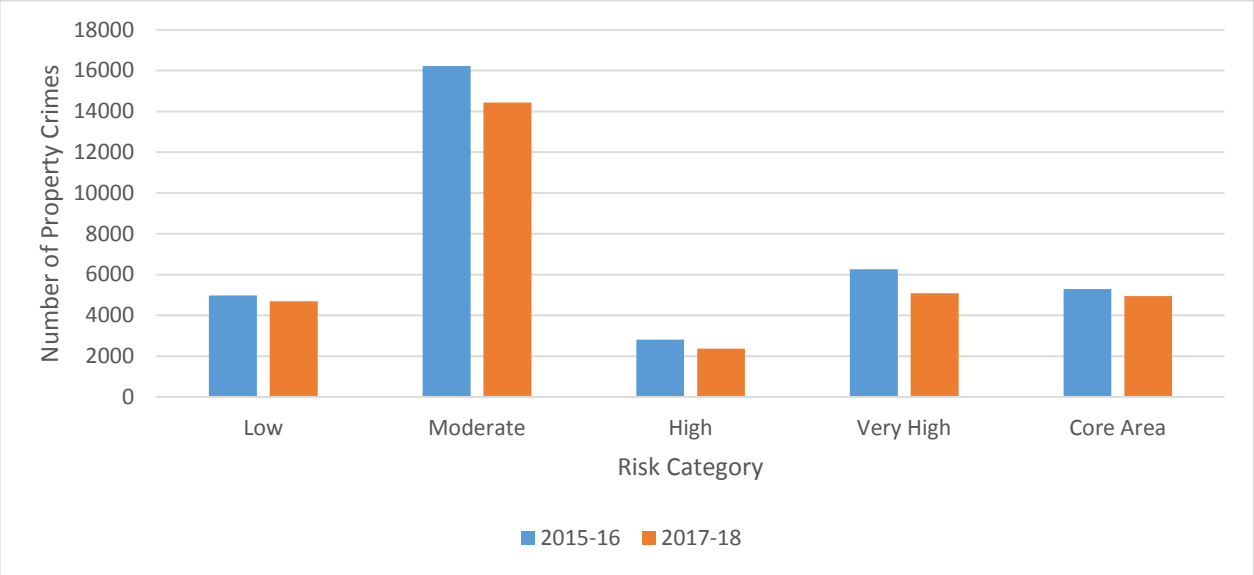
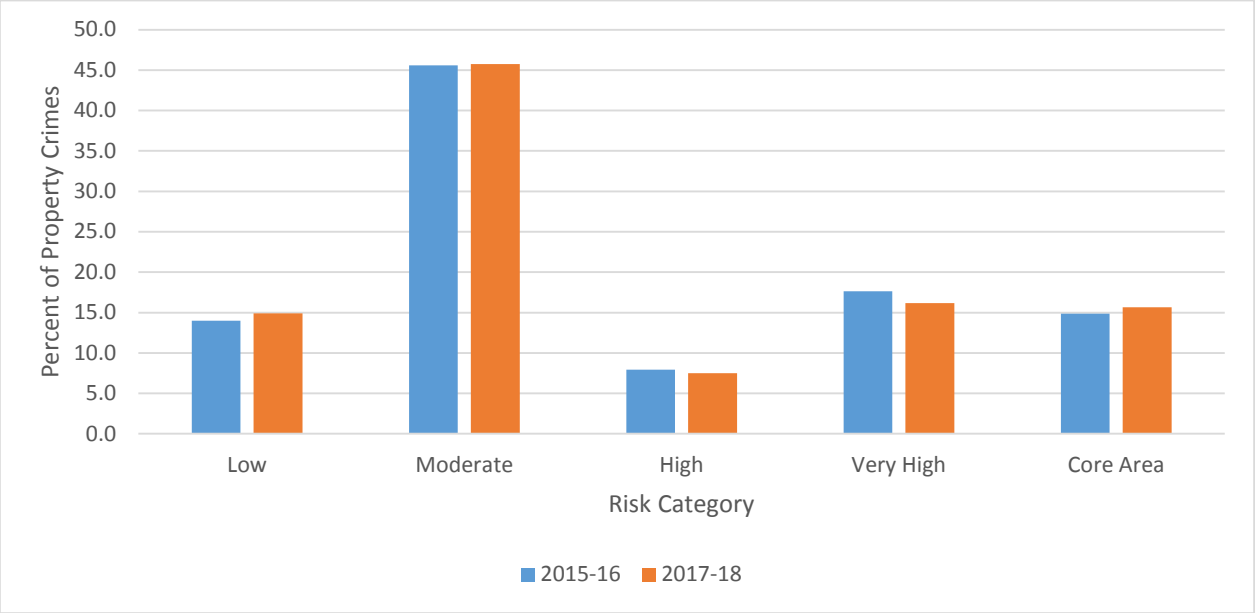


**FIGURE 10: PERCENT PROPERTY CRIMES BY RISK CATEGORY**




## SUMMARY

The City of Surrey, along with the East side of Vancouver have experienced the worst of the opioid crisis. Over the four years for which we have data, it is evident that opioid-related incidents have not abated substantially. When we take a macro perspective looking at the period prior to and after 2017, several things become evident. Specifically, regarding overdoses:

- The aggregate number of overdoses increased across the city from prior to, to after January 1, 2017.
- The relative distribution of overdoses remained reasonably consistent across risk areas although the percentage distribution went up slightly in "Low" risk areas and down slightly in the "High" and "Very High" risk areas.

Regarding deaths:

- There was a dramatic increase in deaths across the three-year period 2016-2018 which was disproportionate to the increased incidence of overdoses.
- As with overdoses, the proportion of deaths increased in the "Low" risk areas relative to the "Very High" risk and Core areas.

The pattern for property crimes differed somewhat from that of overdoses and deaths. That is:

- In the aggregate, the recorded number of property crimes decreased by about 11% in the period after January 1, 2017.
- The distribution of property crimes across drug-risk areas remained proportionately consistent. It is also the case that those area that had the highest incidences and rates of property crime also had the highest likelihood of opioid-related overdoses and deaths.

## Opioid-related Incidents in Surrey

As indicated previously, the geographical focus of the City's intervention corresponds broadly to a Core Area containing two central census tracts identified as CTs **191.04** and **191.07**. In this analysis, we examine whether there has been a change in the incidence of opioid incidents over the period of the intervention within those zones.

To reiterate, there are three key intervention phases on which this analysis focuses. These are:

1. January, 2017: Initiation of SOT Surrey Outreach Team
2. June, 2017: Initiation of SafePoint, the supervised consumption site
3. June 2018: Creation of Workforce Housing for 200 people

As part of a comparative design, we can use these three intervention points to create four periods for analysis. The initial or base period is *prior* to the City of Surrey's CCRP intervention which was initiated on January 1, 2017. The first intervention starts on January 1, 2017 at which point the SOT is put into service. The second intervention period starts June 1, 2017 after which the safe consumption site was operationalized in conjunction with the SOT. The third intervention period starts June 1, 2018 with the implementation of the Workforce Housing project. Again, this last intervention is in addition to the previously implemented SOT and safe consumption site interventions.

To summarize, observations were taken over four periods—the baseline and three intervention phases:

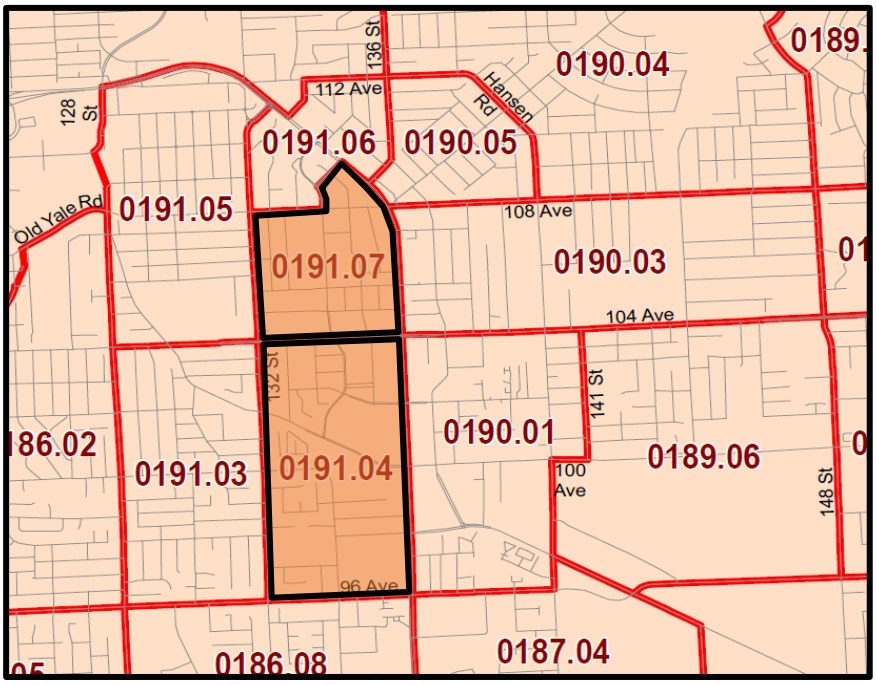
- Period 0 (2015 and 2016);
- Period 1 (January 1, 2017 to May 30, 2017);
- Period 2 (June 1, 2017 to May 30, 2018); and,
- Period 3 (June 1, 2018 to December 31, 2018).

It is only possible to understand the impact of an intervention when it is compared to something else. Typically, in true experimental designs, the comparison is generally known as a control group. The control group is one which is not exposed to the intervention. Since the current situation does not constitute a true experimental design, we resort to an alternate approach which is to contrast the experimental or target group with a series of comparators. In this case, to provide a context for interpreting the data in the Core Areas (CTs 191.04 and 191.07), data are provided for four neighbouring census tracts (190.01, 190.03, 191.03 and 191.05). All six of those areas were identified as "Very High" risk in the previous sections of this report. The second comparator we use consists of all other CT areas within the City of Surrey (that is, the remaining 89 census tracts).[7]

[7] For a discussion of various approaches to evaluating nonexperimental design, see Gertler et al. (2016); Khandker et al. (2010); and Province of Ontario (2007)

For reference, the locations of the two core and four adjacent CTs are identified in Figure 11. The two core areas are highlighted in a darker orange.

**FIGURE 11: WHALLEY CORE CENSUS TRACTS**




## OVERDOSES

The incidence of opioid-related overdoses is reported in Table 5. Here, both the absolute numbers of overdoses are reported along with the rate per 1,000 population within the respective areas. The base population (denominator) for the rates is taken from the 2016 Census. Arguably, the population figures are somewhat problematic since many of the incidents of overdosing were among transient individuals who may not have been captured by the Census. While the inclusion of transient individuals into the population count may be an issue, it is likely that the resident population still provides a reasonable base from which to compare relative rates across geographical zones (CTs).

There are two key items to note from Table 5. First, the two Core Area census tracts account for slightly more than one-third of the total number of recorded overdose incidents over the four-year period (2,942 out of 8,753). The adjacent CTs account for an additional 11% of the reported incidents and the remaining 55% of incidents are spread across the rest of the city.

A second point to note is that while the total number of incidents varies across CTs, the overall pattern across time remains remarkably similar regardless of location.

**TABLE 5: NUMBER OF OPIOID-RELATED OVERDOSES IN TARGET AREA (CTS) RATES PER 1,000 POPULATION IN PARENTHESES**

| | Period | | | | |
|---|---|---|---|---|---|
| **Core Area** | **Period 0** | **Period 1** | **Period 2** | **Period 3** | **Total** |
| 191.04 | 481 | 133 | 250 | 68 | 932 |
| | (69.5) | (19.2) | (36.1) | (9.8) | (134.6) |
| 191.07 | 863 | 352 | 620 | 175 | 2,010 |
| | (219.3) | (89.5) | (157.6) | (44.5) | (510.8) |
| Total | 1,344 | 485 | 870 | 243 | 2,942 |
| | (123.8) | (44.7) | (80.1) | (22.4) | (270.9) |
| **Adjacent Area** | **Period 0** | **Period 1** | **Period 2** | **Period 3** | **Total** |
| 190.01 | 135 | 57 | 101 | 17 | 310 |
| | (15.0) | (6.3) | (11.2) | (1.9) | (34.4) |
| 190.03 | 197 | 86 | 113 | 52 | 448 |
| | (28.6) | (12.5) | (16.4) | (7.5) | (65.0) |
| 191.03 | 75 | 16 | 32 | 10 | 133 |
| | (13.3) | (2.8) | (5.7) | (1.8) | (23.7) |
| 191.05 | 51 | 13 | 38 | 12 | 114 |
| | (12.6) | (3.2) | (9.4) | (3.0) | (28.3) |
| Total | 458 | 172 | 284 | 91 | 1,005 |
| | (17.9) | (6.7) | (11.1) | (3.6) | (39.3) |
| **Surrey (Other)** | **Period 0** | **Period 1** | **Period 2** | **Period 3** | **Total** |
| Remaining CTs | 2,391 | 667 | 1,395 | 353 | 4,806 |
| | (5.0) | (1.4) | (2.9) | (0.7) | (10.0) |

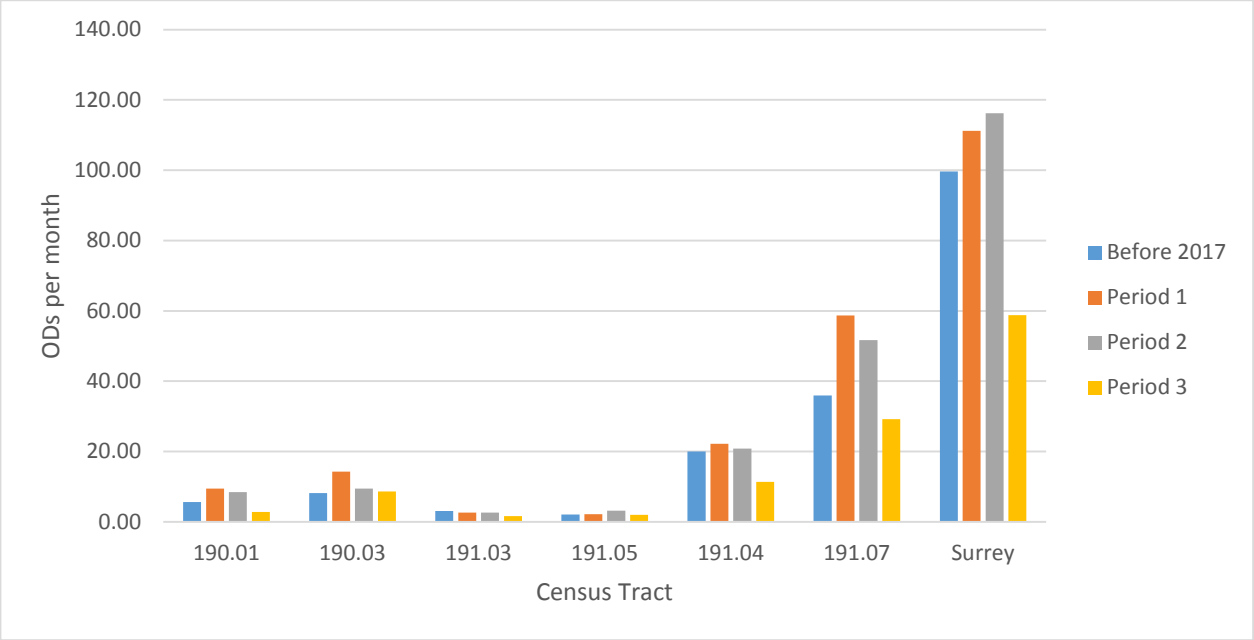
As might be expected, the total number of overdoses in Period 0 (the pre-intervention phase) is greater than for the other three segments since it incorporates data from the two previous years, 2015 and 2016. Similarly, there is a "bump" in incidents in Period 2. This is also not unexpected since Period 2 covers a 12-month duration while Periods 1 and 3 are only 6 months in duration. To correct for the differences in time across the intervention periods, incident rates *per month* were calculated and presented in Figure 12.

In Figure 12, the bars represent the number of reported overdoses *per month* for each of the four periods. This corrects for the differing durations of the periods under consideration. What Figure 12 indicates is that there was an overall increase in the rate of overdoses from before 2017 to peak in 2017, and then decrease in the final six months of 2018. When a statistical test was conducted on the pattern of overdoses over time across the three comparator regions (Core Area, Adjacent CTs and the remainder of Surrey), there are is a statistically significant differences using a commonly

accepted probability level of .05.[8] The overall pattern is a little complex but an examination of standardized residuals suggested that while all three regions experienced an *increase* in overdoses in Period 1, both the Core Area and the Adjacent CTs saw a *drop* in overdoses in Period 2 while the remainder of the City continued to experience a relative increase. There was, however, a substantial decrease in both the absolute and relative number of overdoses in Period 3 in all parts of the City.

From the perspective of the intervention, the results are not unambiguous. All parts of the City saw a significant drop in overdoses in Period 3. In the Core and Adjacent areas, however, it appears that the decline started to occur in Period 2 (the 12 months from June 1, 2017 to May 30, 2018).

**FIGURE 12: OVERDOSES PER MONTH BY CORE CENSUS TRACT**




## DEATHS

Beyond reducing the number of overdoses, it was hoped that the CCRP intervention would reduce the number of opioid-related deaths which were occurring in the City. As indicated in the previous sections of this report, the number of deaths generally increased in tandem with reported overdoses. With deaths, we should recall that the pre-intervention exposure period (Period 0) consists only of the calendar year 2016 since data from the previous year were unavailable for analysis.

Over the three-year period (2016-2018 inclusive) there were 399 identified opioid-related deaths for which locational data were available.[9] While that number is clearly tragic, it should be noted

[8] Chi-square 15.3; 15 d.f.; p-value=0.018

[9] There was a total of 403 deaths identified; however, a census tract location could only be assigned to 399. Consequently, the latter tally was used in this analysis.

that breaking down the statistics by place and time can soon result in small numbers. Consequently, we would advise some caution when drawing conclusions from these data.

A breakdown of both the number and rates of deaths per 1,000 population is presented in Table 6. This parallels the format of Table 5 which provides information on overdoses. As with overdoses, however, the Core area and surrounding CTs experienced an inordinate number of fatalities in comparison with the rest of Surrey. Again, because of durational differences in the intervention periods, it is easier to interpret the results if we look at deaths per month.

**TABLE 6: NUMBER OF OPIOID-RELATED DEATHS IN TARGET AREA (RATE PER 1,000 POPULATION OF OPIOID-RELATED DEATHS IN TARGET AREA)**

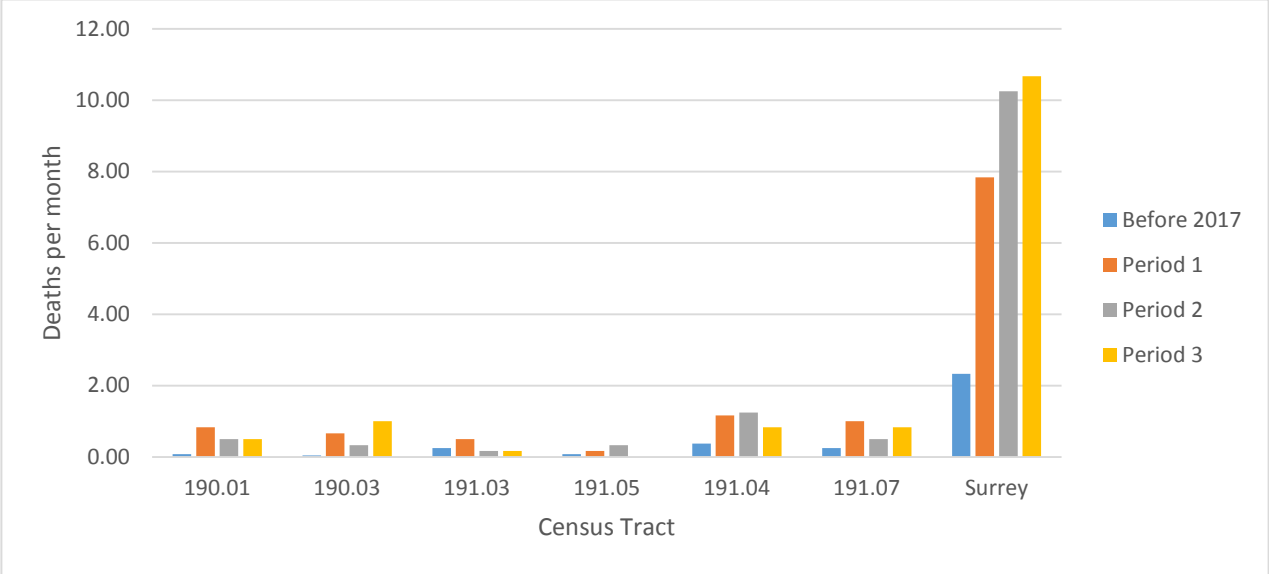
| | Period | | | | |
|---|---|---|---|---|---|
| **Core Area** | **Period 0** | **Period 1** | **Period 2** | **Period 3** | **Total** |
| 191.04 | 9 | 7 | 15 | 5 | 36 |
| | (1.3) | (1.1) | (2.2) | (0.7) | (5.2) |
| 191.07 | 6 | 6 | 6 | 5 | 23 |
| | (1.5) | (1.5) | (1.5) | (1.3) | (5.8) |
| Total | 15 | 13 | 21 | 10 | 59 |
| | (1.4) | (1.2) | (1.9) | (0.9) | (5.4) |
| **Adjacent Area** | **Period 0** | **Period 1** | **Period 2** | **Period 3** | **Total** |
| 190.01 | 2 | 5 | 6 | 3 | 16 |
| | (0.2) | (0.6) | (0.7) | (0.3) | (1.8) |
| 190.03 | 1 | 4 | 4 | 6 | 15 |
| | (0.1) | (0.6) | (0.6) | (0.9) | (2.2) |
| 191.03 | 6 | 3 | 2 | 1 | 12 |
| | (1.1) | (0.5) | (0.4) | (0.2) | (2.1) |
| 191.05 | 2 | 1 | 4 | 0 | 7 |
| | (0.5) | (0.2) | (1.0) | (0.0) | (1.7) |
| Total | 11 | 13 | 16 | 10 | 50 |
| | (0.4) | (0.5) | (0.6) | (0.4) | (2.0) |
| **Surrey (Other)** | **Period 0** | **Period 1** | **Period 2** | **Period 3** | **Total** |
| Remaining CTs | 56 | 47 | 123 | 64 | 290 |
| | (0.1) | (0.1) | (0.3) | (0.1) | (0.6) |

In Figure 13, the bars represent the number of reported overdoses *per month* for each of the four periods. This corrects for the differing durations of the intervention periods. What we see in Figure 13 is that there is a substantial amount of variability across census tracts. This is again a function of the relatively small numbers. However, a couple of consistent patterns emerge. The first is that among the cluster of "Very High" risk CTs around the Central Core, the two primary CTs (191.04 and 191.07) generally have the highest deaths per month. In all instances, the intervention periods see higher deaths per month than we find in the pre-2017 period. Within the three intervention

periods, however, there does not appear to be any systematic trend. That is not the case for the remaining parts of Surrey where the number of deaths per month increased from the pre-2017 period through the three intervention periods.

Again, the numbers of deaths are relatively few, so it is inadvisable do draw an incontrovertible statistical conclusion at this point. If there is an emerging pattern, however, it is that none of the core CTs experienced the consistent pattern of increases in deaths over the intervention period (2017-2018) that is seen in the rest of the City.

**FIGURE 13: DEATHS PER MONTH BY CORE CENSUS TRACT**




## PROPERTY CRIMES

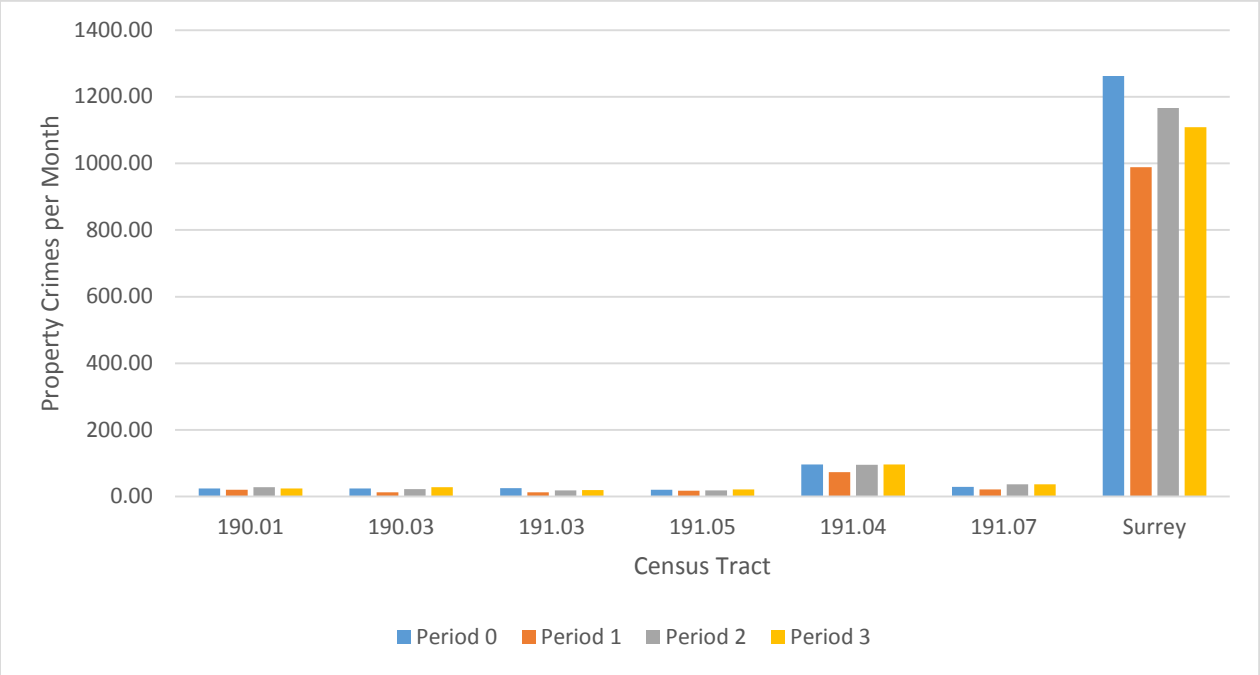
The third element under consideration beyond opioid-related overdoses and deaths is property crimes. The number of reported crimes during the period under consideration is presented in Table 7. As with opioid-related overdoses and deaths, property crimes within Surrey are reported disproportionately in the core Whalley area of the City.

Again, due to the differing durations of the interventions, the number of reported crimes per month were calculated and presented in Figure 14. The remarkable aspect of Figure 14 is that, despite the substantial variations in opioid-related overdoses and deaths illustrated in Figures 12 and 13, property crime rates appeared remarkably consistent with time.

**TABLE 7: NUMBER OF PROPERTY CRIMES IN TARGET AREA (RATES PER 1,000 POPULATION IN PARENTHESES)**

| | Period | | | | |
|---|---|---|---|---|---|
| **Core Area** | **Period 0** | **Period 1** | **Period 2** | **Period 3** | **Total** |
| 191.04 | 2,323 | 438 | 1,146 | 579 | 4,486 |
| | (335.5) | (63.2) | (165.5) | (83.6) | (647.8) |
| 191.07 | 702 | 129 | 437 | 219 | 1,487 |
| | (178.4) | (32.8) | (111.1) | (55.6) | (377.9) |
| Total | 3,025 | 567 | 1,583 | 798 | 5,973 |
| | (278.5) | (52.2) | (145.8) | (73.5) | (550.0) |
| **Adjacent Area** | **Period 0** | **Period 1** | **Period 2** | **Period 3** | **Total** |
| 190.01 | 580 | 121 | 333 | 145 | 1,179 |
| | (64.4) | (13.4) | (37.0) | (16.1) | (131.0) |
| 190.03 | 576 | 78 | 269 | 167 | 1,090 |
| | (83.5) | (11.3) | (39.0) | (24.2) | (158.1) |
| 191.03 | 618 | 76 | 226 | 116 | 1,036 |
| | (110.0) | (13.5) | (40.2) | (20.6) | (184.3) |
| 191.05 | 490 | 108 | 227 | 126 | 951 |
| | (121.4) | (26.8) | (56.3) | (31.2) | (235.7) |
| Total | 2,264 | 383 | 1,055 | 554 | 4,256 |
| | (88.6) | (15.0) | (41.3) | (21.7) | (166.6) |
| **Surrey (Other)** | **Period 0** | **Period 1** | **Period 2** | **Period 3** | **Total** |
| Remaining CTs | 30,285 | 5,934 | 13,998 | 6,654 | 56,871 |
| | (62.9) | (12.3) | (29.1) | (13.8) | (118.1) |

**FIGURE 14: PROPERTY CRIMES PER MONTH BY CORE CENSUS TRACT**




## SUMMARY

This section provides a more refined examination of the impact that the CCRP may have had on the rates of overdoses, deaths and property crimes in the Central Core or target area. To more fully appreciate the impact that the CCRP may or may not have had on what was happening in the Core, we contrasted patterns in those two key CTs with a series of adjacent CTs that had been identified as "High Risk" zones, and the remainder of the City.

While the overall pattern we find in this analysis differs little from the macro "before-after" analysis of the previous section, there are some nuances that become more evident. To summarize the results, for overdoses, we find that:

- The two Core Area census tracts experienced slightly more than two-thirds of the total number of recorded overdoses over the entire four-year period
- The adjacent CTs accounted for an additional 11% of the reported overdoses, with the remaining 55% being spread across the rest of the City
- In general, there was an increase in overdose rates across the entire city from before 2017 to a peak in 2017. In contrast, the Central Core and adjacent CTs saw a slight decline in rates in phase 2 of the CCRP (Period 2).
- Overall, there was a decrease in overdoses throughout the City in the final six months of 2018. This corresponds to the implementation of phase three of the CCRP (the housing phase). It should be noted, however, that this pattern was replicated throughout the City and not just in the Central Core.

Regarding deaths:

- The two Central Core CTs had the highest overall death rates across all periods examined.

- In the City as a whole, all three intervention periods saw higher deaths per month than occurred in the pre-intervention period.
- While the overall death rate increased in the Core and adjacent CTs in the intervention period, none of the core CTs experienced the consistent pattern of increases in deaths that was seen in the rest of the City.

Unlike overdoses and deaths, while there were annual fluctuations, property crimes remained relatively consistent across all parts of Surrey.

## Demographics of Opioid-Related Deaths

Unfortunately, limited information is available on where opioid-related deaths occur and on the personal characteristics of the victims. Over the three-year period, 2016-2018 inclusive, 403 deaths were recorded within the City of Surrey.[10] This analysis will focus on the known characteristics of those victims.

### GENDER

Consistent with other data relating to opioid-related mortality, most victims in Surrey are males. What does stand out, however, is the dramatic proportionate increase in male deaths in comparison to females over time. As Table 8 indicates, while the number of female overdose victims increase by about 60% (32 v. 20) over the three-year period, the increase in the number of male victims increased by about 114% (136 v. 63). Consequently, while the male to female death ratio was about 3.15:1 in 2016, it increased to 4.25:1 in 2018. Male deaths not only increased in absolute numbers, they also increased at a much greater rate than deaths among females.

**TABLE 8: GENDER OF VICTIM BY YEAR**

| Gender | Year | | |
|---|---|---|---|
| | 2016 | 2017 | 2018 |
| Female | 20 | 21 | 32 |
| Male | 63 | 131 | 136 |
| Total | 83 | 152 | 168 |

### AGE

The variation in age among victims is quite wide. As Table 9 illustrates, for the three years under investigation, victims have ranged from those in their mid-teens to senior citizens. Most, however, are individuals around 40 years of age. Unlike gender, the age profile of the victims has been relatively stable with time.

[10] A total of 403 opioid-related deaths were recorded in Surrey. This number is contrasts with the previous geographical analysis where there was census tract information on the location of 399 cases.

**TABLE 9: AGE OF VICTIM BY YEAR**

| Age | Year | | |
|---|---|---|---|
| | 2016 | 2017 | 2018 |
| Minimum | 19 | 14 | 17 |
| Maximum | 67 | 81 | 66 |
| Average | 39.4 | 41.9 | 38.5 |
| Standard Deviation | 10.4 | 13.0 | 11.7 |
| No. of Cases | 83 | 152 | 168 |

## RACE

Table 10 provides a breakdown of victims by race. Most of the victims of opioid-related overdoses are classified either as "Caucasian," South Asian or Aboriginal. This is not surprising since those groups are highly proportionate to the overall population in the Surrey area. The biggest increases in deaths has occurred among Caucasians, where the number jumped by close to 100% from 2016 to 2017 and 2018 (53 to 101 and 94 respectively). A similar pattern can be found among South Asians where there was a doubling in the number of deaths from 2016 to 2017 (13 to 27) and a further 60% increase from 2017 to 2018 (27 to 43). While the proportion of deaths is quite small in relation to Caucasians and South Asians, the pattern among other ethnic/racial groups in the area appears stable over time. This is also the case for Aboriginal people who compose the third largest identifiable group of victims.

**TABLE 10: RACE OF VICTIM BY YEAR**

| Race | Year | | |
|---|---|---|---|
| | 2016 | 2017 | 2018 |
| Aboriginal | 12 | 10 | 17 |
| Asian | 0 | 5 | 4 |
| Black | 4 | 6 | 5 |
| Caucasian | 53 | 101 | 94 |
| Hispanic | 1 | 0 | 3 |
| Middle Eastern | 0 | 1 | 1 |
| South Asian | 13 | 27 | 43 |
| Unknown | 0 | 2 | 1 |
| Total | 83 | 152 | 168 |

## LOCATION OF DEATH

Limited information is also available on the location where the victim was located.[11] As Table 11 illustrates, about three-quarters of the victims, are found in a residence of some type. An additional 10% are found outside on a "street" location. The remainder are found in a variety of locations from parks to motor vehicles to hospitals. What is not known, with perhaps the exception of a hospital setting, is whether the victims were alone or in the company of others when they overdosed.

**TABLE 11: LOCATION OF DEATH BY YEAR**

| Location | Year | | |
|---|---|---|---|
| | 2016 | 2017 | 2018 |
| Barn | 0 | 1 | 0 |
| Commercial Residence | 0 | 8 | 6 |
| Commercial Washroom | 1 | 1 | 1 |
| Government Institution | 0 | 0 | 1 |
| Hospital | 1 | 4 | 8 |
| Residence | 63 | 117 | 126 |
| Street | 13 | 14 | 14 |
| Vehicle | 3 | 5 | 8 |
| Wooded Area-Field/Park | 2 | 1 | 4 |
| Total | 83 | 151 | 168 |

## SUMMARY

Limited information was available on overdose victims. In summary, however:

- The majority of victims were male. Mortality rates increased substantially in 2017-2018 over 2016, with rates among women increasing by about 50% while rates among men doubled.
- The average age of victims was about 40 years-of-age, although there was considerable variation from those in their late teens to individuals beyond retirement age.
- Most victims were identified as "Caucasian" and the mortality rate among that group doubled after 2016. South Asians were the second largest racial group with their mortality rate doubling from 2016 to 2017 and further increasing by 60% from 2017 to 2018. There was no identifiable pattern among the other groups identified.
- Three-quarters of the victims were discovered in residences with an additional 10% found on a "street" location.

[11] Information was missing on one victim in 2017; hence, the total of 151 as opposed to 152 in the previous tables.

## Conclusions

The "opioid crisis" has taken a substantial toll on the citizens of Surrey and of British Columbia as a whole. Beyond the human tragedy resulting from overdoses and deaths, opioid dependency has placed a strain on the City's resources and on the broader social fabric. Overall, it is a social tragedy for which there appear to be few easy policy solutions. It is also evident that opioid addiction and its consequences are complex phenomena that require a significant amount and diversity of resources if they are to be addressed successfully. While opioid addiction cuts across all social strata, it is perhaps among the itinerant poor that it is most evident.

In British Columbia and, increasingly, throughout much of the rest of Canada, local municipalities are trying to respond in a significant manner. Typical responses include such developments as the establishment of safe consumption sites, increasing the number of Recovery Houses, better training for first responders to deal with overdose situations, and the broader distribution of naloxone kits. All of these efforts and more are taking place within Surrey.

The establishment of a "Tent City" in City Centre merely highlighted how the problem was focused in one area of Surrey. In response, City Council created Surrey's Centre City Response Plan to try to mitigate some of the consequences of street-level drug use. The plan consisted of three main components: an enhanced service presence based on the *Surrey Outreach Team* (SOT); the Introduction of *SafePoint*, a safe supervised consumption site; and, the initiation of an *Emergency Housing First* program. The plan was implemented in three overlapping phases starting January 1, 2017.

Looking at the data, it is not unambiguously evident that the CCRP had an impact above and beyond the other activities that were occurring within the City more broadly. It is the case that in the Period 3 (the final six months of 2018), the number and rate of *overdoses* in the City Centre area declined substantially. Then, again, they simultaneously declined throughout most of the rest of the city.

On the other hand, the rate of opioid-related *deaths* appeared to stabilize or even decline in the Core Area while they increased in the rest of the City. This was particularly the case in Period 3 when the Emergency Housing First component was implemented. It is still too early to conclude that the Emergency Housing component of the CCRP was responsible for the decline in opioid-related deaths. Six months is a short duration particularly since part of that time involved putting the housing units in place. A longer follow-up would help to provide more insight into the impact of that implementation. The collection of on-site, qualitative research would also be of substantial benefit in determining the relationship between the resources expended by the City, how people took advantage of those resources, and what impact they had on drug use and its consequences.

The third component examined—property crimes—appeared to be relatively time-invariant across all regions of the City. Areas with high reported crime rates continued to have high rates while areas with lower rates continued to report lower rates.

It should also be noted that the impact of the CCRP might extend beyond the three indicators examined in this study. Again, further monitoring over a longer duration and a detailed collection of qualitative data would assist in that assessment.

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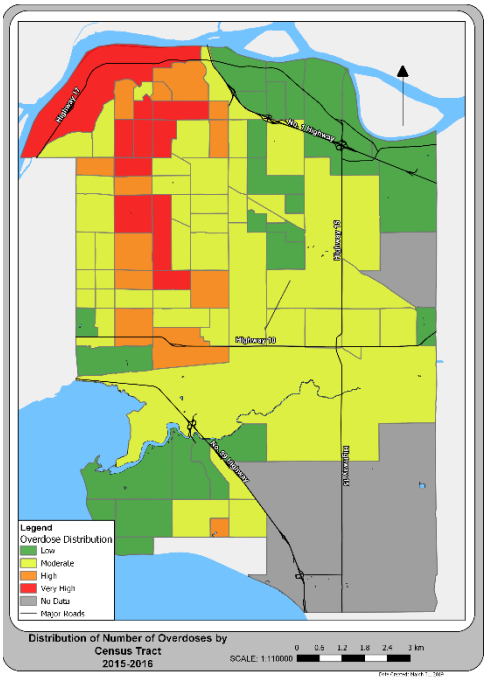
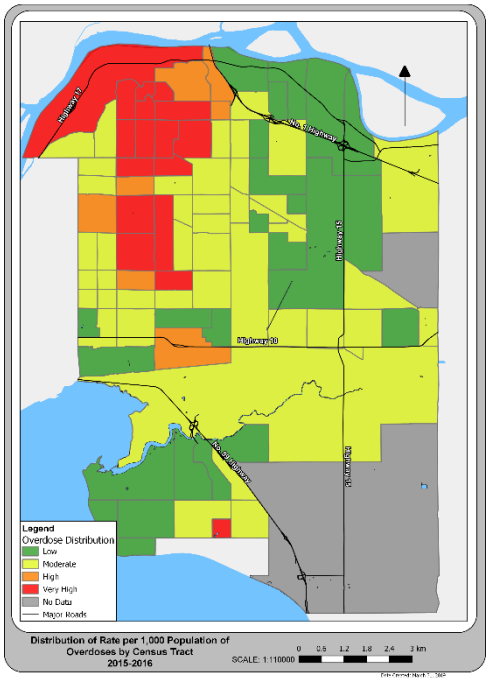
# Appendix

## OVERDOSES PRE-2017

### FIGURE 3A: NUMBER OF OVERDOSES BY CENSUS TRACT

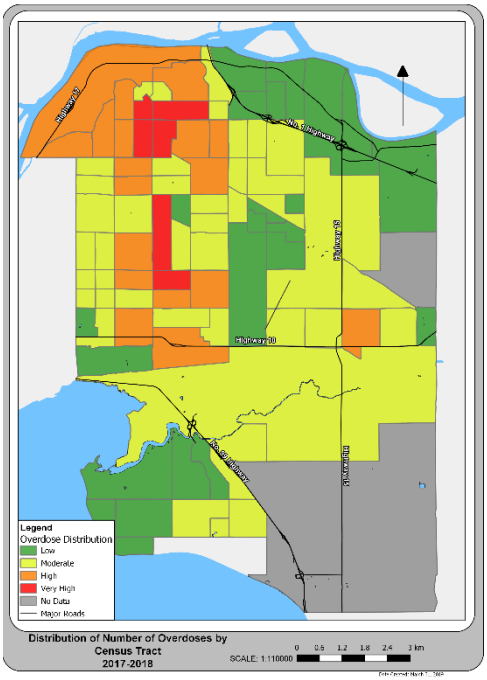



### FIGURE 1B: RATE OF OVERDOSES BY CENSUS TRACT

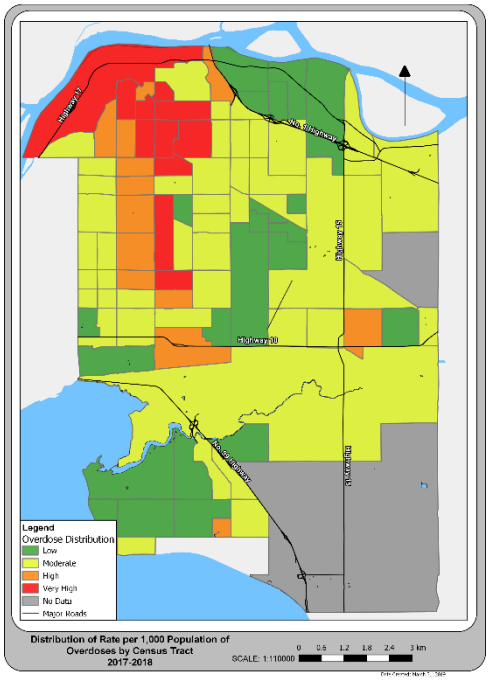



## OVERDOSES POST-2017

### FIGURE 4A: NUMBER OF OVERDOSES BY CENSUS TRACT

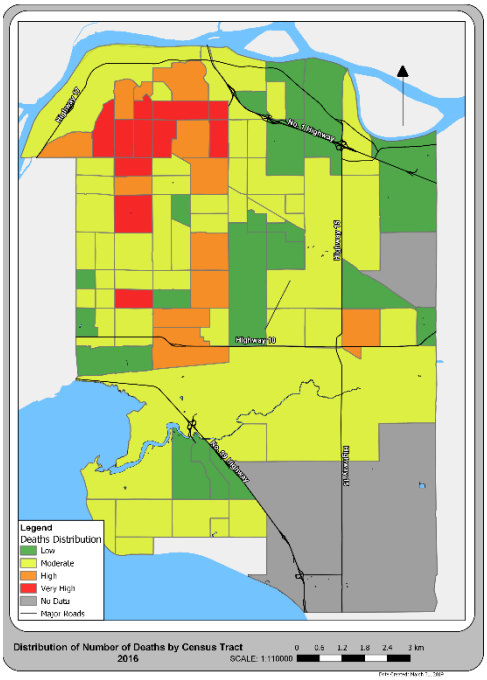



### FIGURE 2B: RATE OF OVERDOSES BY CENSUS TRACT

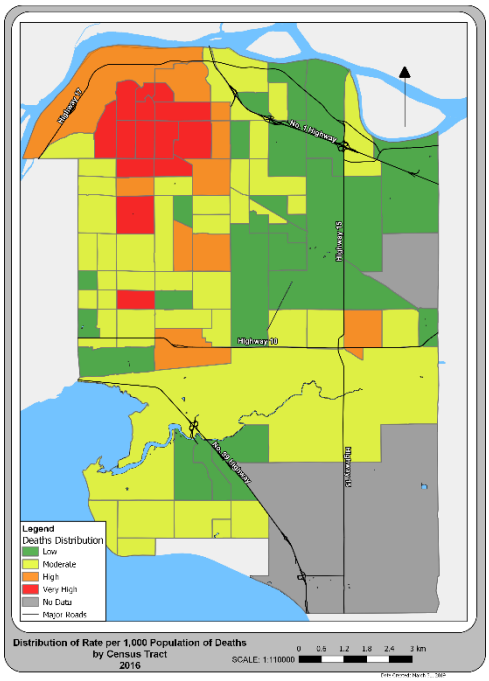


## DEATHS PRE-2017

### FIGURE 5A: NUMBER OF DEATHS BY CENSUS TRACT

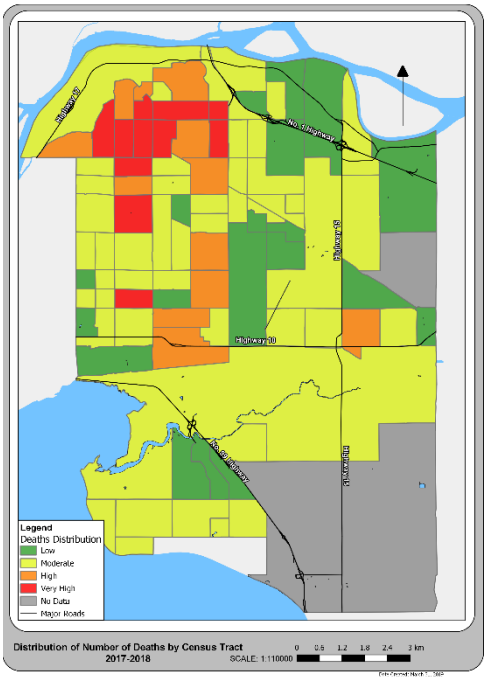



### FIGURE 3B: NUMBER OF DEATHS BY CENSUS TRACT

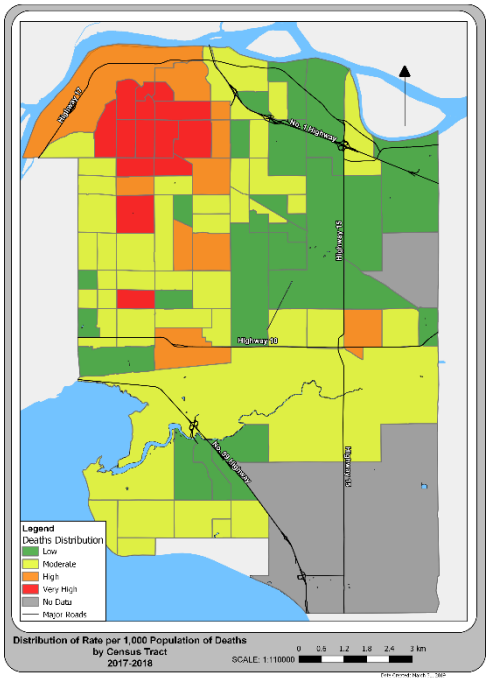



## DEATHS POST-2017

### FIGURE 6A: NUMBER OF DEATHS BY CENSUS TRACT

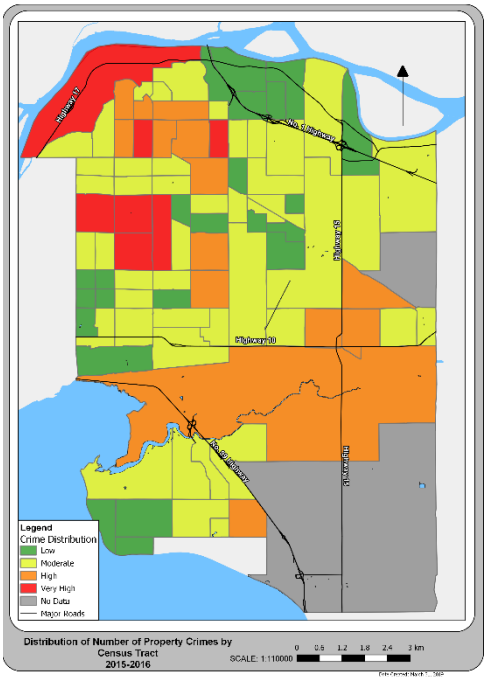



### FIGURE 4B: RATE OF DEATHS BY CENSUS TRACT

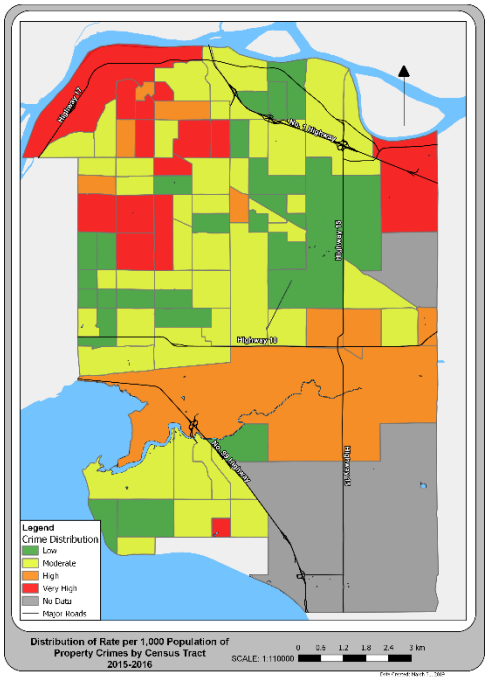


## CRIMES PRE-2017

### FIGURE 7A: NUMBER OF CRIMES BY CENSUS TRACT

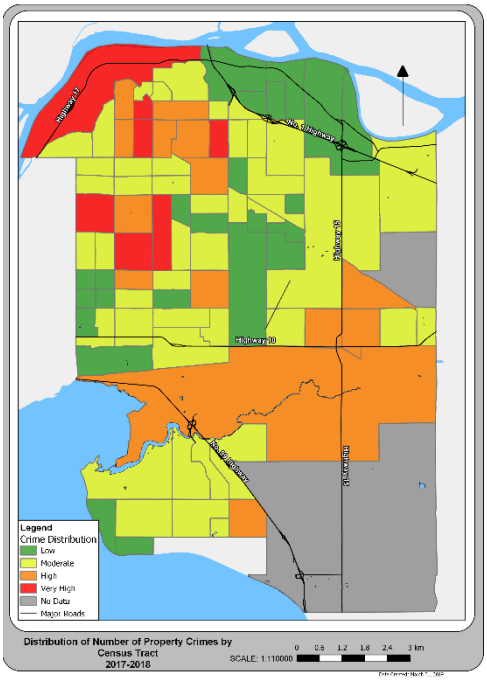



### FIGURE 5B: RATE OF CRIMES BY CENSUS TRACT

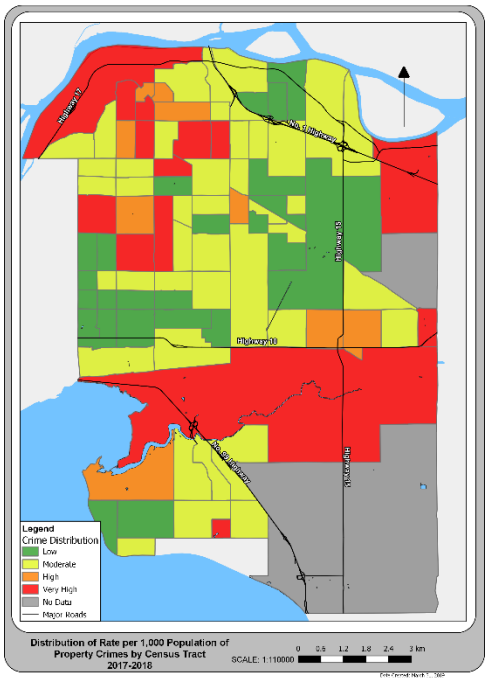



## CRIMES POST-2017

### FIGURE 8A: NUMBER OF CRIMES BY CENSUS TRACT




### FIGURE 6B: RATE OF CRIMES BY CENSUS TRACT



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