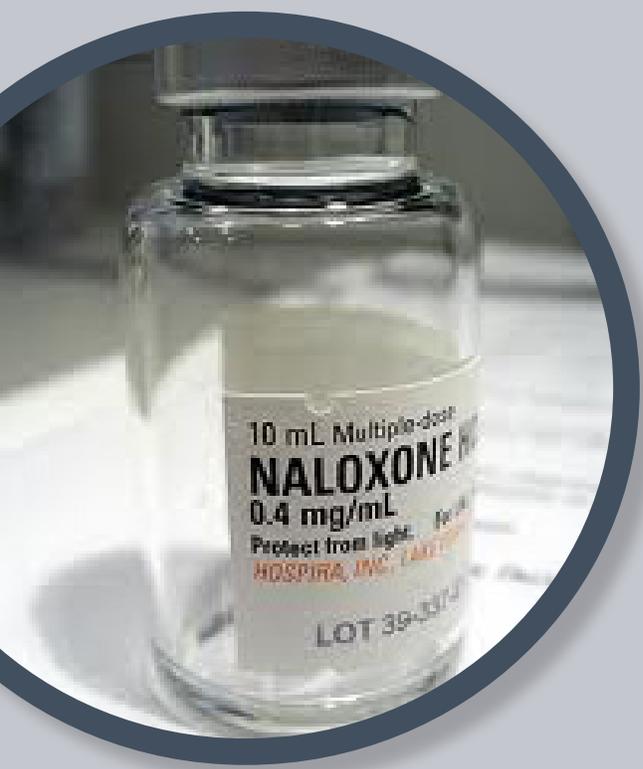




Epidemiological Report, No. 2
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Naloxone (Narcan®) Administration in Ohio 2003-2012





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Background

The Ohio Department of Mental Health and Addiction Services (OhioMHAS) has observed alarming trends in drug overdose over the last decade. During calendar years 1999 - 2011, Ohio's death rate due to unintentional drug overdoses increased 440 percent.¹ Opioids (prescription opioids and/or heroin) were involved in 65.4 percent of all unintentional drug overdose deaths in 2011.² The increase in deaths has been largely driven by abuse and misuse of prescription opioid pain medications. A variety of societal and medical trends have led to the rise in prescription pain medication abuse and misuse. These trends include the direct-to-consumer marketing of pharmaceuticals and changes in clinical pain management, which have led to a rise in opioid use in the population.³ The costs associated with opioid-related poisoning are staggering. Nationally, it is estimated the direct and indirect costs of opioid poisoning to be \$20.4 billion in 2011, with prescription opioids representing a majority of the cost (78%).⁴ Costs are highest for those who have died due to overdose. In Ohio, the estimated annual cost of overdose fatalities is \$3.5 billion, with \$4.9 million per year in direct medical expenses.⁵

Coinciding with the increase in mortality, the number of emergency medical services (EMS) runs for suspected opioid-related overdose also have increased. Emergency medical technicians (EMTs) may dispense naloxone when they recognize that a person may be experiencing overdose; however, only EMT Paramedics and those with an Intermediate license may dispense the drug, while first responders and EMT Basics are not allowed to dispense the drug.⁶



The Ohio Department of Health discusses naloxone:²

Naloxone (also known as Narcan®) is a medication that can reverse an overdose that is caused by an opioid drug. When administered during an overdose, Naloxone blocks the effects of opioids on the brain and restores breathing within two to eight minutes. Naloxone has been used safely by emergency medical professionals for more than 40 years and has only one function: to reverse the effects of opioids on the brain and respiratory system in order to prevent death. Naloxone has no potential for abuse.

If Naloxone is given to a person who is not experiencing an opioid overdose, it is harmless. If naloxone is administered to a person who is dependent on opioids, it will produce withdrawal symptoms. Withdrawal, although uncomfortable, is not life-threatening.

One would suspect an increase in the overdose rates, considering the rise in the mortality rate. According to data from the Ohio Hospital Association, there were 13,428 emergency department visits in 2010 alone due to unintentional poisoning,⁷ but it is difficult to know the true number of opioid-related poisonings because some people refuse transport to an emergency room for fear of police involvement. While not a perfect metric for overdose, data on naloxone administration rates may help to understand who is being administered naloxone and where it is being administered.^{8,9} The purpose of this report is to describe trends and patterns in the incidence of naloxone administration by demographic and regional characteristics with EMS data from 2003-2012. Findings will be used to develop and influence drug prevention and treatment policies.

1. Ohio Department of Health. (2013, July 10). *Ohio's prescription drug overdose epidemic: Epidemiology, contributing factors and ongoing prevention efforts* [PowerPoint]. Retrieved from <http://www.odh.ohio.gov/~media/HealthyOhio/ASSETS/Files/injury%20prevention/PHW20pres1.ashx>
2. ODH Office of Vital Statistics.
3. Ohio Department of Health. (2013). Project DAWN (Deaths Avoided with Naloxone). Retrieved from
4. Inocencio, T. J., Carroll, N. V., Read, E. J., & Holdford, D. A. (2013). *The economic burden of opioid-related poisoning in the United States. Pain Medicine*. Advanced online publication. doi: 10.1111/pme.12183
5. Children's Safety network Economics & Data Analysis Resource Center, at Pacific Institute for Research and Evaluation. (2005).

Methodology

Naloxone Administration Data

Data on naloxone were collected quarterly by the Ohio Department of Public Safety (ODPS), Division of Emergency Medical Services, EMS Incident Reporting System (EMSIRS). EMS data are required to be submitted to EMSIRS. However, there are minimal sanctions for failing to submit, so the data are limited by the number of individual EMS agencies submitting data and the accuracy of these submissions. EMSIRS staff estimate that roughly 90 percent of EMS providers participate in data collection annually. Data for this report had to be added together from two data systems because EMSIRS is transitioning from its original standard to the new standards associated with the National EMS Information System (NEMSIS). Data reflect unique administrations of naloxone, and not doses. Data given to OhioMHAS were de-identified, so it is not possible to calculate the number of unique individuals being administered naloxone (e.g., numbers may show the same person being administered the drug on different days).

Census Data

Census data for this report were obtained for the calculation of administration rates. Historical population data for Ohio were obtained from the [2000-2010 intercessional estimates](#), and current population data for Ohio were obtained from the more recent [2010-2012 county characteristics estimates](#). Several estimates were available for the 2010 dataset; the population figures used for this analysis came from the April 1, 2010, estimates because OhioMHAS has used these estimates for other reports. Variables from these datasets were transformed in two instances because of the small numbers of naloxone administration in each category. The age groups 0-4, 5-9, 10-14 and 15-19 were added together to form a 0-19 age group. Also, the racial categories for "Asians" and "Native Hawaiian and Other Pacific Islanders" were added together to form a combined Asians/Hawaiian and Other Pacific Islander category.

Calculation of Administration Rates

Various administration rates for naloxone are calculated throughout the document. Each of these incidence rates is calculated on the basis of dividing the number of administrations per category by a year-specific Ohio population figure. The resulting statistic is then multiplied by 10,000 to determine a rate per 10,000 person years (PY). For example, the naloxone administration rate in 2003 is calculated by dividing the total number of administrations in 2003 by the intercessional population estimate for 2003, and then multiplying the figure by 10,000. Occasionally, some EMSIRS data was listed as "Unknown" or "Not Listed" for the variables age (4.7%), gender (1.0%) and race (17.3%). These numbers were not used for calculation of any age-, gender- and race-specific administration rates.



6. EMT classifications have recently changed, but the previous classifications are still referenced in the law. Individuals with the First-Responder license now are called Emergency Medical Responders, individuals with the EMT Basic license now are called EMTs, individuals with the Intermediate license now are called Advanced EMTs and individuals with the EMT Paramedic license now are just called Paramedics.
7. Falb, M. & Beeghly, C. (2012, October). *The burden of injury in Ohio: 2000-2010*. Ohio Department of Health, Division of Prevention and Health Promotion, Bureau of Health Ohio, Violence and Injury Prevention Program.
8. Knowlton, A., Weir, B. W., Hazzard, F., Olsen, Y., McWilliams, J., Fields, J., & Gaasch, W. (2013). EMS runs for suspected opioid overdose: Implications for surveillance and prevention. *Prehospital Emergency Care*, 17(3), 317-329.
9. Merchant, R. C., Schwartzapfel, B. L., Wolf, F. A., Li, W., Carlson, L., & Rich, J. D. (2006). Demographic, geographic, and temporal patterns of ambulance runs for suspected opiate overdose in Rhode Island, 1997-2002. *Substance Use & Misuse*, 41(9), 1209-1226.

Naloxone Survey

In 2012, a brief 15-item SurveyMonkey® questionnaire was sent to 1,627 EMS providers throughout the state. Respondents answered questions about overdose episodes in their community from July 1, 2011 to Dec. 31, 2011, through multiple-choice and open-ended questions. Some survey questions were similar to data kept by EMSIRS; thus, only select results are presented in this report.

EMSIRS Results

Naloxone (Narcan®) Administration

Approximately 74,000 naloxone administrations occurred from 2003 to 2012. The number of naloxone administrations per year grew every year from 4,010 in 2003 to 10,589 in 2012 (164%). This means that, on average, there were 11 administrations per day (or 334 per month) in 2003 and 29 administrations per day (or 882 per month) in 2012. Figure 1 analyzes the administration rate per 10,000 person years (PY). The annual rate of naloxone administration more than doubled from 3.51 in 2003 to 9.17 in 2012. The administration rate grew from 2003 to 2006 and then leveled off until 2012. Between 2011 and 2012, the rate of naloxone administration grew 21 percent, representing the second highest increase in the past 10 years.

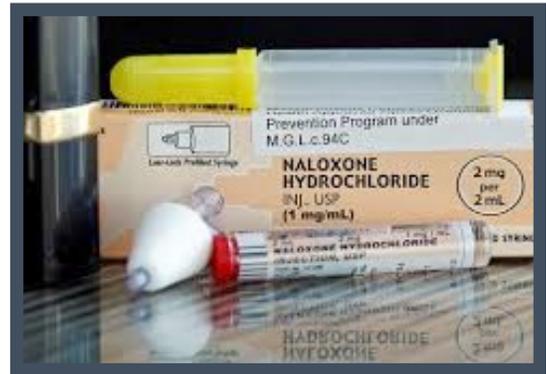
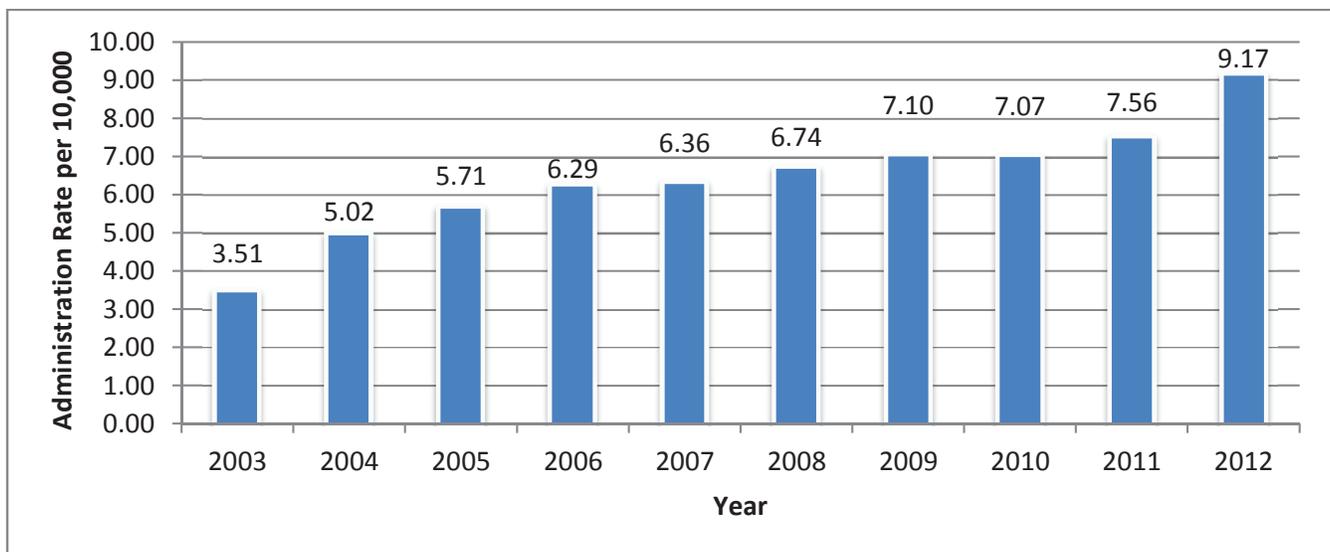


Figure 1. Incidence rates of naloxone administration, Ohio, 2003-2012



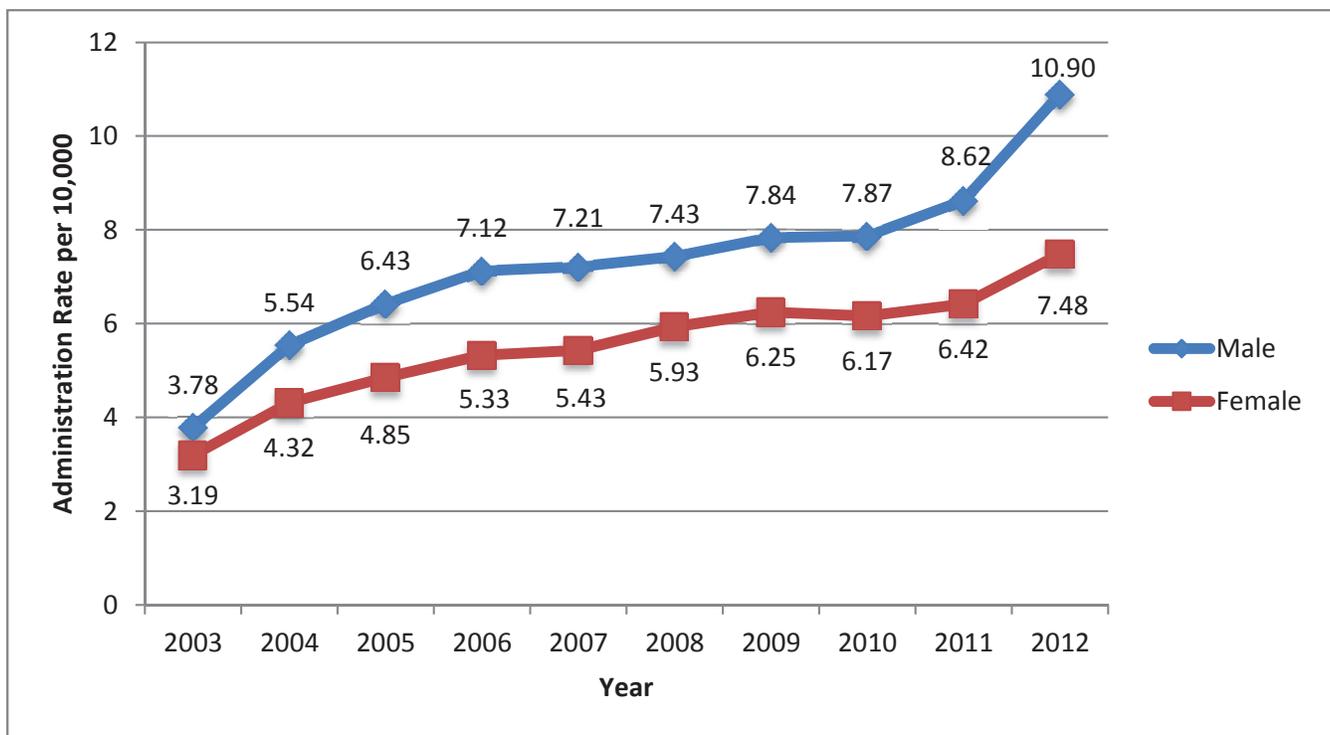
Source: EMS Incident Reporting System

Gender

Men were more frequently administered naloxone than women every year. Almost 56 percent of administrations were to men and 44 percent of administrations to women from 2003 to 2012. The ratio of men to women receiving naloxone increased over time; 53 percent of administrations were to men and 47 percent were to women in 2003, but 58 percent of administrations were to men and 42 percent were to women in 2012.

Men still had more frequent naloxone administration when comparing the administration rates per 10,000 PY (Figure 2). Both men and women showed increased administration of naloxone over time. Administrations for men almost tripled from 3.78 in 2003 to 10.89 per 10,000 PY in 2012 (188%). Administrations for women also increased, but at a slightly slower pace; administrations of naloxone for women doubled from 3.19 in 2003 to 7.48 per 10,000 PY in 2012 (134%).

Figure 2. Incidence rates of naloxone administration by gender, Ohio, 2003-2012

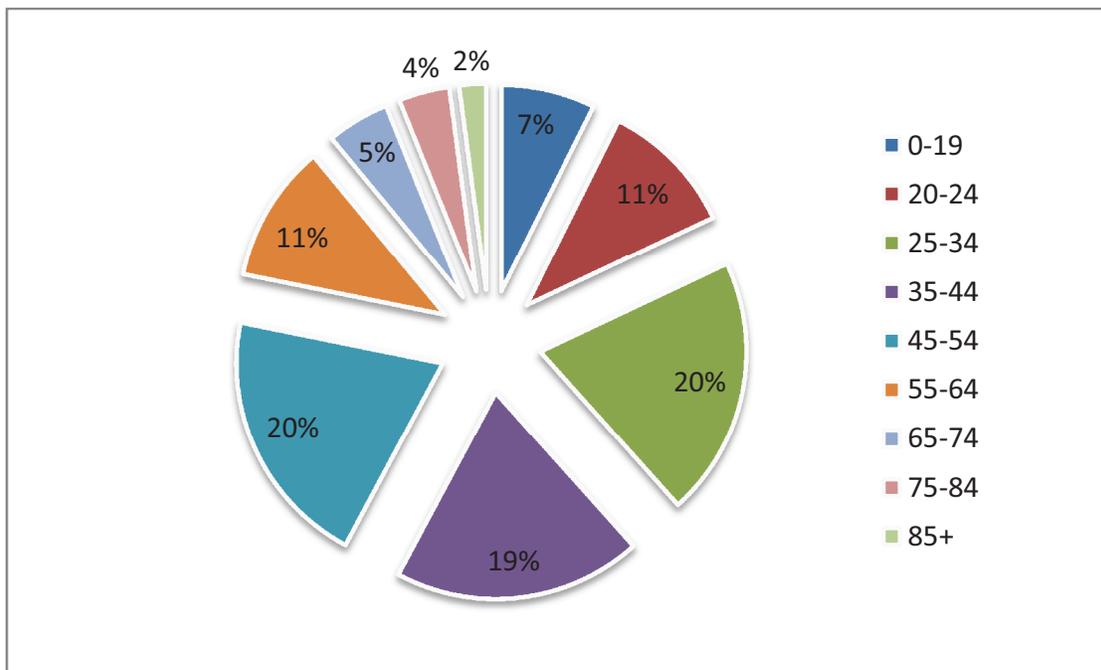


Source: EMS Incident Reporting System

Age

During the past 10 years, a majority (81%) of persons administered naloxone were between the ages of 20-64. Individuals between the ages of 25-34 and 45-54 were the most likely groups to be administered the drug, although those aged 35-44 were not that far behind (Figure 3). While the number of administrations increased nearly every year for every age category, the specific age groups receiving naloxone changed over time. The percentage of persons receiving naloxone increased for 25-34 year olds (19% in 2003 to 25% in 2012), for 55-64 year olds (8% in 2003 to 12% in 2012), and for those 85 and older (1% in 2003 to 2% in 2012). The percentage of persons receiving naloxone decreased for 35-44 year olds (25% in 2003 to 17% in 2012), for 0-19 year olds (10% in 2003 to 5% in 2012), and for 45-54 year olds (20% in 2003 to 18% in 2012). The percentage of individuals receiving naloxone stayed relatively stable for those in the 20-24 age group, as well as for those ages 65-84.

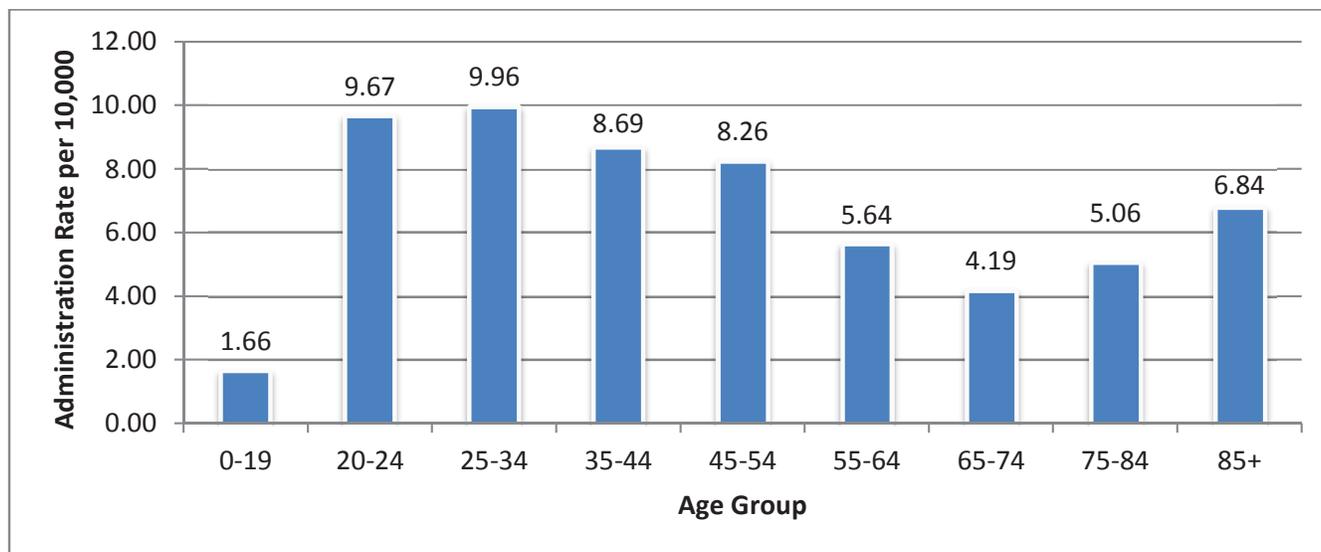
Figure 3. Percent of naloxone administrations by age group, Ohio, data pooled from 2003-2012



Source: EMS Incident Reporting System

The naloxone administration rate pooled over 10 years differed by age group (Figure 4). Those in the 25-34 age group had the highest administration rate (9.96 per 10,000 PY), followed by those in the 20-24 age group (9.67 per 10,000 PY). The administration rates gradually decreased for those age 35 and older, but began to increase for those age 75 and older. People aged 0-19 had the lowest naloxone administration rates.

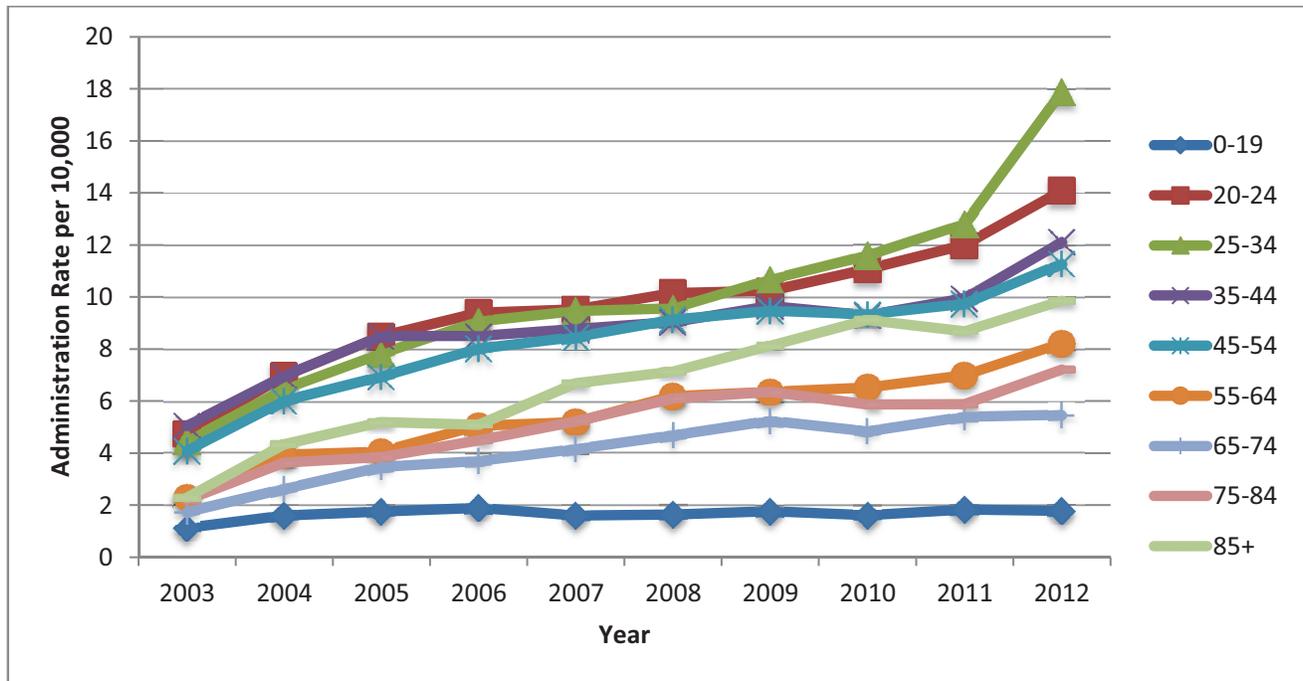
Figure 4. Incidence rates of naloxone administration by age group, Ohio, data pooled from 2003-2012



Source: EMS Incident Reporting System

Every age group experienced growth in naloxone administration rates during 2003-2012 (Figure 5; Please see Table 1 on page 21 for data points that correspond to Figures 5, 8 and 9). The age group with the largest increase in administration rates represented those age 85 and older (331%); however, this group only received two percent of naloxone administrations. The 25-34 age group had the second highest increase in administration rates (300%), and it represented 20 percent of all individuals receiving naloxone. Administrations for other age groups that represented a sizeable percentage of those receiving naloxone also increased; rates for people aged 20-24 increased 197 percent and administration rates for those aged 35-44 increased 139 percent.

Figure 5. Incidence rates of naloxone administration by age group, Ohio, 2003-2012



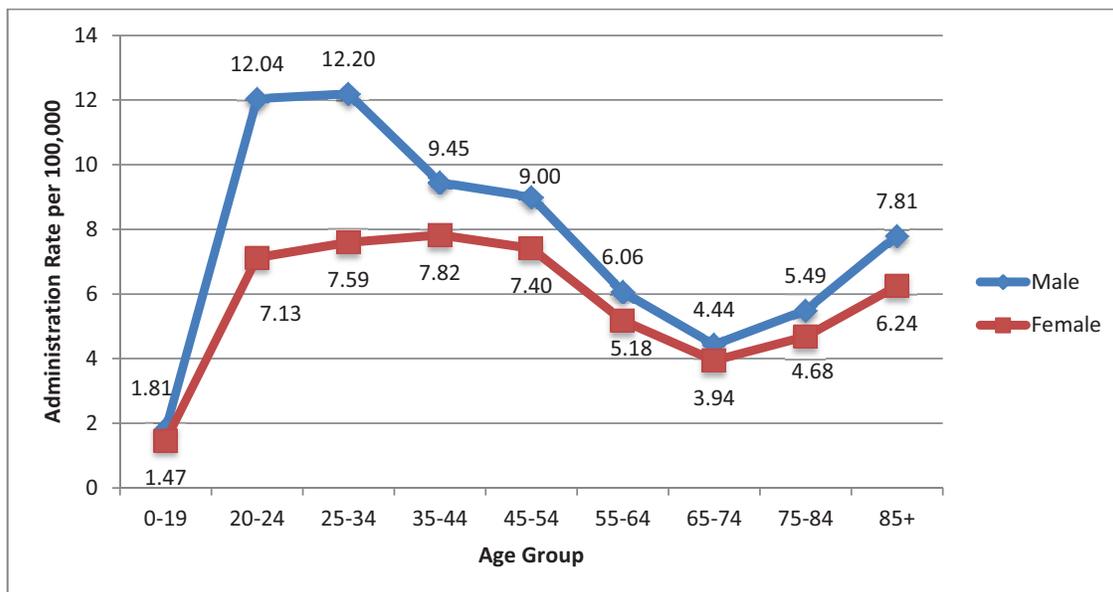
Source: EMS Incident Reporting System

Gender by Age

Males of every age category experienced a greater number of naloxone administrations than females (Figure 6). On average, the administration rate for males was 1.3 times greater than that of females during 2003-2012. In fact, males in age groups 20-24 and 25-34 had more than one-and-a-half times the number of naloxone administrations as females (1.7 and 1.6 per 10,000 PY, respectively). From 2003 to 2012, males aged 25-34 had the highest administration rate (12.2 per 10,000 PY) followed closely by males aged 20-24 (12.0 per 10,000 PY). Similar to Figure 4, the rates of naloxone administration fell for every age group, but began to rise for those individuals aged 75 and older. Females experienced the greatest rate of naloxone administration in the 35-44 age group (7.8 per 10,000 PY), but those aged 25-34 and 45-54 were not that far behind (7.6 and 7.4 per 10,000 PY, respectively). As with their male counterparts, the administration rate for females gradually fell, but then began to rise again for those aged 75 and older.



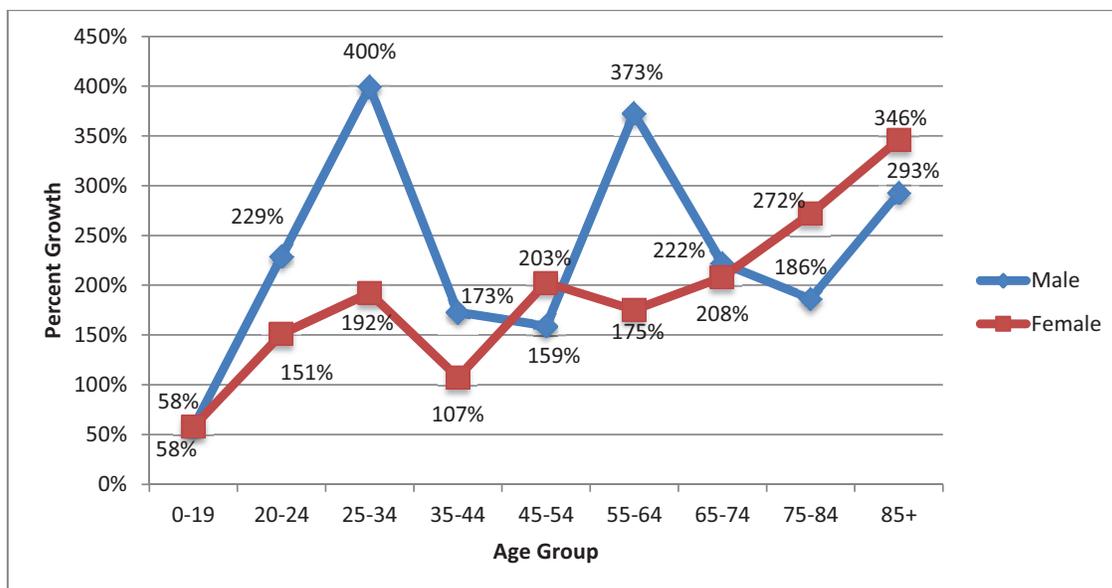
Figure 6. Incidence rates of naloxone administration by gender and age group, Ohio, 2003-2012



Source: EMS Incident Reporting System

Rates of naloxone administration also increased when examining gender by age group during 2003-2012 (Figure 7). While males experienced higher average growth in administration rates for every age category compared to females (219% vs. 160%), there were some age categories for which females experienced greater growth in administration rates. For example, the growth in male's naloxone administration rates were double that of females for ages 25-34 and 55-64, but the growth in administration rates were higher for females ages 45-54 (1.3 times higher), 75-84 (1.5 times higher) and 85 or older (1.2 times higher).

Figure 7. Growth in incidence rates of naloxone administration by gender and age group, Ohio, 2003-2012



Source: EMS Incident Reporting System

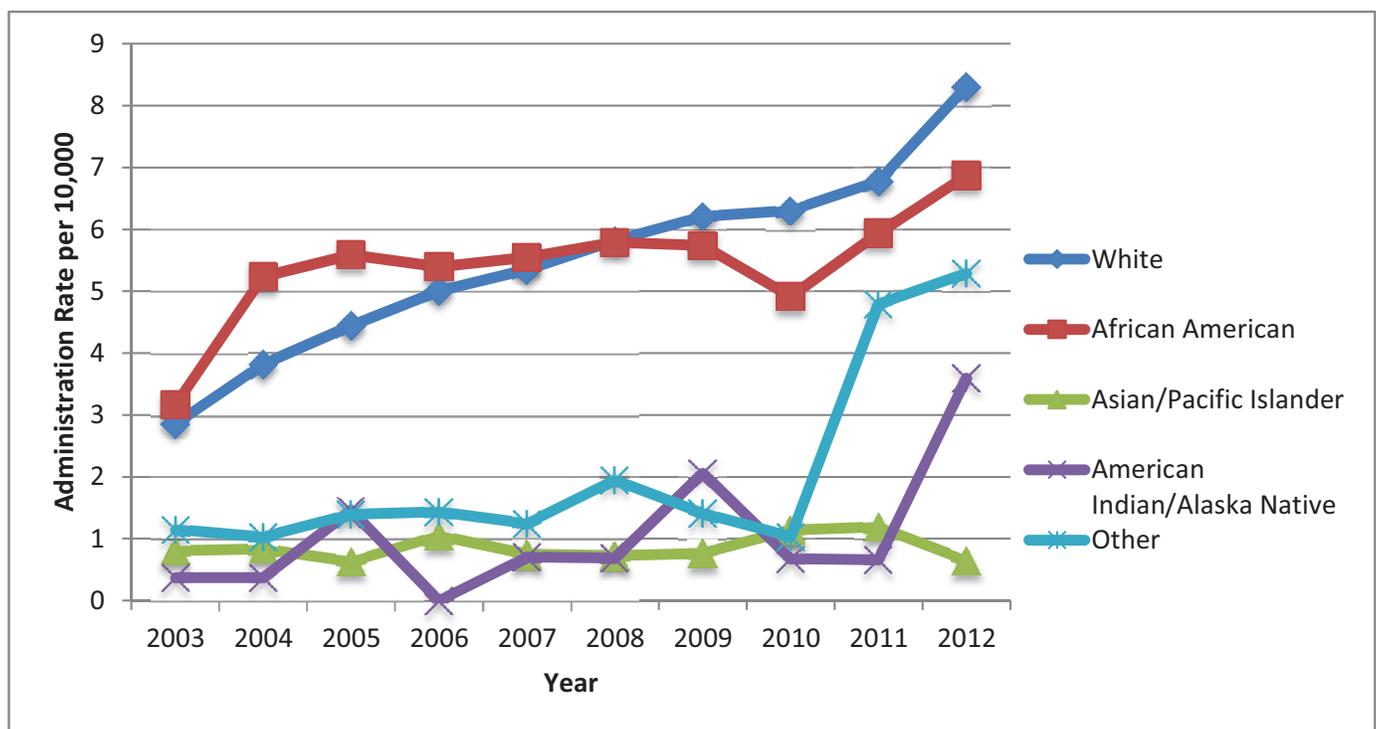
Race

Whites were more frequently administered naloxone than other racial groups during 2003-2012. On average, 87 percent of naloxone administrations went to whites, 12 percent went to African-Americans, and the remaining administrations went to other racial groups. While there was some year-to-year variation, the demographic breakdown remained stable during the 10-year period.

When pooling the data over 10 years, the naloxone administration rates also differed by race. Whites and African-Americans had similar administration rates (5.48 and 5.42 per 10,000 PY, respectively). Administration rates for other racial groups were relatively low. Those in the “Other” racial group had 2.22 administrations per 10,000 PY, American-Indian/Alaska Natives had 1.08 administrations per 10,000 PY and Asian/Pacific Islanders had 0.86 administrations per 10,000 PY.

A majority of racial groups experienced growth in naloxone administration rates from 2003 to 2012 (Figure 8). Those in the “Other” racial group experienced the highest growth in administration rates (359%), but they only represented one percent of total administrations. Administration rates also increased for whites (191%) and African-Americans (117%). Those in the Asian/Pacific Islander and American-Indian/Alaska Native and groups experienced rate changes, but the number of individuals in these groups is small, so these changes are likely unstable.

Figure 8. Incidence rates of naloxone administration by race, Ohio, 2003-2012



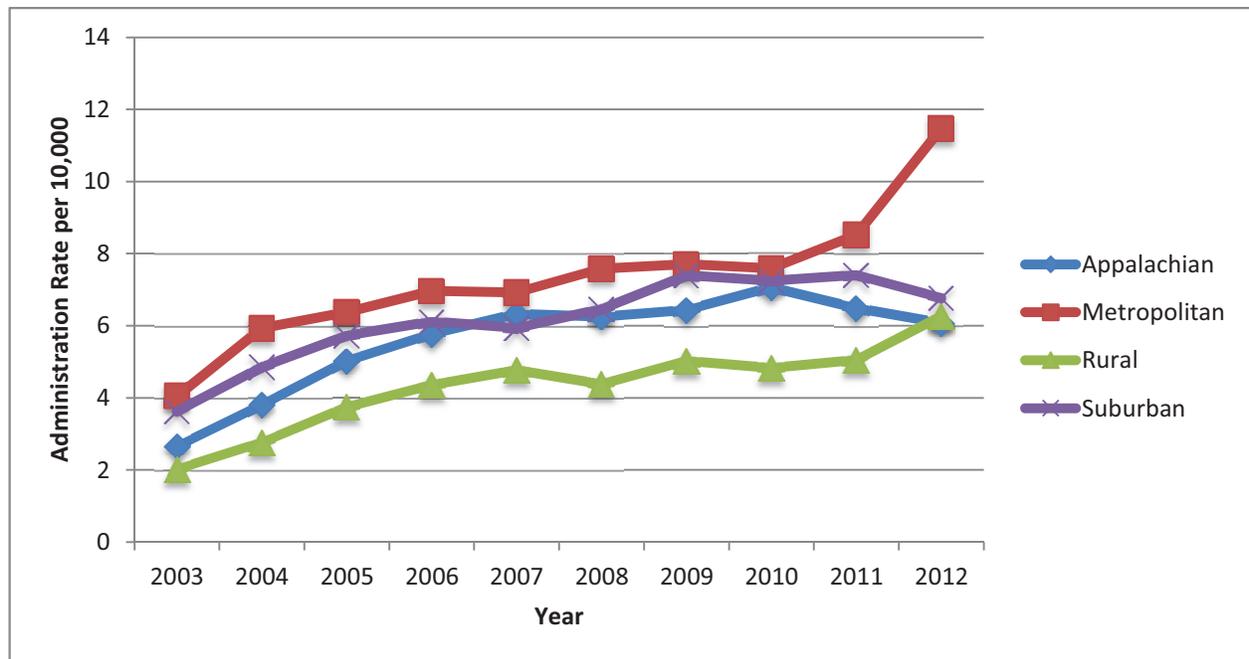
Source: EMS Incident Reporting System

Region

Naloxone administration differs by region (Please see page 22 for regional map). From 2003 to 2012, pooled data suggested that naloxone administration was highest for the metropolitan region (7.31 per 10,000 PY) followed by the suburban region (6.18 per 10,000 PY). The Appalachian and rural regions experienced the lowest administration rates (5.60 and 4.33 per 10,000 PY, respectively).

On average, administration rates experienced the growth in every region during the 10-year period (Figure 9). Naloxone administration rates tripled in the rural region, rising from 2.02 in 2003 to 6.27 per 10,000 PY in 2012 (210%). The metropolitan region also experienced a near tripling of administration rates, increasing from 4.04 in 2003 to 11.48 per 10,000 PY in 2012 (184%). Other regions experienced slightly less growth; naloxone administration rates also increased in the Appalachian and suburban regions (128% and 86%, respectively) between 2003 and 2012. While administration rates rose almost every year for every region, the Appalachian region has experienced two consecutive years of lower administration rates since 2010 (-14%).

Figure 9. Incidence rates of naloxone administration by region, Ohio, 2003-2012



Source: EMS Incident Reporting System

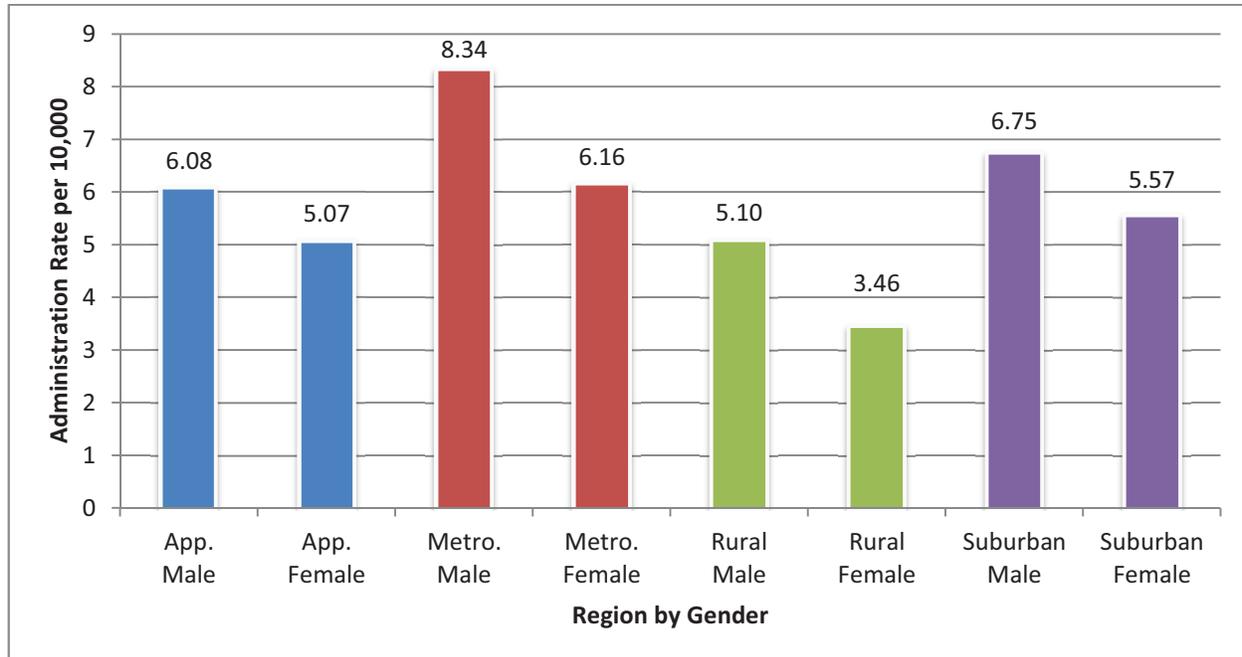
Region by Gender

Regional naloxone administration also differed by gender. Pooled data from 2003 to 2012 indicated that males in each region had higher administration rates than their female counterparts. Metropolitan males had the highest rate of administrations (8.34 per 10,000 PY) followed by suburban males (6.75 per 10,000 PY). Metropolitan females had the third-highest number of naloxone administrations (6.16 per 10,000 PY), which surpassed Appalachian and rural males. Rural females had the lowest rate of naloxone administration (3.46 per 10,000 PY).

From 2003 to 2012, males and females in every region experienced growth in naloxone administration rates (Figure 10). Administration rates tripled for rural males (2.24 in 2003 vs. 7.15 per 10,000 PY in 2012), rural females (1.79 in 2003 vs. 5.40 per 10,000 PY in 2012) and metropolitan males (4.44 in 2003 vs. 13.99 per 10,000 PY in 2012). Administration rates in other regions also increased between 67 percent and 153 percent. Similar

to trends in Figure 9, naloxone administration has decreased for males and females in Appalachia (-10% and 19%, respectively) between 2010 and 2012. However, analyzing regional data by gender also shows that administration rates have decreased between 2010 and 2012 for suburban females (-11%).

Figure 10. Incidence rates of naloxone administration by region and gender, Ohio, data pooled from 2003-2012



Source: EMS Incident Reporting System

Region by Age

Nearly every age group in metropolitan regions had higher pooled naloxone administration rates than other regions from 2003 to 2012, following the trends in Figure 9. The only exception was that suburban youth aged 0-19 had slightly higher administration rates than metropolitan youth in the same age group (2.15 vs. 1.91 per 10,000 PY, respectively). Aside from that minor deviation, other trends held true. People living in suburban regions of every age group had the second-highest naloxone administration rates, while people living in Appalachian and rural regions consistently had the lowest administration rates.

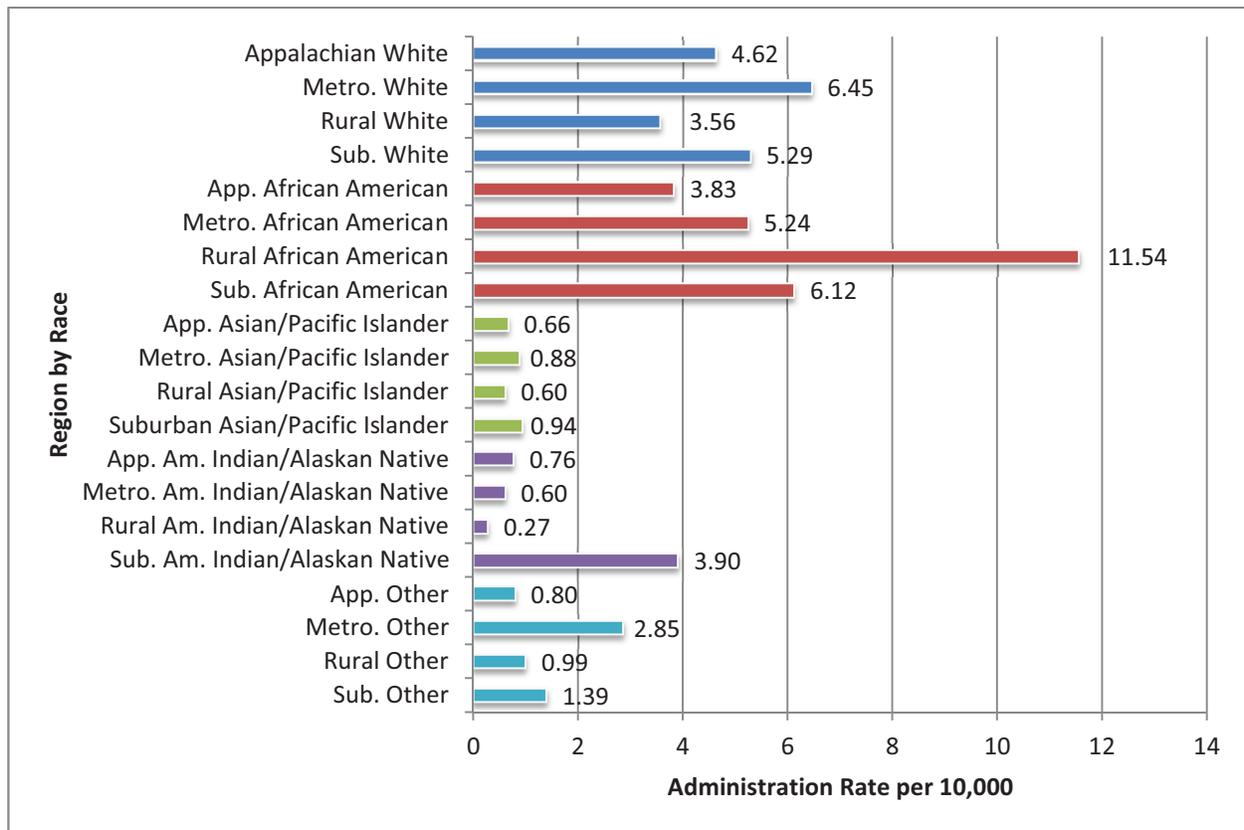
When examining pooled naloxone administration rates among the regions, some age groups had much higher rates than others. People aged 25-34 living in metropolitan regions had the highest administration rates (12.10 per 10,000 PY) followed by people aged 20-4 in Appalachian regions (11.36 per 10,000 PY) and people aged 20-24 in rural regions (11.03 per 10,000 PY). Aside from individuals aged 0-19, people with the lowest naloxone administration rates were aged 65-74 in rural regions (3.21 per 10,000 PY), aged 75-84 in rural regions (3.66 per 10,000 PY) and aged 65-74 in Appalachian regions (4.05 per 10,000 PY).

From 2003 to 2012, naloxone administration rates increased for age groups in every region. Rates of naloxone administration increased more than tenfold for people aged 55-64 living in rural regions, rising from 0.55 in 2003 to 5.79 in 2012 per 10,000 PY. Other noticeably high increases were for those aged 65-74 in rural regions (467%) and those aged 25-34 in metropolitan regions (363%). The growth in naloxone administration rates was even larger for some age groups in specific regions, but the rates are likely to be unstable because they were based on small numbers.

Region by Race

As mentioned previously, Whites have the highest pooled naloxone administration rates over the past 10 years; however, some interesting differences become apparent when breaking down the data by region (Figure 11). Pooled data from 2003 to 2012 showed that African Americans in rural counties had the highest administration rates (11.54 per 10,000 PY). This rate was nearly double that of metropolitan Whites (6.45 per 10,000 PY). Suburban African Americans had the third highest administration rates (6.12 per 10,000 PY) followed by suburban Whites (5.29 per 10,000 PY). On average, these administration rates are substantially higher than rates in minority communities across all other regions.

Figure 11. Incidence rates of naloxone administration by region and race, Ohio, data pooled from 2003-2012



Source: EMS Incident Reporting System

Within racial categories, metropolitan and suburban regions typically had the highest naloxone administration rates. The only exception was that rural African-Americans had a surprisingly high rate. Further examination of the data showed that a substantial number of these African-Americans came from Warren County. Naloxone administration rates from other racial categories must be interpreted with caution because some of these rates are based on small numbers. Generally, administration rates for Asians and Pacific Islanders were similar across all regions. Administration rates for American-Indians and Alaskan Natives were highest in suburban regions (3.90 per 10,000 PY), and administration rates were highest for other races in metropolitan regions (2.85 per 10,000 PY).

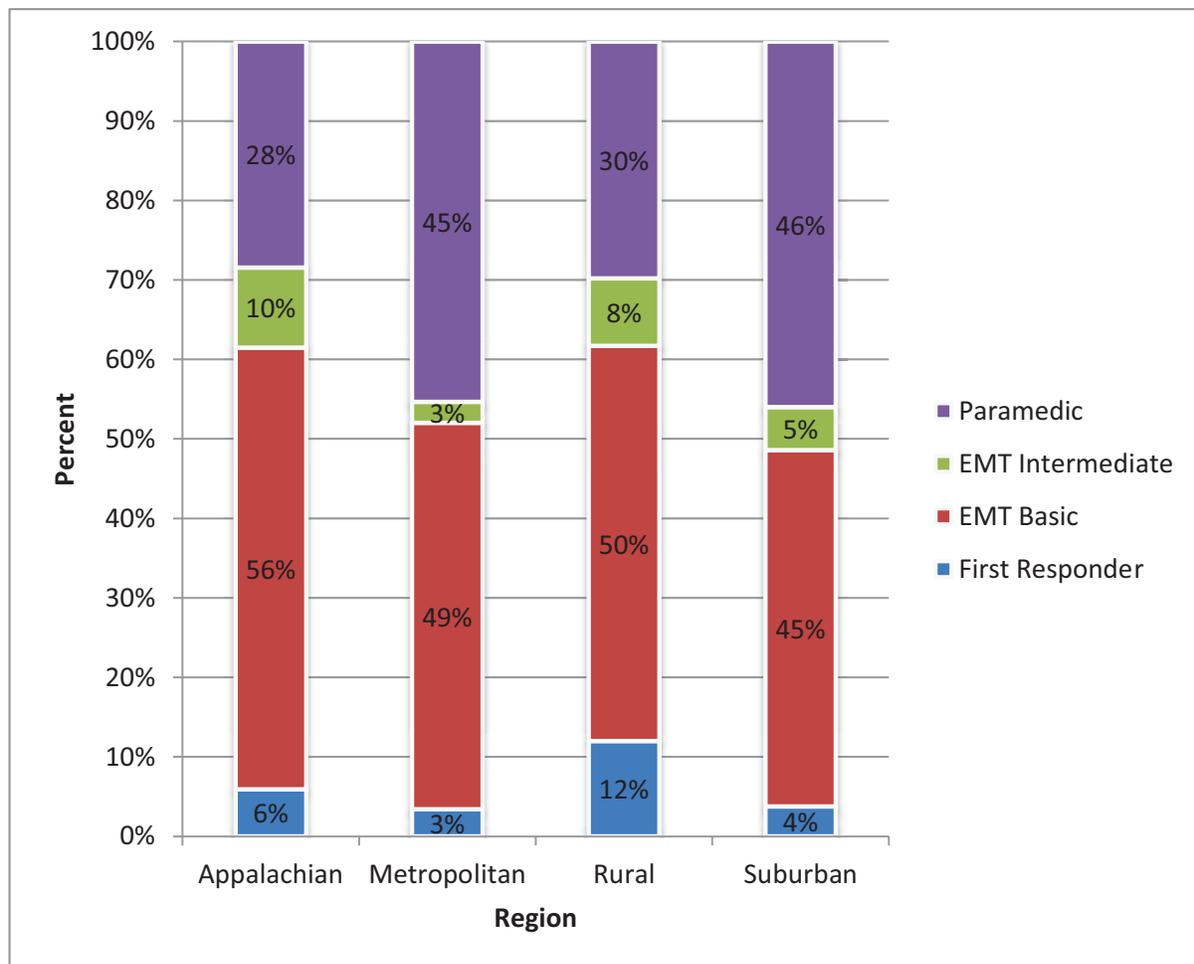
Naloxone administration rates either increased or remained stable for a majority of (85%) racial groups across all regions from 2003 to 2012. The largest increase was experienced by other races that lived in metropolitan

regions; the administration rate more than quadrupled, rising from 1.58 in 2003 to 7.26 per 10,000 PY in 2012 (359%). Administration rates also more than tripled for Whites living in metropolitan and rural regions (230% and 250%, respectively). In contrast, naloxone administration rates decreased during the 10-year period for African-Americans in Appalachia (-23%). Asian and Pacific Islanders from metropolitan and suburban regions also experienced a decrease in administration rates, but the rates are likely to be unstable because they were based on small numbers.

EMS Certification

In 2012, Ohio had 40,509 persons certified as first responders and EMTs. Most of these persons (54%) either had the first responder or EMT basic license, which means that they could not give naloxone to individuals who needed it. The percentage of first responders and EMT Basics differed by region. Appalachian and rural regions typically had a higher percentage of these licenses (62% in both regions) than metropolitan or suburban regions (52% and 49%, respectively: Figure 12). Within county, the percentage of persons with first responder and EMT Basic licenses also varied greatly. Counties with the highest percentage of persons unable to administer naloxone were Noble (82%), Sandusky (78%) and Putnam (76%), while counties with the fewest persons reporting these licenses were Lake (40%), Summit (41%) and Geauga (42%).

Figure 12. Percent of license type by region, Ohio, 2012

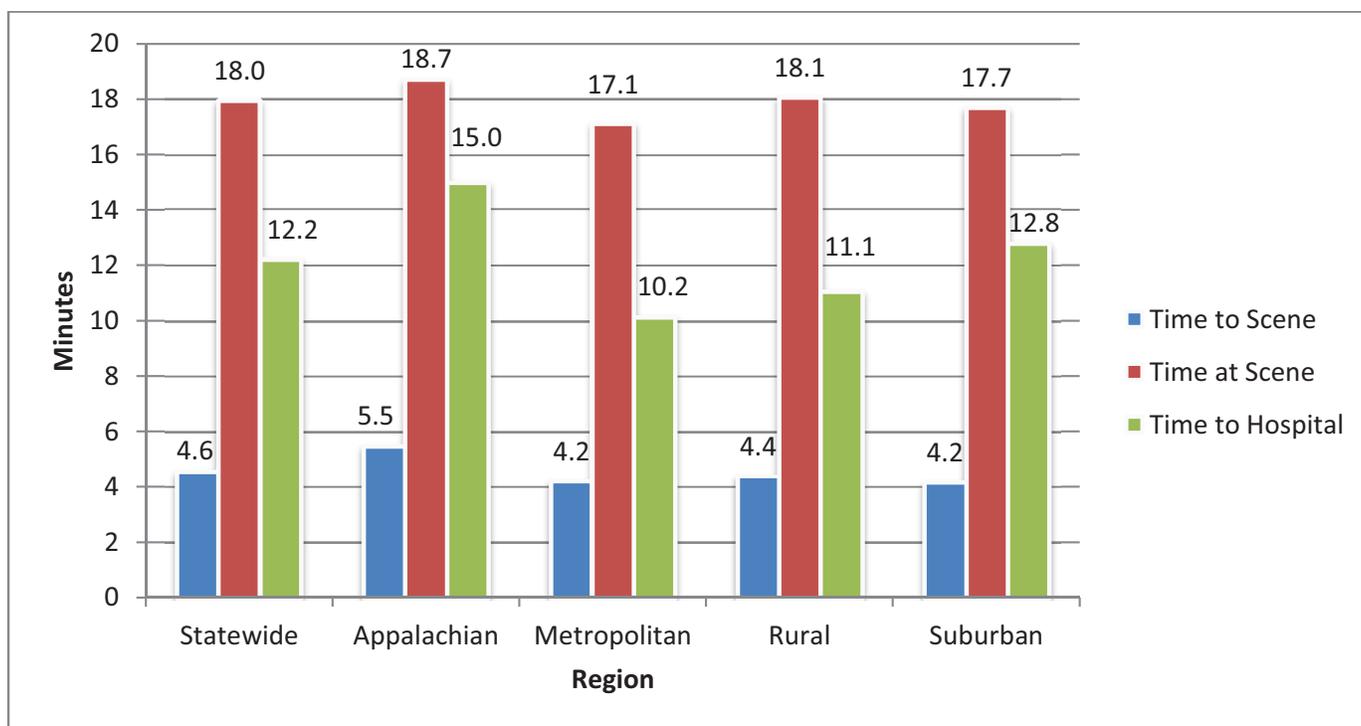


Source: EMS Incident Reporting System

EMS Response Times

EMSIRS gathers information on EMS response times. In 2012, most counties (78%) submitted EMS response times for people treated with naloxone. Statewide, it took 4.6 minutes to arrive at the scene where someone was treated with the drug. EMS crews spent an average of 18 minutes at the scene, and transported the patient to a hospital within 12.2 minutes. All told, it took an average of 30.4 minutes before the person reached the hospital. Figure 13 displays travel times by region. Counties in Appalachia have the longest travel time to the scene, the longest time at the scene and the longest travel to a hospital, while metropolitan counties have the shortest times in each category. Total travel time varied from 31.5 minutes in metropolitan counties to 39.2 minutes in Appalachian counties.

Figure 13. EMS response times for people treated with naloxone, Ohio, 2012

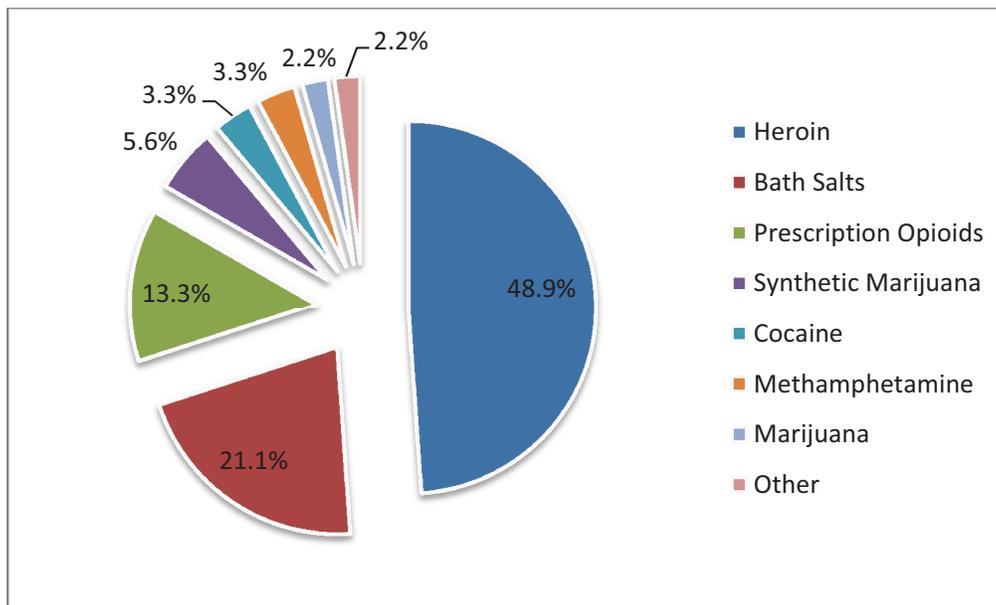


Source: EMS Incident Reporting System

Naloxone Survey Results

Results from the naloxone survey speak to overdose episodes reported by EMTs from July 1 - Dec. 31, 2011. Results are based on responses from 170 (10.4% of sample) individuals and show the impact heroin and prescription opioids were having on their community during this time. When asked about the drugs commonly seen on their EMT runs, Figure 14 shows that most respondents mentioned heroin (48.9%), followed by bath salts (21.1%) and prescription opioids (13.3%). Respondents were also asked the number of pregnant women they had resuscitated for a suspected drug-related overdose. Nearly 20 percent of respondents had administered naloxone to pregnant women during the six months of the survey. Respondents who treated these women resuscitated 35 pregnant women for overdose episodes (range 1-15 women).

Figure 14. Mentions of overdose episodes by drug



Source: EMS Incident Reporting System

Respondents frequently described the effects drug abuse had on their community. Comments like *"use is skyrocketing"* and *"heroin overdose [has risen] dramatically"* were common. On occasion, respondents reported they delayed treatment until law enforcement arrived because of the dangerous nature of the incident. An EMT explained, *"We have, on several occasions, been advised by dispatch not to enter the scene until law enforcement arrives. We have had to wait as long as 45 minutes to respond into the scene for law enforcement to arrive. This obviously decreases the chance of successful resuscitation and causes a significant delay in treatment."* Another topic frequently mentioned by EMTs was opioid-related mortality. Expressing his frustration with opioid abuse, a respondent said, *"Prescription opiates are regularly abused but we seldom get the cases early enough to do anything. By the time we are called, it is a coroner's case."*

Oftentimes, respondents said no one stayed with the overdose victim until EMTs arrived, *"They are regularly being abandoned by their dealers or friends and left for dead. Some have been lucky and had family or friends find them."* Respondents also discussed why they thought deaths were increasing. Some claimed increased mortality resulted from the cut or mixture of drugs. One said, *"Heroin seems to be ... mixed with something else. Unknown what else, but it is very bad. We are lucky to have only one death due to being too late of a call when patient was found."* Other respondents attributed increased deaths to the user's transition from one drug to another. A respondent reported, *"The problem is that more 'inexperienced' drug users are converting to other drugs. By this I refer to the prescription*

drug abusers who are now branching out into cocaine or heroin and [are] not aware of the more powerful effects and the quicker onset, thus creating overdoses and deaths."

Respondents also said that substance abusers were well aware of naloxone, and that they would put themselves in situations where they could be resuscitated in the occurrence of overdose. A respondent talked about the new trend in his area: *"My agency borders the state of Indiana. Dearborn County, Indiana, does not have Paramedics or Intermediates who can administer Narcan® (naloxone). People drive to Ohio because they know we have Narcan® and can give it to them. This has been told to us many times by patients from Indiana."* Another respondent reported seeing something similar with Ohioans: *"The numbers are climbing on the amount of overdoses that are from more rural areas coming into our area. We have been told by some of the patients they come to take drugs in our area because we are a paid department and they can get Narcan® quicker because we are on station."*

Other respondents said drug users prepare for overdose by drawing public attention to themselves in case of an overdose episode. A respondent explained, *"The new trend is to go into a public building, stuff the drain with objects and then take the 'street drugs.' If they become unresponsive, the running water will overflow and alert someone to check on them and call 911."* Another EMT was surprised at how users would draw attention to themselves: *"Interestingly, we have received several calls for auto accidents. Apparently, some users are stopping in the parking lot, putting their car in 'drive' with foot on brake. They know that if they overdose, the car will roll forward and wreck and this prompts someone to call 911! Due to this, we have been dispatched to a few 'auto accident, person not breathing' in parking lots!"*

Limitations

This study has several limitations. Results are likely to underestimate the true naloxone administration rate because the EMSIRS data is not complete. Roughly 10 percent of EMS agencies did not participate in Ohio Department of Public Safety data collection efforts, and this missing data will lead to some degree of measurement error. Even when EMS agencies did participate, some of their demographic data is not complete (e.g., an individual is listed as of "Unknown" race). While gender- and age-based administration rates have little missing information, race has missing information on 17 percent of cases; therefore, race-based administration rates are likely to have a higher degree of measurement error than other administration rates. A small degree of measurement error will also be present for regional administration rates because data represent county of administration and not county of residence.

Naloxone administrations rather than individuals were the unit of observation. Administrations were used in the place of individuals because identifiable data were not available. The use of administrations may result in duplication when multiple administrations for the same patient occurred at different times, and thereby overestimate administration rates. The use of administrations may lead to smaller bias than the undercounting of naloxone use due to missing data.

The naloxone survey is limited in its generalizability because results represented a small percentage of the people on the EMSIRS listserv. Other communities may or may not see similar drugs during their EMT runs. Likewise, the number of pregnant women resuscitated with naloxone is likely much higher, but there is no way to know just how high it is because this field is typically not submitted to EMSIRS. Finally, qualitative responses from participants may be reflective of trends in other communities, but there is no way to validate the themes without further study.

Current Efforts

The increase in opioid-related mortality has led the Ohio Department of Health to fund several ground-breaking pilot projects to reverse the trends in unintentional drug overdose.³ **Project DAWN** (Deaths Avoided with Naloxone) currently serves Cuyahoga, Montgomery and Scioto counties and the city of Cleveland. The program provides high-risk opioid users with naloxone and trains these individuals on how to respond to an opioid overdose. Some of the topics covered at trainings include recognizing the signs and symptoms of overdose, the importance of calling 911 and proper administration of naloxone. Intranasal naloxone is provided to participants at the conclusion of training to treat overdose before EMS squads arrive. ODH is planning to expand to three additional Project DAWN sites soon.

Findings/Recommendations

Major Findings

- The number of naloxone administrations has increased 164 percent from 2003 to 2012.
- Men consistently have higher naloxone administration rates than women.
- Individuals between the ages of 25-54 represent a majority (59%) of naloxone administrations.
- The highest administration rates were for those people aged 25-34 (9.96 per 10,000 PY) followed by those aged 20-24 (9.67 per 10,000 PY).
- Even when breaking out the age groups by gender, 25- to 34-year-old men and women both have the highest naloxone administration rates.
- Most naloxone administrations went to whites during the past 10 years, but whites did not surpass African-Americans in naloxone administration rates until 2008.
- Metropolitan regions experienced the highest naloxone administration rates, followed by suburban regions.
- Generally, the regional trends held true when breaking out regional administration rates by gender and age.
- Rural African-Americans had the highest naloxone administration rate (11.54 per 10,000 PY), which was nearly double that of the second highest rate from metropolitan whites (6.45 per 10,000 PY).

Comparisons with National Data

- Ohio has a higher incidence of naloxone administration compared to the limited number of other studies with EMS data.^{7,8}
- Like other studies, males were found to experience higher incidence rates of naloxone administration.^{7,8}
- Unlike Knowlton et al. (2013), whites experienced higher incidence rates of naloxone administration than African-Americans. This finding is likely due to the racial demographics of the city of Baltimore, which are dissimilar to the racial demographics of Ohio.
- While many of the time periods differ in Knowlton, et al., (2013) and this study, both 2008 and 2009 administration rates for men and women are much higher in Ohio than in Baltimore.

Implications for Health Care and Substance Abuse Treatment

- The Ohio Administrative Code should be revised to allow first responders and EMTs with the Basic license to administer naloxone for suspected drug overdoses.
- Law makers should also consider a [911 Good Samaritan](#) law that provides immunity from arrest for minor drug law violations for people who summon help at the scene of an overdose. These laws protect the caller and overdose victim from arrest and prosecution for simple drug possession, possession of paraphernalia, and/or being under the influence. ODH has developed a [policy brief](#) about the 911 Good Samaritan Law based off of a recent survey.
- Since the overall trend in naloxone administration has increased every year for a majority of groups, everyone prescribed opioids should be educated about the drug's potential for addiction along with the sign and symptoms of overdose.
- Active opioid drug users should be educated that naloxone can be legally prescribed/dispensed to them in Ohio. Education efforts also should include when and how to use the medication.
- Active drug users should be educated on recognizing the sign and symptoms of overdose, rescue breathing and the rescue position, and the importance of calling 911. They should also be trained that some anecdotal remedies do not work and may even cause death (e.g., injecting salt water or cocaine).
- Opioid users (especially heroin) released from correctional institutions should be linked with treatment services as soon as possible because they are likely to resume drug use, and they are at greater risk of death due to a loss of drug tolerance.
- Rates of naloxone administration decrease for those 35 and older, but then begin to rise for those 75 and older. Physicians should carefully monitor prescription pain medications to make sure patients are taking them as prescribed. Physicians should also be careful to prescribe within the recommended dosage guidelines established by best medication practices.
- Elderly prescribed prescription opioids and their caregivers should be educated about the signs and symptoms associated with overdose.
- Physicians and other practitioners prescribing opioids in large quantities and/or high morphine equivalents should be informed about prescribing guidelines established in their respective fields.
- As Knowlton et al. (2013) suggest, speaking with an overdose victim's caregivers is "associated with a five-fold increase in treatment seeking" (p. 327); therefore, medical professionals should speak with caregivers about drug treatment soon after overdose.

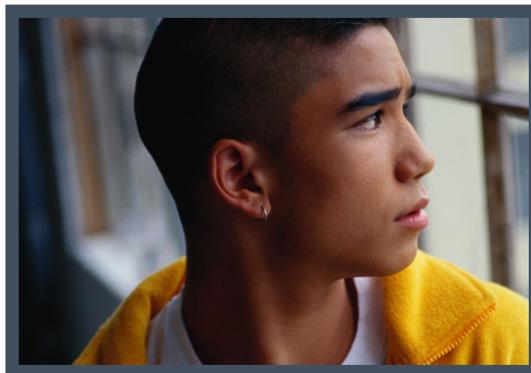


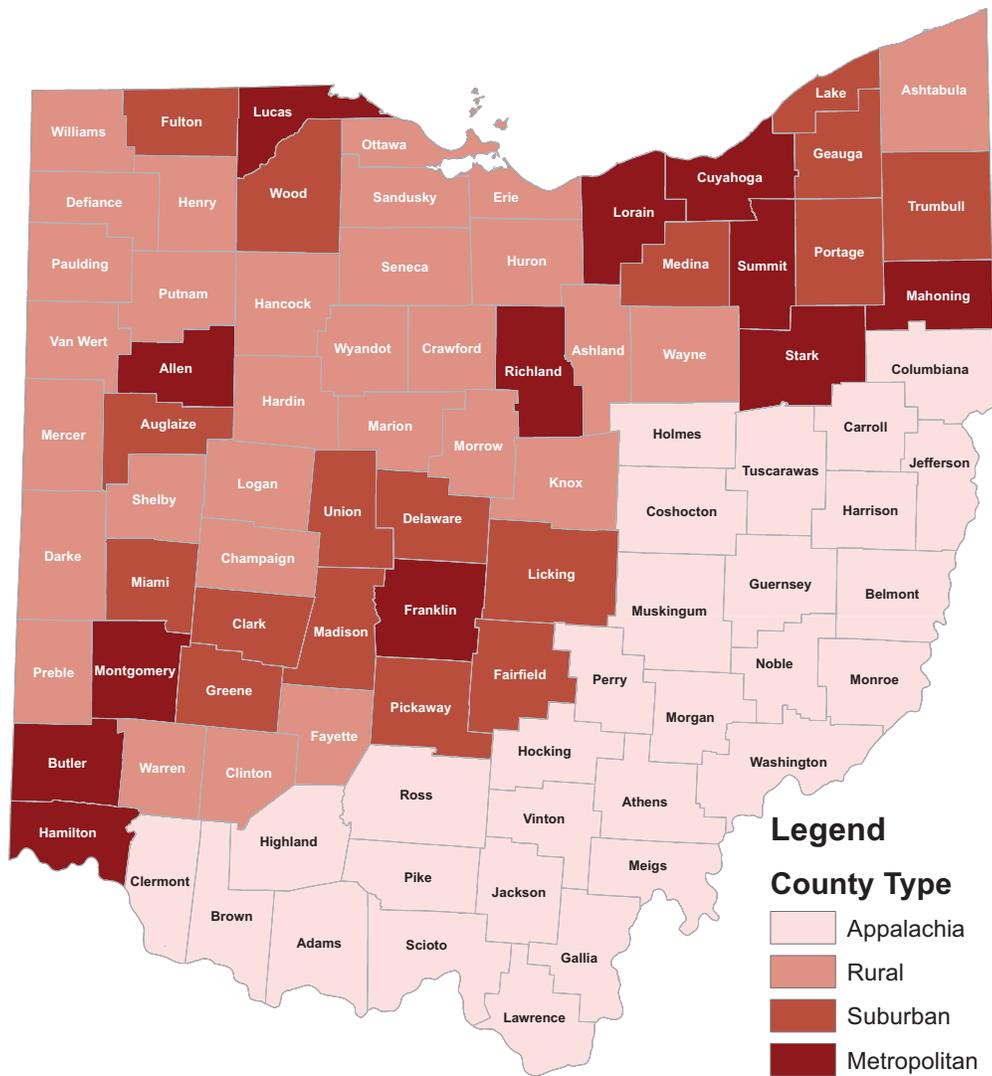
Table 1. Selected results

Incidence rates of naloxone administration per 10,000 person years (Source: EMSIRS)

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Age										
0-19	1.13	1.61	1.76	1.89	1.60	1.64	1.77	1.61	1.83	1.78
20-24	4.74	6.96	8.49	9.40	9.52	10.15	10.24	11.07	12.01	14.09
25-34	4.47	6.45	7.83	9.07	9.46	9.56	10.67	11.60	12.80	17.88
35-44	5.07	6.97	8.50	8.50	8.77	9.03	9.65	9.30	9.95	12.10
45-54	4.09	6.01	6.95	8.02	8.46	9.13	9.47	9.33	9.74	11.28
55-64	2.31	3.95	4.05	5.05	5.20	6.19	6.36	6.52	6.99	8.22
65-74	1.74	2.62	3.47	3.69	4.16	4.68	5.24	4.83	5.40	5.48
75-84	2.20	3.64	3.85	4.48	5.21	6.10	6.36	5.87	5.88	7.22
85+	2.29	4.34	5.19	5.09	6.69	7.13	8.11	9.11	8.68	9.86
Race										
White	2.85	3.82	4.44	5.01	5.35	5.82	6.21	6.31	6.78	8.31
African-American	3.16	5.23	5.59	5.40	5.55	5.79	5.74	4.91	5.94	6.87
Asian/Pacific Islander	0.81	0.83	0.63	1.05	0.75	0.73	0.76	1.14	1.19	0.65
Am. Indian/AK Native	0.37	0.37	1.46	0.00	0.71	0.69	2.06	0.67	0.66	3.59
Other	1.15	1.03	1.39	1.44	1.25	1.95	1.41	1.03	4.80	5.29
Region										
Appalachian	2.66	3.81	5.02	5.77	6.33	6.25	6.44	7.06	6.49	6.07
Metropolitan	4.04	5.93	6.37	6.97	6.92	7.58	7.71	7.59	8.52	11.48
Rural	2.02	2.76	3.74	4.35	4.77	4.38	5.02	4.83	5.05	6.27
Suburban	3.63	4.86	5.73	6.12	5.94	6.46	7.4	7.25	7.41	6.77



Appendix A: County Classifications



County Classifications

This map shows how counties were classified for regional analyses. Counties were classified as metropolitan if they had an urban core that served as a center of economic activity for surrounding counties. Counties were considered suburban if they were located adjacent to a metropolitan county and strongly connected with economic activity in the metropolitan county. Rural and Appalachian counties do not have urban cores, and Appalachian counties are classified differently than rural counties because of their unique culture and history. Regional classification of counties is largely based on data from the Ohio Department of Health, with the exception of Ashtabula, Mahoning and Trumbull counties.

Appendix B: Glossary

Administration Rate — The number of naloxone administrations divided by the person time of the at risk population. All units are expressed in a ratio per 10,000 person years. This term is used interchangeably with incidence rate throughout this report.

Emergency Medical Technician (EMT) — A health-care provider who provides emergency medical services. Ohio has three levels of EMT: EMT Basic (aka EMT), EMT Intermediate (aka Advanced EMT) and EMT Paramedic (aka Paramedic). EMT Basics are not certified to administer naloxone in Ohio, but all other EMT classifications have the necessary certification.

First Responder — A certified professional who can provide basic care during medical emergencies (e.g., CPR). First responders are not certified to administer naloxone in Ohio.

Naloxone — An opioid antagonist that is proven to reduce the rate of fatal overdose. The drug counteracts the effects of opioids such as depression of the central nervous system and respiratory system. Naloxone is also commonly referred to by its brand name, Narcan®.

Opioid — A psychoactive chemical that resembles morphine or other opiates in its pharmacological effects. As used in this report, the term opioid may refer to prescription opioids (narcotics) or heroin.



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