

Montgomery County Residents Hospital Emergency Department Visits for Accidental Overdose on Selected Drugs, 2007-2010

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Introduction

This brief report describes, in very general terms, Montgomery County residents who presented to Emergency Departments (EDs) at hospitals in Montgomery County for treatment of an accidental drug overdose (OD) from 2007-2010. Its purpose is to broaden the perspective on the unintentional drug overdose problem as manifested in Montgomery County, Ohio. To date, the issue has been framed largely by mortality data from the Montgomery County Coroner's Office and the Ohio Department of Health. While highly informative and extremely useful, these data only partially reflect the nature and extent of the problem as they are based solely on people who have died from an accidental drug overdose. It is our hope that bringing local ED OD data to light will help inform the discussion and lead to an appropriate response to a public health problem that is affecting our community and many others.

Methods

Tabulations in this report are based on data provided in a de-identified form by the Greater Dayton Area Hospital Association. The data were used to gain a better understanding accidental OD phenomenon in Montgomery County as well as to develop a very rough profile of residents who presented to EDs in Montgomery County for treatment of accidental drug overdoses.

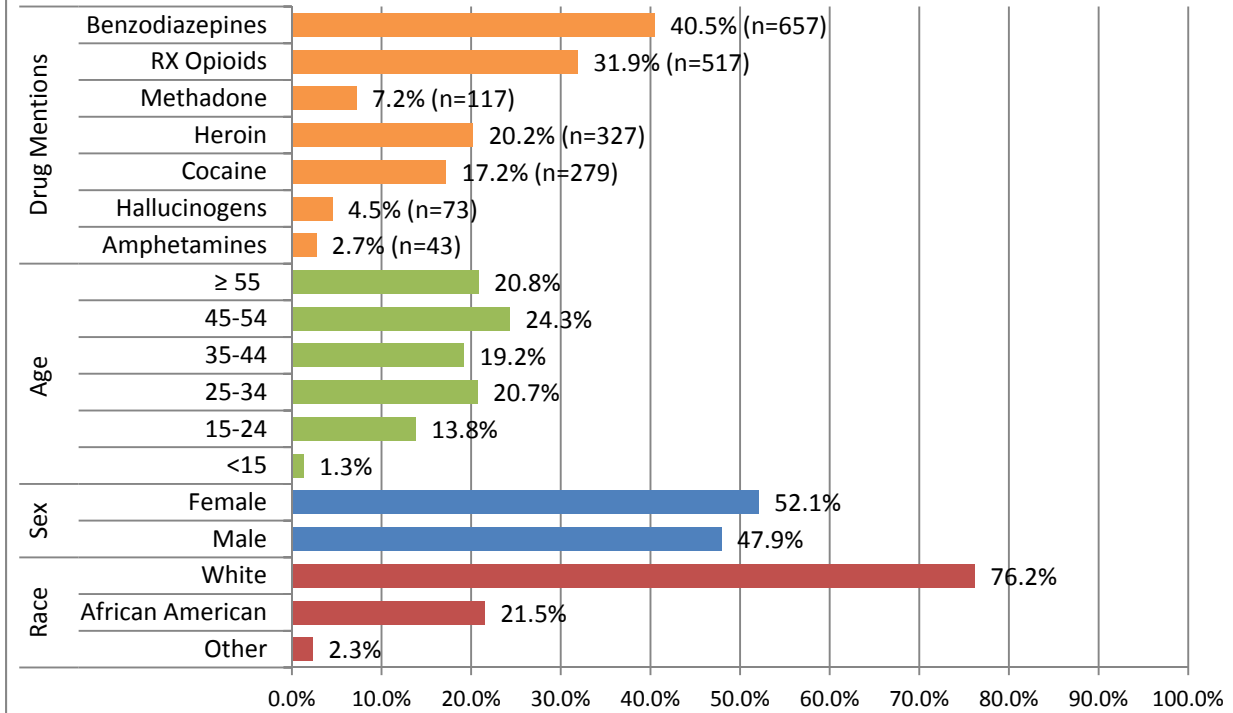
The variables considered were age, gender, race/ethnicity, residency, and ICD-9 codes for selected drugs. Residency was determined by the zip code information collected by the hospitals. ICD-9 codes identified accidental (as opposed to intentional) overdoses associated with specific drugs or drug types. International Classification of Diseases – Ninth Revision (ICD-9) codes are used by hospitals to specify diagnoses on billable reimbursement claims. ICD-9 codes were used to enumerate ED ODs associated with the following 7 drugs/drug types: amphetamines, benzodiazepines, cocaine, hallucinogens, heroin, methadone, and prescription (Rx) opioids other than methadone.

Univariate statistics were used to describe the data where applicable.

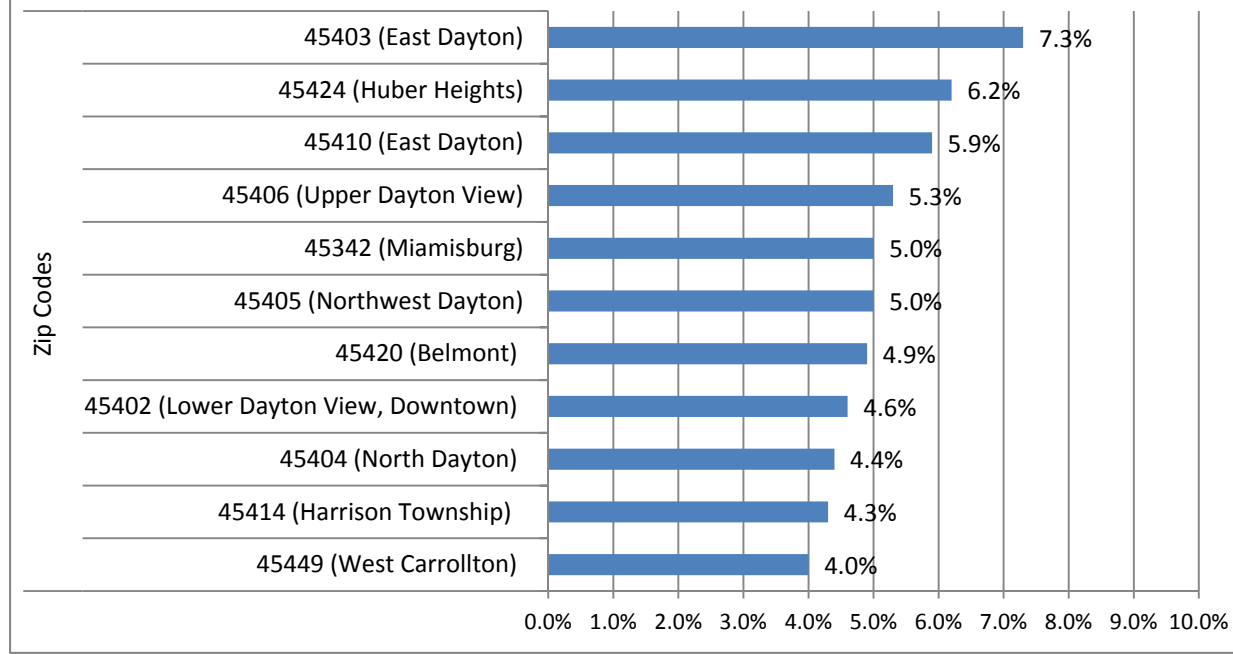
Findings

Between January 1, 2007 and December 31, 2010, EDs in Montgomery County treated 1937 Montgomery County residents who received ICD-9 codes indicating accidental drug poisonings. Of these, 1622 (83.7%) visits (373 in 2007; 447 in 2008; 415 in 2009; 387 in 2010) involved one or more of the aforementioned 7 drugs (*see Graphs on pages 2-3*). Of the 315 cases not included in this report, 265 (84.1%) involved either antidepressants or anti-psychotics. The remainder involved barbiturates, alcohol, or other drugs whose identity could not be determined with certainty from the ICD-9 coding.

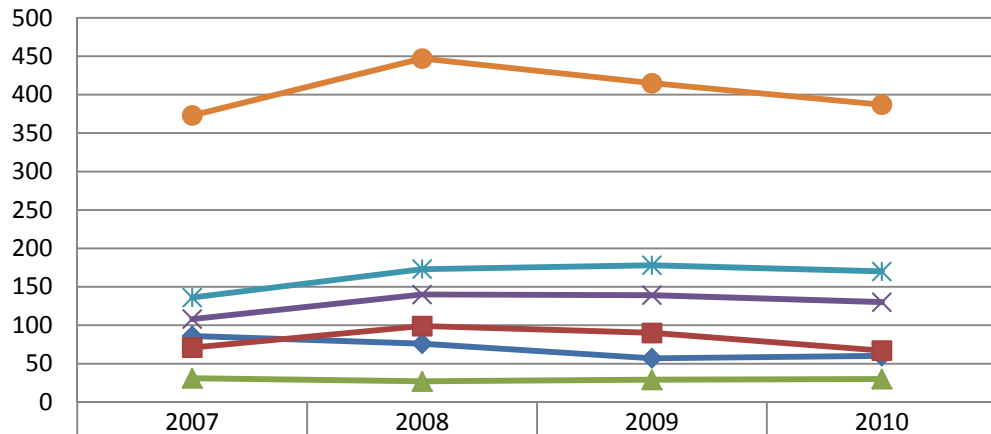
Characteristics of ED Visits for 7 Selected Drugs, 2007-2010 (N=1,622)



Zip Codes Contributing ≥4% of Total ODs at EDs (2007-2010)

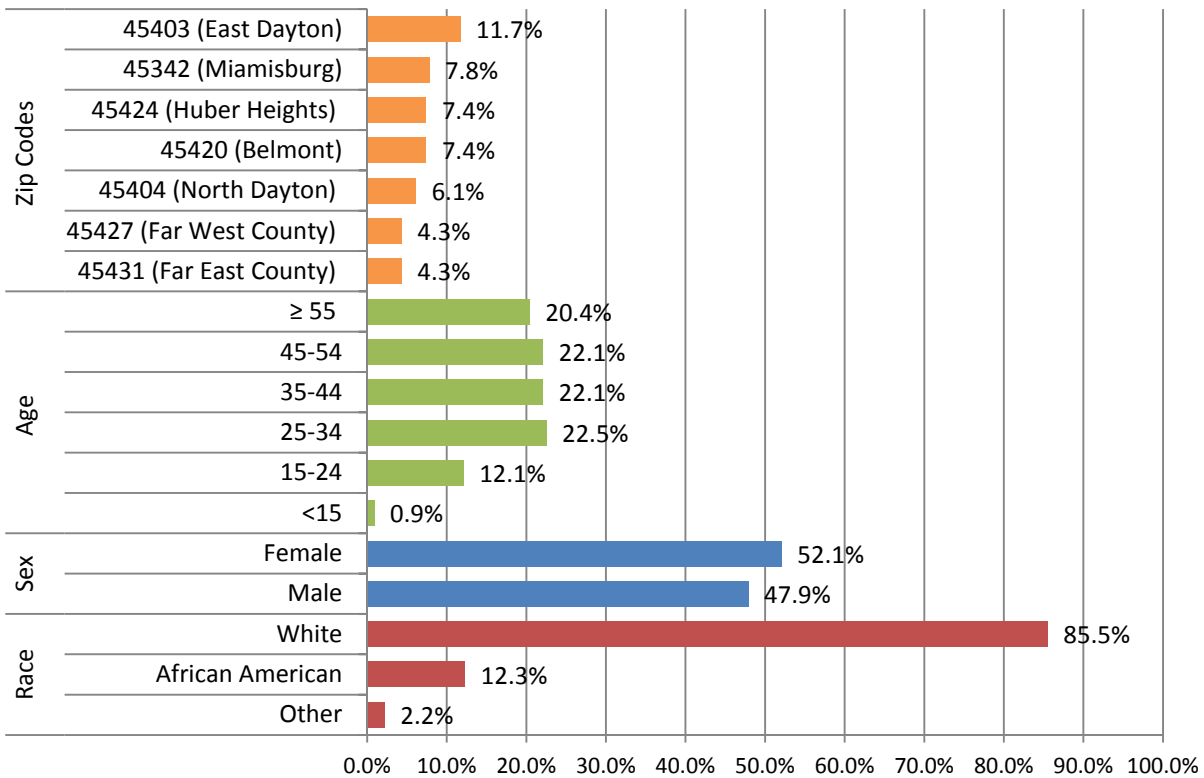


ED Visits and Mentions of Selected Drugs by Year, 2007-2010



◆ Cocaine	86	76	57	60
■ Heroin	71	99	90	67
▲ Methadone	31	27	29	30
✕ RX Opioids	108	140	139	130
* Benzodiazepines	136	173	178	170
● ED Visits	373	447	415	387

ED Visits with ICD-9 Codes for Multiple* Opioids or Opioids/Benzodiazepines, 2007-2010 (N=231)



*Includes cases that were coded as methadone and another Rx opioid or any Rx opioid (including methadone) and a benzodiazepine.

Discussion

The data upon which this report is based are subject to a number of limitations. First, the data are from hospital billing departments, not medical record reviews. Sometimes there are differences between patient medical records and how diagnoses are coded and subsequently billed. Second, not all accidental drug overdoses are diagnosed as such. Thus, the data in this report likely somewhat underestimate the extent of the problem. Third, for a variety of reasons, the identity of the drug(s) on which a person has overdosed is not always verified by toxicology tests at a hospital during an ED visit. Simply, sometimes there is no quick test for the drug which has caused the problem. For example, as of this writing, methcathinone, MDPV and mephedrone, possible ingredients in some “bath salts,” are not detectable with an instant urine or saliva test. Further, there is, as of this writing, some variation in the ICD-9 coding of “bath salt” overdoses. Sometimes they are coded under Hallucinogens, sometimes under Stimulants, and sometimes under Unspecified agents. Consequently, there is some reason to believe that not every accidental drug overdose case is coded appropriately with respect to the poisoning agent. Fourth, a person who has overdosed on two (or more) drugs that fall under the same ICD-9 code, e.g., hydrocodone and oxycodone (ICD-9 code E850.2), are coded only once. Thus, the number of mentions for a specific drug (or drug type or drug class) cited in this report are likely lower than their actual occurrence since a single code may not reflect the complete poisoning picture. Fifth, zip codes are imperfect indicators of the extent and location(s) of the problem within the county. This has a number of implications. For example, only people who reported an address with a Montgomery County zip code are included in the data set. Thus, *non-residents* who overdosed in Montgomery County and visited a hospital in Montgomery County are not included in the data. Similarly, Montgomery County residents who overdosed and presented at a hospital outside of Montgomery County are not included in the data either. In addition, although the vast majority of zip codes in this report are contained within the boundaries of Montgomery County, several bleed into contiguous counties. Sixth, the data presented represent visits/cases, not separate individuals. Since the data were de-identified, it is not possible to ascertain the number of people who contributed more than one case to the data base. Seventh, although the data show how many cases were treated at EDs in Montgomery County from 2007-2010, they do not reflect the extent of the overdose problem, not only for some of the reasons noted above, but also because there is evidence to indicate the vast majority of persons who die from accidental drug overdoses die before reaching an ED. For example, in 2010, only 20 of the 127 (15.7%) people who died in Montgomery County from an unintentional drug overdose reached a hospital ED. Thus, when factoring in data from the Montgomery County Coroner’s Office, there is good reason to think there are, on average, 500 plus cases of accidental drug overdose the in the county each year involving the selected drugs highlighted in this report. In addition, for a variety of reasons, an unknown number of drug overdoses never come to the attention of medical centers or legal authorities. Some ODs are

treated by bystanders, friends and family at the scene of the event for fear of legal repercussions.

Even with these limitations, the data provide important perspective on the accidental drug overdose problem in Montgomery County. Perhaps the most interesting and potentially useful finding emanates from the zip code data. Although OD ED cases occur across the county (indeed, the Miami Valley, Ohio and the US) and in all zip codes, more than one-half (52.5%) of the cases occurred among people whose residence was in one of eleven zip codes (*see Maps on pages 8-10*). There are 39 zip codes in Montgomery County. It is important to note that population density varies across zip codes as do a host of economic and demographic factors. Nevertheless, while these findings may surprise some observers and not others, they can help geographically target neighborhood-level interventions to help reduce the accidental OD problem. Such interventions could be implemented following well-known health behavior theory and public health practices. While interventions targeting users and their families may help reduce the problem, they will not solve it as the problem is multi-factorial in nature (Webster et al. 2011), and public health-oriented interventions will not impact all factors.

Drug mentions from ED ODs are very consistent with Montgomery County Coroner's Office toxicology reports in that data from both sources show sedatives/tranquilizers and Rx opioids are the most frequently mentioned drugs relative to other drugs in accidental OD cases. The most frequently mentioned drugs in the Coroner's Office 2010 autopsy reports were sedatives, 93% of which were benzodiazepines, followed Rx opioids (WSU CITAR 2011); the most frequently mentioned drugs in ED OD cases, regardless of the sample size (1937 or 1622), were benzodiazepines, such as alprazolam, followed by Rx opioids, such as hydrocodone and oxycodone. The relatively large number of people suffering an OD caused or complicated by benzodiazepines demonstrates not only that they are widely prescribed and misused but that their use can result in symptoms which may precipitate an ED visit. Fortunately, most benzodiazepines have relatively high margins of safety when *not* combined with other drugs that depress the central nervous system (CNS). When combined with other CNS depressants, such as an opioid or alcohol, benzodiazepine use can be very problematic, sometimes lethal.

Specific drug mention data for the four year time period covered by this report show a large increase in benzodiazepine and Rx opioids (exclusive of methadone) mentions from 2007 to 2008, then stabilization. Methadone mentions (virtually all of which are related to methadone prescribed for pain relief, not methadone used to treat drug addiction) have remained stable over the reporting period. Cocaine mentions appear to have decreased somewhat, while heroin mentions reveal no pattern. Notably, any given case can contribute more than one drug to the drug mention count. In fact, data show that, at a minimum, given the aforementioned limitation in ICD-9 coding, about 14% of the ED OD cases involved people who had more than one opioid (heroin, methadone, other Rx opioids) in their system, or an opioid and a

benzodiazepine, upon arrival at the hospital. Generally, accidental ODs involving multiple CNS depressants have the highest likelihood of very bad outcomes.

Recently published data from the CDC show the most widely prescribed drugs in the United States for people aged 20-59 were anti-depressants followed very closely by analgesics. CDC data also show that proportionately more women than men are prescribed these drugs, as are whites compared to other racial/ethnic groups (Gu et al. 2010). Thus, it is not surprising that women and whites made up a larger proportion of the ED OD population in Montgomery County than did other groups. Notably, age and race/ethnicity data for Montgomery County ED ODs are very much in concert with 2010 US Census data for the county. In terms of gender, census data show about 52% of Montgomery County residents are women; racially/ethnically, about 74% of the county residents white and 21% are African American.

Although this report focuses on the general demographics of people who overdosed and the specific types of drugs that brought them to an ED, the cost of OD ED visits merits some mention. We computed the average billed cost of outpatient treatment (an ED OD visit where the patient was not admitted to the hospital as an inpatient, aka treat-and-release) for an opioid (including heroin) overdose in 2010. The average cost, based on 54 visits where the primary ICD-9 code was an opioid poisoning, was \$4588 per case. This suggests that the cost of treating the 227 opioid cases presenting at area hospital EDs in 2010 was, at a minimum, \$1,041,476. Notably, these costs do not factor in those associated with the services provided by publically-funded Emergency Medical Services. Additionally, if opioid OD cases resulting in inpatient treatment had been considered, the monetary costs would be substantially more, as the cost for these cases is much higher than for treat-and-release cases. Further, the OD treatment cost for other drugs, such as benzodiazepines, was not calculated. The critically important point here is that, aside from the incalculable human costs associated with drug overdoses, there is a substantial financial cost as well.

Conclusion

This is a brief report with a number of limitations. Still, it provides information that allows additional insight into the accidental drug overdose problem in our community. The nature and extent of the phenomenon are clearer. Aside from the 500 plus Montgomery County residents who experienced an OD in 2010, their family, friends, and co-workers were also affected by the event in some way. So, in a real sense, these unintentional ODs likely touched thousands of people. We also now have a better idea of the short-term health care costs associated with a segment of the OD problem. Virtually all of us pay for the problem, and the costs, whether human and financial, are not insignificant. We also know that although the problem exists across the county, it is more prevalent in some areas than in others. This finding could be useful in the development and implementation of various interventions to reduce the problem.

Acknowledgments

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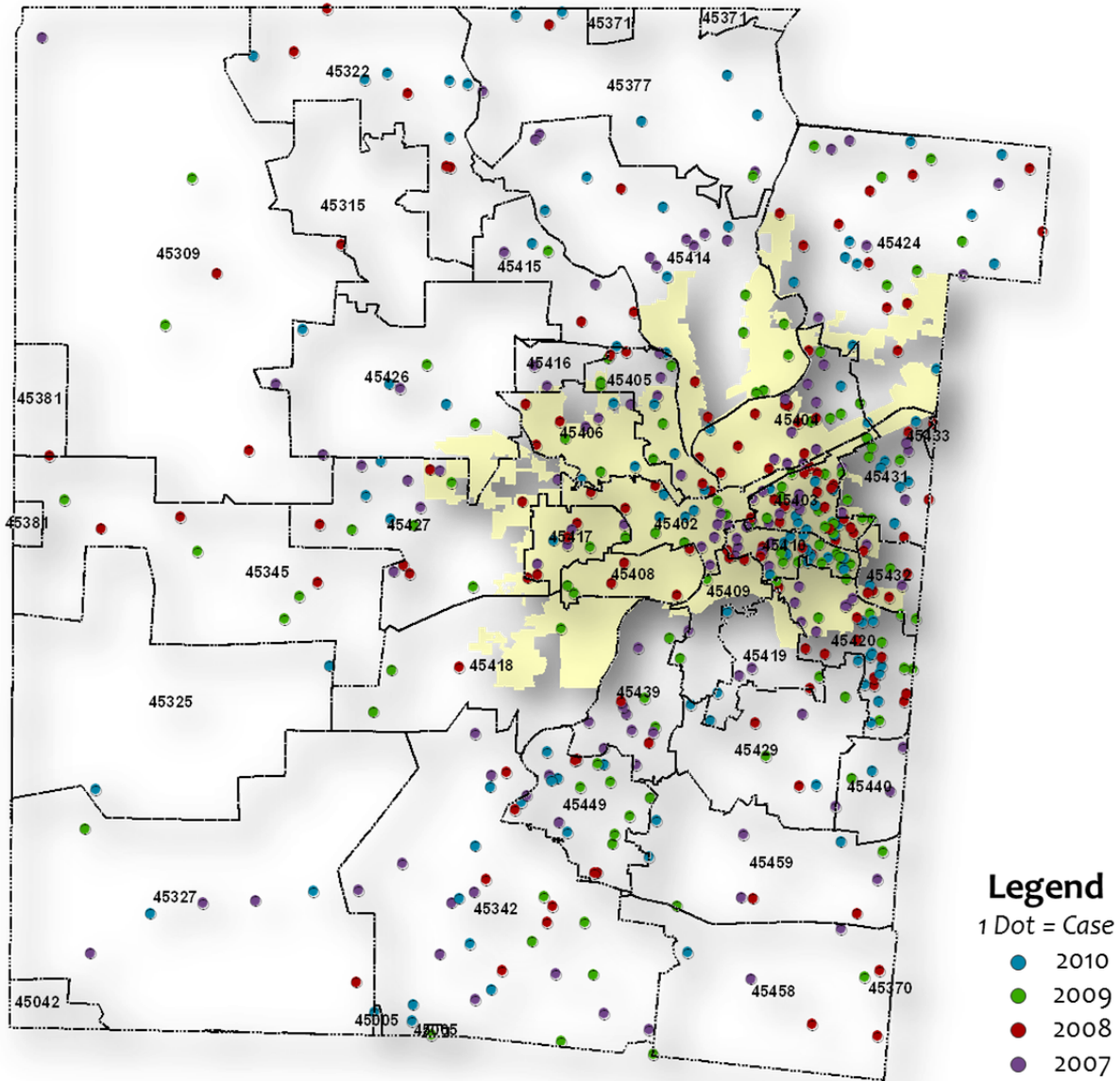
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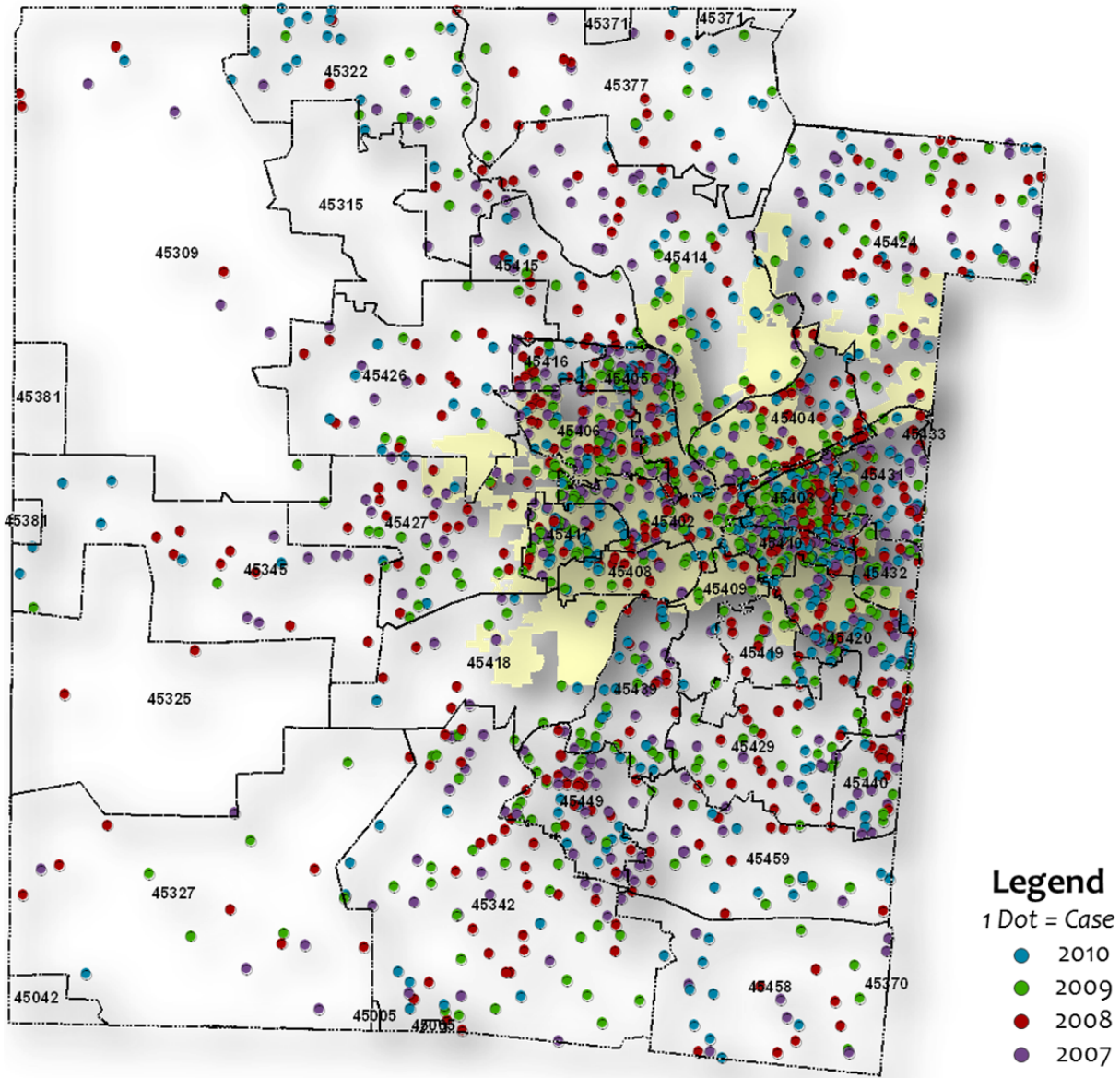
Overdose Cases Resulting in Death, 2007-2010

Montgomery County, Ohio



Overdose Cases Resulting in ED Visits, 2007-2010

Montgomery County, Ohio



Overdose Cases, 2007-2010
(ED ODs and Deaths Combined)
Montgomery County, Ohio

