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Prescription Drug Abuse and Misuse in Southern Appalachia: An Epidemiologic Perspective

Billy Brooks
East Tennessee State University, brooksb1@etsu.edu

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Prescription Drug Abuse and Misuse in Southern Appalachia: An Epidemiologic Perspective

Billy Brooks, DrPH(c), MPH
Department of Biostatistics and Epidemiology

COLLEGE of
PUBLIC HEALTH
EAST TENNESSEE STATE UNIVERSITY
Drug overdose death rates in the US have more than tripled since 1990.\(^5\)

*Deaths are those for which poisoning by drugs (illicit, prescription, and over-the-counter) was the underlying cause.

In 2008, there were 14,800 prescription painkiller deaths.\textsuperscript{4}

For every 1 death there are...

- 10 treatment admissions for abuse\textsuperscript{9}
- 32 emergency dept visits for misuse or abuse\textsuperscript{6}
- 130 people who abuse or are dependent\textsuperscript{7}
- 825 nonmedical users\textsuperscript{7}

12,210,000


Substance Abuse and Mental Health Services Administration. Results from the 2010 National Survey on Drug Use and Health: volume 1: summary of national findings. Rockville, MD: Substance Abuse and Mental Health Services Administration, Office of Applied Studies; 2011.

Available from URL: http://oas.samhsa.gov/NSDUH/2K10NSDUH/2K10Results.htm#2.16
Past Year Initiates of Illicit Drugs, 12 or Older, 2012

4,149,000 new users in 2012
Drug overdose deaths of all intents by major drug type, U.S., 1999-2009

Source: National Vital Statistics System. The reported 2009 numbers are underestimates. Some overdose deaths were not included in the total for 2009 because of delayed reporting of the final cause of death.
Prescription vs. Illicit (2011)

• Drug overdose leading cause of injury death

• 80% (33,071) of overdose deaths unintentional

• 58.3% (1.4 million) of overdose ED Admissions related to pharmaceuticals

• 55% (22,810) of drug overdose deaths related to pharmaceuticals
Non-medical Prescription Drug Use (NMPDU)

“…the use of a medication without a prescription, in a way other than as prescribed, or for the experience or feelings elicited…”

-National Institute on Drug Abuse
Drug Overdose Rates by State, 2008

Percent Change in Unintentional Poisoning Mortality Rates, by Rural Status of State – United States, 1999-2004

Drug Overdose Death Rates Are Increasing

Death Rates from Drug Overdoses per 100,000 population, Tennessee vs. US

Year
1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010
No. of Deaths per 100,000 Persons
6.1 6.9 7.4 8.4 9.3 10.1 11.3 12.8 14.6 16.0 15.0 16.7

Source: Office of Policy, Planning and Assessment, Tennessee Department of Health – Death Certificates
Source: NCHS Data Brief, No. 81, December 2011, “Drug Poisoning Deaths in the United States, 1980 – 2008”, Data table for Figure 1
### Drug Dependence Surveillance Summary

**For the Week of December 22-December 28, 2013 (Week 52)**

#### Source of Maternal Substance (if known)

<table>
<thead>
<tr>
<th>Source of Maternal Substance</th>
<th># Cases</th>
<th>% Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supervised replacement therapy</td>
<td>397</td>
<td>46.4%</td>
</tr>
<tr>
<td>Supervised pain therapy</td>
<td>165</td>
<td>19.3%</td>
</tr>
<tr>
<td>Therapy for psychiatric or neurological condition</td>
<td>67</td>
<td>7.8%</td>
</tr>
<tr>
<td>Prescription substance obtained WITHOUT a prescription</td>
<td>341</td>
<td>39.9%</td>
</tr>
<tr>
<td>Non-prescription substance</td>
<td>236</td>
<td>27.6%</td>
</tr>
<tr>
<td>No known exposure but clinical signs consistent with NAS</td>
<td>11</td>
<td>1.3%</td>
</tr>
<tr>
<td>No response</td>
<td>19</td>
<td>2.2%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>855</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

#### Maternal County of Residence (By Health Department Region)

<table>
<thead>
<tr>
<th>Maternal County of Residence</th>
<th># Cases</th>
<th>% Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Davidson</td>
<td>34</td>
<td>4.0%</td>
</tr>
<tr>
<td>East</td>
<td>240</td>
<td>28.1%</td>
</tr>
<tr>
<td>Hamilton</td>
<td>17</td>
<td>2.0%</td>
</tr>
<tr>
<td>Jackson/Madison</td>
<td>2</td>
<td>0.2%</td>
</tr>
<tr>
<td>Knox</td>
<td>99</td>
<td>11.6%</td>
</tr>
<tr>
<td>Mid-Cumberland</td>
<td>57</td>
<td>6.7%</td>
</tr>
<tr>
<td><strong>North East</strong></td>
<td><strong>124</strong></td>
<td><strong>14.5%</strong></td>
</tr>
<tr>
<td>Shelby</td>
<td>18</td>
<td>2.1%</td>
</tr>
<tr>
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<td>3.2%</td>
</tr>
<tr>
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</tr>
<tr>
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<td>84</td>
<td>9.8%</td>
</tr>
<tr>
<td>Upper Cumberland</td>
<td>110</td>
<td>12.9%</td>
</tr>
<tr>
<td>West</td>
<td>31</td>
<td>3.6%</td>
</tr>
<tr>
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<td><strong>100%</strong></td>
</tr>
</tbody>
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---

1. Summary reports are archived weekly at: [http://health.tn.gov/MCH/NAS/NAS_Summary_Archive.shtml](http://health.tn.gov/MCH/NAS/NAS_Summary_Archive.shtml)
2. Multiple maternal substance exposures can be reported; therefore the total number of cases in this table (124) may not match the total number of cases reported (855).

---

**Reporting Summary (Year-to-date)**

- **Cases Reported:** 855
  - Male: 500
  - Female: 355
- **Unique Hospitals Reporting:** 50

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**Maternal County of Residence (By Health Department Region)**

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</tr>
<tr>
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<td><strong>855</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>
Table I-1. Drug Dependent Newborns (Neonatal Abstinence Syndrome) Surveillance Summary 2013

Rate of Babies Born with Neonatal Abstinence Syndrome per 1000 Live Births, Region 1 vs. TN, 2013

<table>
<thead>
<tr>
<th>Region 1</th>
<th>TN</th>
</tr>
</thead>
<tbody>
<tr>
<td>42.9</td>
<td>10.53</td>
</tr>
</tbody>
</table>

Source:
Deaths by Accidental Poisonings, 2002-2011, Region 1 vs. TN

[Graph showing the age-adjusted rate per 100,000 for deaths by accidental poisonings from 2002 to 2011 for Region 1 and Tennessee (TN). The graph illustrates an increase in rates for both regions over the years, with Region 1 consistently having a higher rate than TN.]
Drug Poisoning Mortality Rate, by Region 1 Counties, 2004-2010

Mortality Rate Per 10,000
What’s Driving NMPDU?

NMPDU Prevalence

Potential prescription drug demand

Prescription drug supply

Prescription drug demand

Aggregate Efforts

Supply

Demand

NMPDU Prevalence

Potential Demand
Supply
Each day, 46 people die from an overdose of prescription painkillers in the US.

Health care providers wrote 259 million prescriptions for painkillers in 2012, enough for every American adult to have a bottle of pills.

10 of highest prescribing states for painkillers are in the South.
Opioid Prescription Rates by County—TN, 2007

Data source: Tennessee Department of Health; Controlled Substance Monitoring Database.
Opioid Prescription Rates by County—TN, 2008

Data source: Tennessee Department of Health; Controlled Substance Monitoring Database.
Opioid Prescription Rates by County—TN, 2009

Data source: Tennessee Department of Health; Controlled Substance Monitoring Database.
Opioid Prescription Rates by County—TN, 2010

Data source: Tennessee Department of Health; Controlled Substance Monitoring Database.
Opioid Prescription Rates by County—TN, 2011

Data source: Tennessee Department of Health; Controlled Substance Monitoring Database.
Drug Dispensing in Tennessee

- 275.5 Million Hydrocodone Pills
  - 51 pills per every Tennessean over age 12

- 116.6 Million Xanax Pills
  - 22 pills per every Tennessean over age 12

- 113.5 Million Oxycodone Pills
  - 21 pills per every Tennessean over age 12
Source Where Pain Relievers Were Obtained for Most Recent Nonmedical Use among Past Year Users Aged 12 or Older: 2011-2012

1 The Other category includes the sources "Wrote Fake Prescription," "Stole from Doctor's Office/Clinic/Hospital/Pharmacy," and "Some Other Way."
### TABLE 5

Source of Prescription Drugs\(^a\) among Those Who Used in Last Year

**Grade 12, 2007–2011**

(Entries are percentages.)

*Where did you get the [insert drug name here] you used without a doctor’s orders during the past year? (Mark all that apply.)*

<table>
<thead>
<tr>
<th>Source of Drugs</th>
<th>Amphetamines</th>
<th>Tranquilizers</th>
<th>Narcotics other than Heroin</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Bought on Internet</strong></td>
<td>4.6</td>
<td>4.5</td>
<td>2.4</td>
</tr>
<tr>
<td><strong>Took from friend/relative without asking</strong></td>
<td>19.6</td>
<td>14.2</td>
<td>21.1</td>
</tr>
<tr>
<td>Took from a friend</td>
<td>—</td>
<td>4.9</td>
<td>—</td>
</tr>
<tr>
<td>Took from a relative</td>
<td>—</td>
<td>9.3</td>
<td>—</td>
</tr>
<tr>
<td><strong>Given for free by friend or relative</strong></td>
<td>58.2</td>
<td>66.4</td>
<td>59.8</td>
</tr>
<tr>
<td>Given for free by a friend</td>
<td>—</td>
<td>5.5</td>
<td>—</td>
</tr>
<tr>
<td>Given for free by a relative</td>
<td>—</td>
<td>9.9</td>
<td>—</td>
</tr>
<tr>
<td><strong>Bought from friend or relative</strong></td>
<td>45.0</td>
<td>46.6</td>
<td>44.1</td>
</tr>
<tr>
<td>Bought from a friend</td>
<td>—</td>
<td>4.9</td>
<td>—</td>
</tr>
<tr>
<td>Bought from a relative</td>
<td>—</td>
<td>2.6</td>
<td>—</td>
</tr>
<tr>
<td>From a prescription I had</td>
<td>15.1</td>
<td>18.1</td>
<td>18.4</td>
</tr>
<tr>
<td>Bought from drug dealer/stranger</td>
<td>26.7</td>
<td>21.8</td>
<td>24.2</td>
</tr>
<tr>
<td>Other method</td>
<td>17.8</td>
<td>13.8</td>
<td>7.5</td>
</tr>
</tbody>
</table>

**Weighted N =**

- 261
- 394
- 226
- 289
- 361
- 447

*Source.* The Monitoring the Future study, the University of Michigan.

*Note.* '—' indicates data not available.

\(^a\)In 2009, the response categories were expanded to differentiate between friends and relatives.
Diversion Tree
Rates of prescription painkiller sales, deaths and substance abuse treatment admissions (1999-2010)

What’s Driving NMPDU?

NMPDU Prevalence

Potential prescription drug demand

Prescription drug supply

Prescription drug demand

Aggregate Efforts

Supply

Demand

NMPDU Prevalence

Potential Demand
Demand/ Potential Demand
In 2008, there were 14,800 prescription painkiller deaths.  

For every 1 death there are...

- 10 treatment admissions for abuse
- 32 emergency dept visits for misuse or abuse
- 130 people who abuse or are dependent
- 825 nonmedical users


Substance Abuse and Mental Health Services Administration. Results from the 2010 National Survey on Drug Use and Health: volume 1: summary of national findings. Rockville, MD: Substance Abuse and Mental Health Services Administration, Office of Applied Studies; 2011. Available from URL: [http://oas.samhsa.gov/NSDUH/2K10NSDUH/2k10Results.htm#2.16](http://oas.samhsa.gov/NSDUH/2K10NSDUH/2k10Results.htm#2.16)
Source: SAMHSA funded MASBIRT program, N=173,714
Individual-Level Determinants

- Age
- Gender
- Social/Emotional competence
- Mental health
- Educational Attainment
- Employment Status
- Marital status
- Housing
- History of trauma
- Age of drug use initiation
Past Year Nonmedical Use of Pain Relievers, by Detailed Age Category

SOURCE: http://www.oas.samhsa.gov/nhsda/
Prescription painkiller overdose deaths are a growing problem among women.

SOURCE: National Vital Statistics System, 1999-2010 (deaths include suicides)
Socio-Familial Determinants

- Social-network size and characteristics
- Parental involvement
- Peer drug use
- Familial support/ bonding
- Divorced parents
Adverse Childhood Experiences

<table>
<thead>
<tr>
<th>Misuse of Prescription Pain Medications</th>
<th>Number Resp.*</th>
<th>95% CI Wt. %</th>
<th>95% CI LL</th>
<th>95% CI UL</th>
<th>Adj. Odds Ratio</th>
<th>95% CI LL</th>
<th>95% CI UL</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 ACEs</td>
<td>3,815</td>
<td>1.4</td>
<td>0.9</td>
<td>2.1</td>
<td>1.00</td>
<td>Referent</td>
<td></td>
</tr>
<tr>
<td>1 to 3 ACEs</td>
<td>3,679</td>
<td>4.1</td>
<td>3.2</td>
<td>5.1</td>
<td>2.76</td>
<td>1.62</td>
<td>4.70</td>
</tr>
<tr>
<td>4 or more ACEs</td>
<td>1,232</td>
<td>9.6</td>
<td>7.2</td>
<td>12.6</td>
<td>6.25</td>
<td>3.49</td>
<td>11.20</td>
</tr>
</tbody>
</table>
Neighborhood-Level Determinants

- Unemployment rate
- Average educational attainment
- Drug arrest rate
- Average income
- Community cohesion
- Diversion control (e.g. drug drop boxes, PDMPs)
Opioid-Related Mortality

Prescriber Behavior

• High volume prescribing
• Sales
• Dosage
• Oxycodone prescribing
• Methadone prescribing
Growth of methadone use for pain and methadone overdoses

- Methadone use for pain (kg/100,000 people)
- Methadone-related overdose deaths per 100,000 people


Death rate from overdoses caused by a single prescription painkiller

Source: Substance Abuse and Mental Health Services Administration, Center for Behavioral Statistics and Quality, Drug Abuse Warning Network Medical Examiner Component, 2009.
Opioid-Related Mortality

Individual Determinants

• SA history
• Diversion
• Doctor shopping
• Drug substitution
• Polydrug toxicity
• Socio-demographics
Number of High Utilization Patients by Quarter in TN CSMD, 2010-2013
Opioid-Related Mortality

Environmental Determinants

- Urbanization
- Geography
- Public policy
- Intervention
- Media
- PDMP
Type of opioids ever used nonmedically++

* statistically significant difference at p<0.05 level
++We present brand and generic names used in the NSDUH survey
What Can be Done?
What’s Driving NMPDU?

- NMPDU Prevalence
- Potential prescription drug demand
- Prescription drug supply

Aggregate Efforts

Supply
- NMPDU Prevalence
- Potential Demand

Demand
Aggregate Efforts

1° Overdose Reversal with Naloxone

2° Rx Monitoring Programs & Diversion Control

3° Traditional & Medically Assisted Treatment

Dissemination & Implementation of Effective Prevention Programs

Little or no discussion

Health Professions Training & Continuing Education

Screening, Brief Intervention & Referral to Tx

Neonatal Abstinence Syndrome: Treatment of Mother, Infant & Preventing Second Pregnancy

Evidence-Based Drug Courts
Prescribing Guidelines

Five studies in different states have shown that ~10-15% of prescribers prescribe ~65-80% of OPRs
Prescribing Guidelines

MED: **Morphine Equivalent Dose**; method of standardizing the volume of consumed opioids in a day

Strong epidemiologic evidence for a significant increase in opioid related morbidity and mortality above *100-120 mg/d MED*
MED: Morphine Equivalent Dosage

- Study of 45 overdoses
- Hazard ratio:
  - 50-100 mg/d MED = almost 4x increase in risk
  - >100 mg/d MED = almost 9x increase in risk

Opioid prescribing guidelines

- 27% reduction in MED/day with OPR guide
- 50% reduction in overdose death rate in 2010 from 2009 rate

Controlling the Supply
Painkillers And The Heroin Market

A growing number of people are using heroin in recent years, in part because it can be cheaper and easier to find than opioid painkillers purchased on the black market. Most heroin users were first hooked on prescription opioids, which generated $11 billion in 2010 for the pharmaceutical industry.

Substance abuse treatment facilities admissions by primary drug

- Heroin
- Other Opiates and Synthetics

4 out of 5 new heroin users have abused painkillers.

A Cheaper High

$30 can buy one oxycodone pill on the street in New York...

or six hits of heroin.

*2012 data for Mississippi, Pennsylvania, and West Virginia are not available.

Sources: SAMHDA, Los Angeles Times, Frost & Sullivan
Prescription Drug Monitoring Programs (PDMPs) Interstate Data Sharing Status

*Engaged* does not mean that a PDMP is sharing with all of the other *engaged* PDMPs.
National Take Back Day: October 26, 2013
Total Weight Collected (pounds): 647,211 (324 Tons)
Permanent Collection Boxes

Figure II-2. Number of Permanent Prescription Drug Collection Boxes

Source: Tennessee Department of Mental Health and Substance Abuse Services (2013)
Concerned by rising rates of prescription drug abuse, the Drug Enforcement Administration announced Monday that it would permit consumers to return unused prescription medications like opioid painkillers to pharmacies.

The move is intended to help reduce stockpiles of unneeded medicines in homes, which are often pilfered by teenagers. Under the new regulation, patients and their relatives will also be allowed to mail unused prescription drugs to an authorized collector using packages to be made available at pharmacies and other locations, like libraries and senior centers.

The new regulation, which will go into effect in a
The Ambulance or the Fence?

Prevention Approach
Usual Approach
Primary Prevention Works

• Parenting programs work:
  – Parental monitoring
  – Authoritative parenting
• Parents need to be engaged
• Kids at risk need to be trained
• We can scale up effective programs to prevent uptake of NMPDU
NREPP is a searchable online registry of more than 300 interventions supporting mental health promotion, substance abuse prevention, and mental health and substance abuse treatment. We connect members of the public to intervention developers so they can learn how to implement these approaches in their communities.

NREPP is not an exhaustive list of interventions, and inclusion in the registry does not constitute an endorsement. Learn More >

News
Learn About NREPP’s RSS Feed

New Intervention Summary Available - 09/23/2013
Read the newly posted summary for Interactive Journaling
Read more >

New Intervention Summary Available - 09/23/2013
Read the newly posted summary for Family Wellness: Survival Skills for Healthy Families
Read more >

Sign up for e-updates
Enter your email address to receive monthly NREPP updates.

300th Intervention Summary Posted
SAMHSA’s NREPP reached a new milestone, publishing its 300th summary of an evidence-based substance abuse or mental health intervention. See the SAMHSA Bulletin for more information about NREPP and this milestone.
Early Intervention
Screening, Brief Intervention, and Referral to Treatment (SBIRT)
Naloxone

• Reverses overdose by blocking receptors

• White House (ONDCP) and Attorney General encourage first responders to carry

• In conjunction with “Good Samaritan” law can effectively reduce mortality rate
Number of Deaths per 100,000 Population from Unintentional Drug Poisoning in Wilkes County, NC, 2004-2011
Northeast TN Resources

Generation Rx
http://etsugenerationrxprovidertoolkit.weebly.com/prescriber-resources.html

Prescription Drug Abuse and Misuse Working Group
http://www.etsu.edu/cph/pdam/
Questions?
References


3. United States Department of Health and Human Services (USDHHS), Centers for Disease Control and Prevention (CDC), National Center for Health Statistics (NCHS), Compressed Mortality File (CMF) on CDC WONDER Online Database.


