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Report on Methamphetamine and Other Drug Use in Kentucky

Prepared by:
The University of Kentucky
Special Commission on
the Study of Methamphetamine and
Other Emerging Drugs in Kentucky

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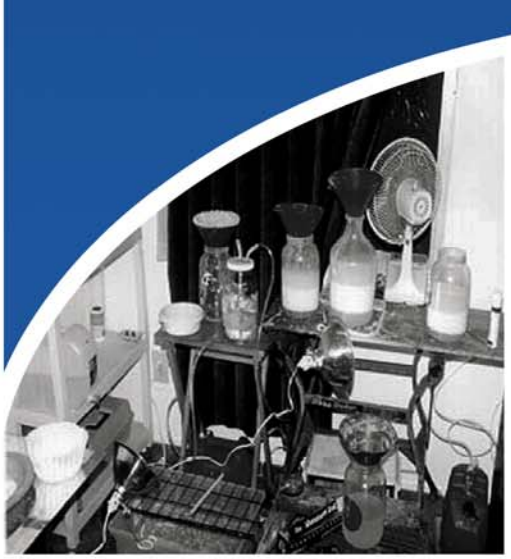
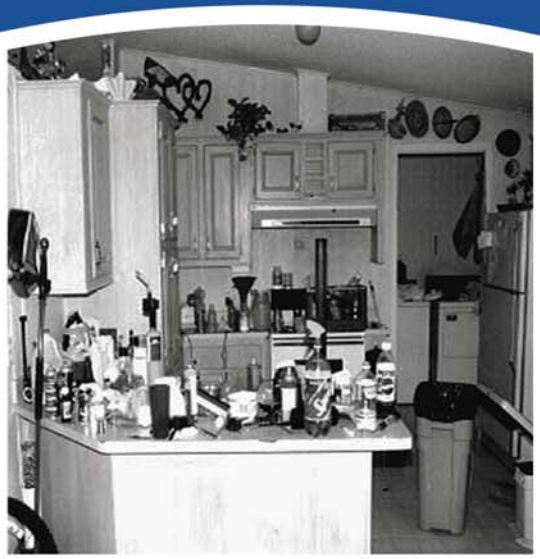




REPORT ON METHAMPHETAMINE AND OTHER DRUG USE IN KENTUCKY

Prepared by

The University of Kentucky Special Commission on the Study of Methamphetamine and Other Drug Use in Kentucky

Sharon Turner, D.D.S., JD,
Chairperson of the Special Commission

Robert Walker, M.S.W., L.C.S.W.,
Consulting Editor

March 2008

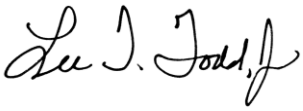
PRESIDENT'S SPECIAL COMMISSION ON METHAMPHETAMINE AND OTHER DRUG USE IN KENTUCKY

In 2005, I spent several months traveling across Kentucky to learn from citizens, parents, and other educators about their perceptions of the critical needs relating to higher education. I also learned about many social and health problems that suggested a need for further research and information. One of the standout issues from virtually every community was the problem of drug abuse and the perceived rise in methamphetamine use. While there are national data that can help us understand the scope of drug abuse in the nation, I felt that it was important to try to take the pulse of the problem here in our Commonwealth.

The University of Kentucky has many researchers, clinical specialists, and educators with outstanding accomplishments in their areas of expertise. Based on what I heard from the community, I asked the Dean of the College of Dentistry, Dr. Sharon Turner, to bring together a team of researchers, policy specialists, and clinical practitioners to focus on an up-to-date study of methamphetamine and other drug use problems in our state.

Dr. Turner assembled a team of researchers to examine the major areas in which drug abuse is affecting our citizens. I am pleased to present a summary of their findings in this report. I am also pleased to have some useful recommendations for the state from this panel of researchers and clinical practitioners. We hope that these findings and recommendations will be helpful to state policy makers as they address the problem of substance abuse in Kentucky.

Sincerely,



Lee T. Todd, Jr.
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Many staff also participated in this project as research or administrative assistants. Ms. Ginni Haynes provided administrative support to numerous researchers and project volunteers over the past year of the project. Ms. Allison Mateyoke-Scrivner developed the graphics and report formatting for the project.

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FOREWORD

Sharon Turner, D.M.D., J.D.

Dean, University of Kentucky, College of Dentistry

University of Kentucky President, Dr. Lee Todd asked the University of Kentucky faculty and staff to conduct a series of internal meetings and studies to develop a better picture of the scope and effects of methamphetamine and nonmedical use of prescription drugs in Kentucky. I was asked to chair this effort and so I began contacting researchers, clinicians, and policymakers to learn what was already in the field in terms of our understanding of these drugs. As the meetings progressed, we had numerous presentations from different disciplines and it became clear that we needed to take further steps to get a fuller picture of the many clinical and social problem related to these drugs.

To that end, I asked Robert Walker of the UK Center on Drug and Alcohol Research to assist by drawing together a team of researchers with expertise in substance abuse and related problem areas and to work with them to develop projects that would increase our knowledge of methamphetamine and prescription drug use in Kentucky. We called in physician researchers to help us explore primary care and its experiences with methamphetamine and prescription drug abuse. We enlisted dentists, dental health specialists, and social work specialists in child trauma to examine the potential effects of methamphetamine on dental health and child protective services. We brought in researchers with experience in substance abuse who also had backgrounds with prison populations. We drew from the knowledge of human resource managers and also engaged an economist to help us describe what would be needed to begin thinking about the economic costs to Kentucky of these two drug abuse patterns.

President Todd sponsored these researchers by providing funds for the pilot studies. This report is intended to provide the University and the state with a more complete picture of some of the problems associated with these substance abuse patterns. Naturally, it is recognized that these pilot studies, undertaken quickly and with the already full schedules of the researchers, provide a still limited picture. In some cases, the data presented are perhaps best thought of as preliminary or pilot data. Nonetheless, we are pleased to present the university community and key policymakers in state government with a group of studies that may inform policy development in regard to services for those affected by methamphetamine and nonmedical use of prescription drugs.

In reviewing the studies included in this special report, it is important to be reminded that these studies are preliminary in nature. This report does not constitute an end-all statement about methamphetamine or nonmedically used prescription drugs in Kentucky. However, it does add to the understanding of some of the clinical and social problems that arise from these drugs. We hope that the report may be of help to policymakers and to the public at large in getting a clearer picture of the scope of this problem.

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EXECUTIVE SUMMARY

The Commission on Methamphetamine and Other Drug Use in Kentucky spent two years listening to various experts and research about the scope of methamphetamine use and use of prescription drugs in Kentucky. While these two classes or types of drug use are not the only ones that pose a problem for the state, they are, nonetheless, ones that have been widely portrayed in the media and have received public notice. We recognize that there are other types of substance abuse that have very great impact on Kentucky. These pilot studies conducted in Kentucky and our exploration of national data applied to Kentucky populations, yield several preliminary findings that deserve attention.

Overall for Kentucky

- National estimates of the prevalence of drug and alcohol problems by industry type suggest that Kentucky has an estimated 54,000 workers with drug abuse and 170,000 with alcohol-related problems.

Methamphetamine use and prescription drug use

- Methamphetamine, while used by a relatively small percent of the population, is associated with serious health and legal problems.
- Sixty percent of the primary care physicians in eastern Kentucky report that prescription opiates are among the most serious drug problems in the state.
- Primary care physicians in the western part of Kentucky have more concern about the use of methamphetamine on health.

Dental health

- Dentists estimate that restoring dental health to individuals with “meth mouth” would cost over $5,000 per person and payer sources for their care is very uncertain.

Drug exposed children

- Children in homes where neglect or abuse have been investigated are more likely to have been exposed to trauma in families where methamphetamine has been used.
- The cost of Out-of-Home placements of children in methamphetamine exposed homes is greater than for other Out-of-Home care for children in other neglect or abuse cases.

Law enforcement and corrections

- The correctional system in Kentucky has a large percentage of inmates who report having used methamphetamine before entering prison and the system is burdened by high health care costs of inmates with drug abuse histories and methamphetamine may add to those costs.
- Arrest data for methamphetamine charges suggest a west-to-east trend, suggesting regional differences in the availability of methamphetamine or in local law enforcement focus.

Economic and social cost of substance abuse

- Estimating the economic costs of substance abuse must take into consideration costs to the individuals involved as well to society as a whole.
- In estimating the costs associated with substance abuse it is important to consider the costs that society may avoid if treatment is provided.

These pilot studies suggest areas of concern for Kentucky and point to the need for continued research to better understand the extent and cost of these drug abuse-related problems in the five content areas focused on by this Commission: (1) dental health; (2) physical health care; (3) children's safety; (4) law enforcement and corrections; and (5) the workforce.

INTRODUCTION AND BACKGROUND

Substance abuse problems affect the entire nation in multiple ways. When examining specific substance abuse-related problems, the substances that are among the most widespread and most harmful to health are alcohol and tobacco – the two legal addictive substances. However, attention has also been drawn to emerging trends of other substance use. In looking at these patterns, Kentucky faces many problems relating to methamphetamine and prescription drug use. Methamphetamine is a highly addictive stimulant which produces a powerful, long-term activation of the central nervous system and has been associated with significant health and dental problems (National Institute on Drug Abuse [NIDA], 2006). Prescription drugs, including prescription opioid analgesics, raise concern about addiction and drug overdose deaths.

In examining the overall pattern of substance abuse in the state, the Kentucky Needs Assessment Project 2004 Adult Household Survey Report found that an estimated 342,162 adult Kentuckians (11% of the adult population) met Diagnostic and Statistical Manual of Mental Disorders-IV-Text Revision (DSM-IV-TR) criteria for alcohol abuse and/or dependence in their lifetime. An estimated 136,559 adult Kentuckians (4.4%) met DSM-IV-TR criteria for alcohol abuse and/or dependence in the past year. In addition, an estimated 65,291 adult Kentuckians (2.1% of the adult population) met DSM-IV-TR criteria for drug abuse and/or dependence in their lifetime and an estimated 50,446 (1.6%) met DSM-IV-TR criteria for drug abuse and/or dependence in the past year. Overall, this report suggests that, allowing for those who received treatment at some point in their lifetime (3.7%), an estimated 374,884 adult Kentuckians (12%) may need substance abuse treatment but are not currently receiving it (Center on Drug and Alcohol Research [CDAR], 2007).

In the Kentucky study, lifetime methamphetamine use was reported by 2.6% of respondents, while MDMA and other stimulants were reported by 2.2% and 7.1% respectively (CDAR, 2007). In addition, an estimated 205,507 Kentuckians have used benzodiazepines nonmedically and about 6.6% of the state population is estimated to have used opioids nonmedically (CDAR, 2007). The National Survey on Drug Use and Health reported a 2005 prevalence of 5.3% of the national population using methamphetamine in their lifetime (Substance Abuse and Mental Health Services Administration [SAMHSA], 2006). However, state level drug-specific data are not available from this report.

Prescription drug misuse, and prescription opiate misuse in particular, has emerged as a major public health concern in recent years (Miller & Greenfeld, 2004; Woolf & Hashmi, 2004) and some national studies have shown that the number of persons meeting the criteria for nonmedical prescription opiate abuse or dependence is second only to marijuana (SAMHSA, 2002). There has been intense media coverage surrounding OxyContin® and reports of dependence, overdoses and diversion (Lipman, 2003; Zacny et al., 2003). In addition, government and media reports have stated that nonmedical prescription opioid use is at “epidemic” levels in the Appalachian regions of

Kentucky, Virginia and West Virginia (Drug Enforcement Administration [DEA], 2002; Hutchinson, 2001). However, rigorous epidemiologic data in the scientific literature are still wanting (Zacny et al., 2003).

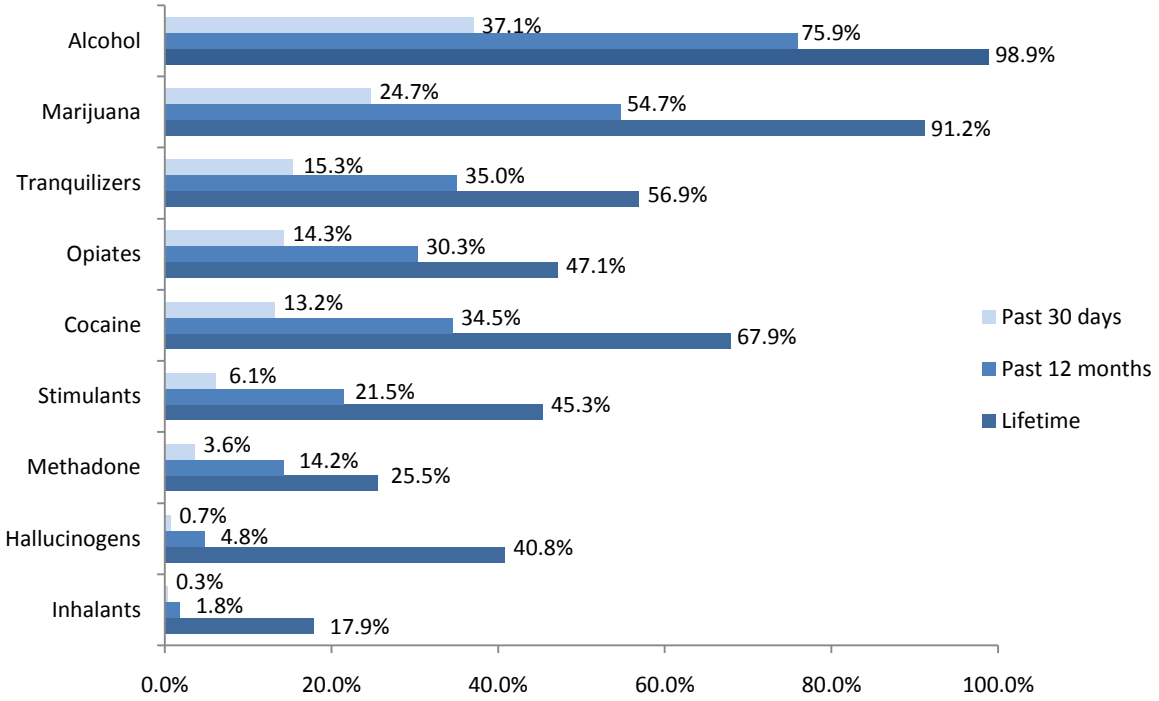
Kentucky, as an Appalachian state, faces major problems with prescription opiates, benzodiazepines, and the "traditional" heavily used substances - alcohol and marijuana. Nationally, there has been a significant increase in the prevalence of nonmedical prescription use with a 67% increase from 1991-1992 to 2001-2002 (Blanco et al., 2007). In the 2006 National Survey on Drug Use and Health, 2.6 million persons aged 12 or older reported nonmedical use of prescription-type drugs for the first time during the year (SAMHSA, 2007). The same study shows that from 2002 to 2006 the percent of the population reporting lifetime nonmedical use of prescription-type drugs increased from 19.8% to 20.3% (SAMHSA, 2007). For prescription opiates, the change was from 12.6% in 2002 to 13.6% in 2006 (SAMHSA, 2007).

Methamphetamine Abuse

The first amphetamine was developed in 1887 (King & Ellinwood, 2005). Methamphetamine, a methylated form of amphetamine, is a central nervous system stimulant with long-acting effects of many hours (Hamby & Fink, 2006; Willens & Spencer, 1998). There are reports of a rising methamphetamine problem in Kentucky while nationally, there are indications of a slight decrease, at least in the number of new users of methamphetamine. The number of new users in the U.S. in 2006 was 259,000 compared to 318,000 in 2004 (SAMHSA, 2007). Nationally, the past-year prevalence of methamphetamine use was highest for the western states (1.6% of the population) and lowest for the northeast (.3%) with the south in between (.7%) (SAMHSA, 2007).

The data on drug use patterns among substance abusers who enter publicly funded treatment in Kentucky have been relatively stable for the past five years. Figure 1 shows the baseline substance use characteristics of the follow-up sample of clients at intake in the FY 2005 Kentucky Substance Abuse Treatment Outcome Study (KTOS) (Walker et al., 2007). Lifetime stimulant use (including methamphetamine) was reported by 45.3% of clients and past 12 month use by 21.5% of clients; however, the data collection at that time did not distinguish between methamphetamine and other stimulant use (Walker et al., 2007).

Figure 1. Baseline substance use among FY 2005 follow-up sample (n=941)



In 2005, the latest year for which Kentucky crime statistics are available, there were 46,679 arrests for drug violations which represents 16.3% of arrests for all crimes in Kentucky (Kentucky State Police [KSP], 2005). Most of these drug arrests were for non-narcotic drugs, including methamphetamine (20,589). Marijuana was second with 16,913 arrests. Opiates and cocaine accounted for 6,141 arrests and synthetic opiates (including OxyContin®) accounted for 3,036 arrests (KSP, 2005). Kentucky experienced an increase in the number of methamphetamine labs through 2005. However, federal legislation and Kentucky Senate Bill 63 greatly curtail likely future growth of home-grown methamphetamine labs by placing restrictions on the retail sale of pseudoephedrine, a commonly used over-the-counter cold or allergy symptom reliever. Pseudoephedrine, which could be bought at retail pharmacies and grocery stores, provided a ready supply of the precursor to methamphetamine which has been produced in home laboratories like those shown in Figure 2. The chemistry is simple, but the process is dangerous and the environmental consequences can be envisioned from these examples.

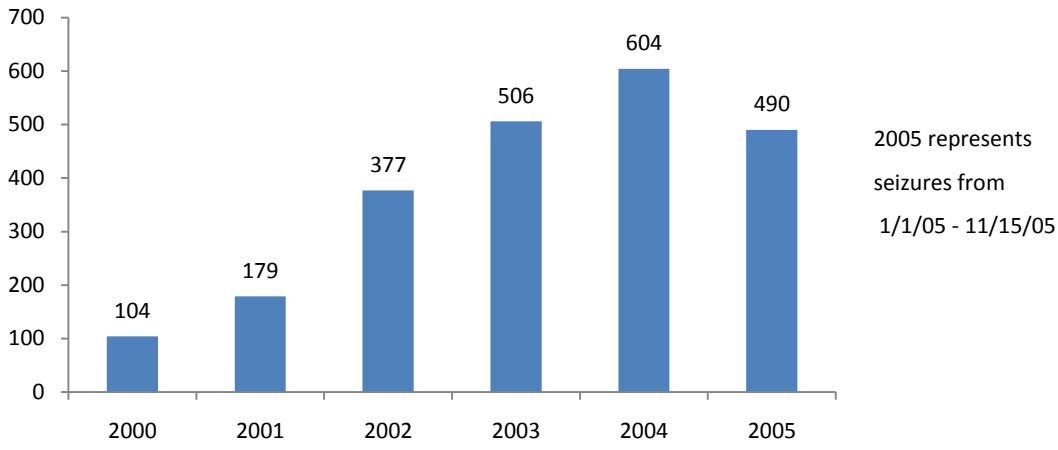
Figure 2. Typical "Meth labs"

Source: National Clandestine Laboratory Database

http://www.natlalliance.org/pdfs/BirkmeyerA2.pdf

The arrest data for methamphetamine labs over the past several years suggest significant methamphetamine problems for Kentucky as shown in Figure 3 below.

Figure 3. Methamphetamine Lab Seizures in Kentucky by Year



(Indiana Criminal Justice Institute, 2005)

Like the rest of the nation, Kentucky has experienced changes in methamphetamine production and distribution trends. These trends have varied from county to county as described in one of the sections of this report (see Hamby & Fink, 2006). Success in decreasing domestic methamphetamine production through law enforcement pressure and strong precursor chemical sales restrictions has resulted in increased Mexican production and distribution. Anecdotally, clinical providers report that the Mexican methamphetamine, a high purity "ice" methamphetamine, is now making inroads in Kentucky. Clinicians here in Kentucky tend to report this form of methamphetamine as resulting in more serious clinical problems and perhaps more rapid onset of addiction to the drug (El Paso Intelligence Center [EPIC], 2007).

While reliable and valid data on methamphetamine production in Mexico are not available, local and national anecdotes suggest that methamphetamine production has increased in Mexico since 2002 (National Drug Intelligence Center [NDIC], 2005). According to the DEA, the number of methamphetamine laboratories in Mexico is increasing as is the amount of methamphetamine seized in Mexico and at land points of entry along the southwest border of the U.S. Data from the International Narcotics Control Strategy Report (INCSR) indicate that the amount of methamphetamine reported seized in Mexico increased from 400 kilograms in 2001, to 457 kilograms in 2002, and 652 kilograms in 2003 (NDIC, 2005).

Kentucky has three major interstates (Interstates 64, 65, and 75) which provide the avenues of trafficking for methamphetamine coming from the south and southwest. Kentucky law enforcement authorities aggressively pursue this traffic. Kentucky counties with the most methamphetamine labs seized in 2005 are shown in Table 1.

Table 1. Leading counties with methamphetamine lab seizures in 2005

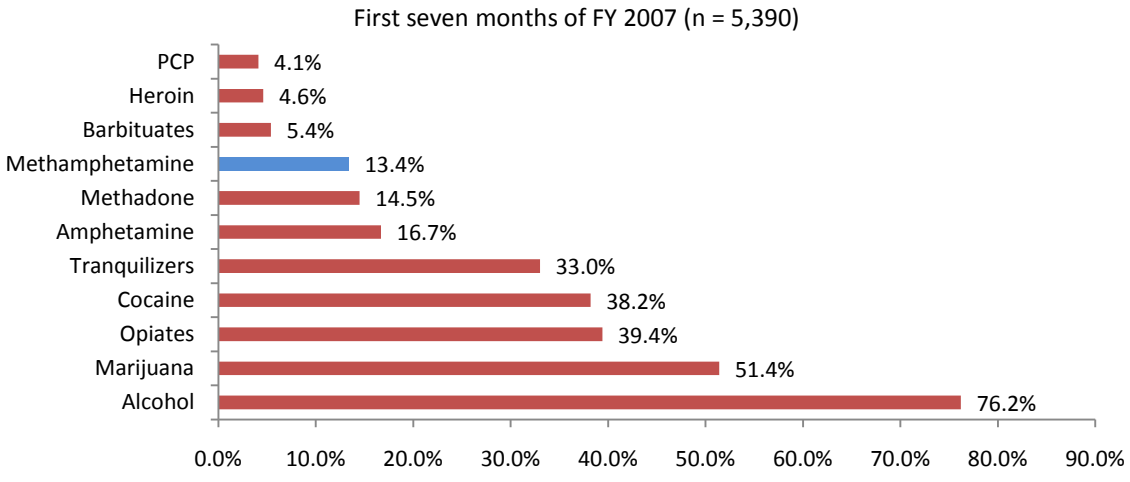
COUNTY	NUMBER OF LAB SEIZURES
Warren	52
Daviess	49
Jefferson	37
Hopkins	34
Monroe	24
Bullitt	23
Allen	21
Laurel	19
Muhlenberg	17
Pulaski	16
Barren	16

Source: Kentucky Office of Drug Control Policy

The number of methamphetamine labs in the last six months of 2005 dropped 73% from the first six months in 2004 (Floden, 2006). In 2005, methamphetamine labs were reported in 81 of our 120 counties (Floden, 2006). In 2005, Kentucky ranked 6th in methamphetamine responses with 587. Missouri had the most methamphetamine lab responses with 2,252. There were 83 statewide methamphetamine arrests in 2006 and 34 counties had methamphetamine lab arrests in 2006 – down from 81 in 2005 (Floden, 2006). Nearly 180 children have been present in methamphetamine lab seizures within the past two years (Floden, 2006)

While the number of methamphetamine arrests should suggest a large problem for the treatment providers, to date the number of methamphetamine users in treatment has remained rather stable over the past few years and at moderate levels of prevalence. The baseline KTOS data from state fiscal year 2007 in Figure 4 shows that among the first seven months of data, 13.4% of clients reported using methamphetamine in the past 12 months.

Figure 4. Kentucky Substance Abuse Treatment Outcome Study (KTOS) baseline data: Percent of clients reporting past 12 month use



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In addition, the program admission data on inmates in the Kentucky Department of Corrections treatment programs show that 44.1% of inmates reported having used stimulants in the 12 months before their last incarceration (Staton-Tindall, McNees, Walker, & Leukefeld, 2007).

Prescription Drug Use

While methamphetamine has been at the forefront of public awareness in recent months, many have noted the increasing problem of prescription drug abuse in the rural Appalachian counties of Eastern Kentucky (Special Report, 2003). Many of the accounts of prescription drug use have focused on prescription opioids, or painkillers. In fact, in the 2006 National Survey on Drug Use and Health, the second highest number of past year illicit drug users was for persons making nonmedical use of prescription drugs and of those, the majority were using prescription opiates (SAMHSA, 2007). The Drug Abuse Warning Network reported that among drug-related suicide attempt emergency department admissions in 2004, 51% of adolescents attempted suicide with prescription opioids (Office of Applied Statistics [OAS], 2006). While much of the media attention has focused on oxycodone preparations, hydrocodone is reported by more substance users in national datasets (SAMHSA, 2007) and in Kentucky substance abuse treatment data, benzodiazepines rank at the same high levels.

Furthermore, according to the DEA, the counties in Eastern Kentucky led the nation in 2003 in total grams of prescription pain medication prescribed per capita (DEA, 2005). According to the public media, the abuse of prescription drugs has had serious negative consequences for users as well as the communities at large (Special Report, 2003). For example, more people are being arrested for DUIs resulting from prescription drug use than alcohol use in some eastern Kentucky counties (DEA, 2005; Special Report, 2003). The Substance Abuse and Mental Health Services Administration (SAMHSA) estimates suggest that Kentucky has the highest rate in the nation of illicit prescription opiate use and these data are supported by the high number of opiate-related overdose deaths in the Appalachian area of the state (Special Report, 2003). In fact, during the time of this report, the producer of the first long-acting oxycodone preparation, Purdue Pharma L.P., entered into a plea arrangement following charges of intentional misrepresentation of the addictive potential of the drug. The terms of the plea bargain included fines of $634.5 million (Lindsey, 2007). While oxycodone is no longer the primary prescription opioid analgesic on the street, it stimulated increased use of other more commonly available opioids such as hydrocodone.

The types of prescription drugs that have been reported as emerging problems include opiates and benzodiazepines (National Drug Intelligence Center and the Kentucky State Police, 2002). OxyContin®, in particular, has received considerable attention (Special Report, 2003; Inciardi & Goode, 2003). Nationwide, hospital emergency department mentions of oxycodone-related incidents increased 348% from 1999 to 2002 and

hydrocodone mentions increased by 165% (SAMHSA, 2003). Methadone misuse has also been reported as increasing in Eastern Kentucky (Cicero & Inciardi, 2005). Appalachia has a lengthy history of involvement in illicit drugs (mostly marijuana) and alcohol, which may be related to the lack of economic opportunity (Katz & Whittaker, 2001). In fact, earlier studies have shown significant substance abuse problems in rural Kentucky, with alcohol traditionally at the forefront (Logan, Schenck, Leukefeld, Meyers, & Allen, 1999). Some prescription drug users have grown up in families where the pattern is common (Special Report, 2003; Manchikanti et al, 2003). Consequently, many of these users may believe that nonmedical use of prescription drugs is acceptable and does not really constitute either a legal or medical problem (National Drug Intelligence Center, 2005; Kentucky State Police, 2002). In addition, anecdotal information indicates that many physicians treat anxiety and "nerves" with benzodiazepines. In Eastern Kentucky, benzodiazepines may be prescribed for long periods of time (months or years); although this is contrary to generally recognized best prescribing practices (Ashton, 1994). In the depressed economies of Eastern Kentucky, long-term treatment with benzodiazepines may have become an accepted way to deal with "bad nerves" or "nerve problems." Not unlike the Latino syndrome, "Ataque de nervios" listed in the DSM-IV-TR, the term "nerves" is a way to report emotional distress in Appalachia (American Psychiatric Association [APA], 2000; Migliore, 1994; van Shaik, 1989). The impact of both of these drug use patterns can be seen in incarceration rates and costs.

Given what has emerged in the national and statewide research as well as clinical observations, there is a need to further clarify the extent and consequences of emerging drug use in Kentucky. With this in mind, the principal substances that have become the focus of this report are methamphetamine and two classes of prescription drugs, benzodiazepines and opioid analgesics. In the following studies, these two forms of substance abuse will be examined in more detail, particularly in regard to the clinical problems related to drug use and the costs associated with these drug-related problems.

PILOT STUDIES OF THE SPECIAL COMMISSION ON METHAMPHETAMINE AND OTHER DRUG USE IN KENTUCKY

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Kentucky Dental Practitioner Survey on Methamphetamine and Other Drug Use

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INTRODUCTION

One of the many health characteristics of methamphetamine use is dental problems including erosion of tooth enamel and severe infection of the gum tissues. The specific oral effects of methamphetamine use can be devastating. Clinical evidence suggests extensive caries that resemble early childhood caries leading to a condition that has been called "meth mouth" (Howe, 1995; McGrath & Chan, 2005; Shaner, 2002). A distinct and often severe pattern of decay can often be seen on the cheek side tooth surface and the between-tooth surfaces of the teeth in the front of the mouth (Shaner, 2002).

The caries that have been associated with methamphetamine use are likely a result of a combination of drug-induced effects that result in xerostomia or "dry mouth syndrome." Methamphetamine users try to counter this effect by drinking sodas and using hard lozenge candy – both of which contribute to tooth decay. Methamphetamine users also practice poor oral hygiene, frequent consumption of high calorie, carbonated beverages and tooth grinding and clenching. Some reports have also speculated that the acidic nature of the drug is a contributing factor (Howe, 1995; McGrath & Chan, 2005; Shaner, 2002).

The American Dental Association (ADA, 2007) has identified oral health problems associated with methamphetamine as a serious dental health problem and noted that dentists need to be aware of the effects of this drug on oral health and how to identify "meth" users in their practice.

Figure 1. "Meth mouth"

(Photograph reproduced with permission from Stephen Wagner, D.D.S.)

METHOD

To better understand the prevalence of "meth mouth" conditions in Kentucky, 728 dentists responded to a survey that included questions about the prevalence of suspected substance abuse among their patients, with a particular focus on methamphetamine and prescription drugs. Two thousand three hundred eight dentists were identified from the Kentucky Board of Dentistry and each received a hard copy survey in the mail. The responding dentists represented 31.9% of the 2,308 who were invited to participate.

RESULTS

The dentists responding to the survey were mostly general dentists (77.7%) with an average of 31 hours per week in outpatient practice. The overwhelming majority had been in practice for a long time with 79.1% in practice for at least 20 years. Most practitioners (91.6%) reported that 30% or less of their caseload was under age 12. Also, most of the dentists (83.1%) in this study reported that 10% or fewer of their patients were substance abusers and fewer than 10% were abusers of methamphetamine.

More importantly, 43.1% of the dentists reported not having received training to recognize and treat methamphetamine-related oral health problems. Forty and one-half percent reported having received some training on methamphetamine-related oral health problems. However, 87.2% of dentists surveyed reported that of all substance abuse types that might negatively affect dental health, methamphetamine was the most detrimental. When asked about factors that suggested that patients may be using methamphetamine, out of the 608 responses, 582 responded that clinical or oral manifestations suggested methamphetamine use and 28 responded that other signs and symptoms such as skin lesions suggested methamphetamine use. Over half (54.3%) reported that parental methamphetamine use results in even worse dental health for children.

Figure 2. "Another classic meth mouth"

(Photograph reproduced with permission from Stephen Wagner, D.D.S.)

CONCLUSION

The cost of dental care is important in considering policies concerning methamphetamine use. In this survey dentists were asked to estimate the cost to restore dental health to the average "meth mouth." The average amount reported was $5,664, but the dentists estimated that only 40% of families would be able to afford this level of care.

The dentists responding to this survey were supportive of more education and training about methamphetamine-related dental health with 79.5% interested in a continuing education program. While a slight majority (53.4%) favored printed educational materials on methamphetamine-related care, many were also comfortable with video formats, workshops or even a CD-ROM format.

This brief survey has several limitations as it explored a wide range of dentists in Kentucky about methamphetamine use. Notably, the response rate was 32% and this may limit generalization of findings. However, this is one of the first efforts to survey of dentists about drug abuse among dental patients.

In conclusion, this survey provides a first effort at examining dentists' knowledge about substance abuse and their stated need for and strong interest in continuing education about methamphetamine and other emerging drug use among their patients.

Prescription Drug and Methamphetamine Misuse: A Survey of Primary Care Physicians in Urban and Rural Kentucky

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INTRODUCTION

Prescription drug misuse, and prescription opiate misuse in particular, has emerged as a major public health concern in recent years (Miller & Greenfeld, 2004; Woolf & Hashmi, 2004). Prescription opiates are second only to marijuana in the number of users who meet abuse or dependence criteria (Substance Abuse and Mental Health Services Administration [SAMHSA], 2007). Particularly noteworthy has been the intense media coverage surrounding OxyContin® and reports of dependence, overdoses and diversion (Lipman, 2003; Zacny et al., 2003). Furthermore, government and media reports have pronounced that prescription opioid abuse is at epidemic levels in the Appalachian regions of Kentucky, Virginia and West Virginia (Drug Enforcement Administration, 2002; OxyContin® Testimony, 2001). However, limited epidemiologic data have appeared in the scientific literature to support such claims (Zacny et al., 2003).

A 300% increase in new OxyContin® users occurred from 1999 to 2000, with similar increases from 2000 to 2001 (SAMHSA, 1999; SAMHSA, 2000; SAMHSA, 2001). Emergency room visits for which oxycodone-containing drugs such as OxyContin® were mentioned have increased 450% since 1994 (Office of Applied Statistics, 2004). Furthermore, among Kentuckians, the number of treatment admissions for prescription opioid abuse and dependence increased 163% in three years (1998-2000) (National Drug Intelligence Center, 2002). In fact, OxyContin® accounted for 86% of emergency department visits in one Appalachian regional medical center in 2001 (Drug Enforcement Administration, 2002).

According to the National Drug Intelligence Center, methamphetamine is the “most rapidly emerging threat to Kentucky,” especially in rural areas (National Drug Intelligence Center, 2002). National reports estimate that approximately 1% of Kentucky residents age 12 and older have used methamphetamine in the past year (SAMHSA), 2006). Data on laboratory seizures during the period from 1998 to 2001 suggested an increase in rural Western Kentucky. However, more recent trends have diminished from these levels.

The purpose of this study was to survey general practice physicians in both urban and rural practice to determine the prevalence of suspected methamphetamine use and prescription drug misuse in their adult patient population. Given that methamphetamine use is thought to be more prevalent in Western Kentucky and prescription drug use is more prevalent in Eastern Kentucky, we examined whether there were differences in physician responses in Eastern and Western Kentucky counties as well as Fayette.

METHOD

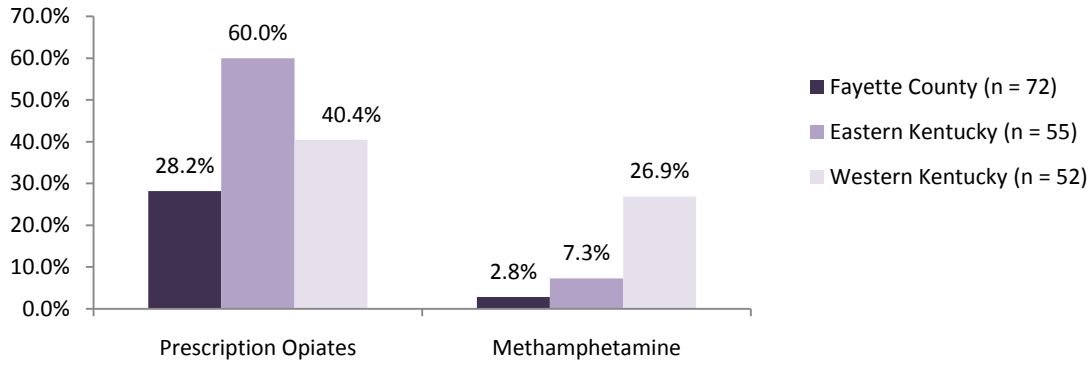
A confidential survey was administered to primary care physicians in one urban county (Fayette) and several rural counties in both Eastern and Western Kentucky via a web-based instrument or as a hard copy that was mailed back to the study investigators. Participants were asked to approximate the percent of their adult patients whom they suspected of misusing or abusing prescription drugs and whether they felt that prescription drug misuse and/or abuse was a growing problem among their adult patients.

A total of 186 physicians completed the survey. The overall response rate for this survey was 27.2% and did not differ significantly between the urban and rural physicians. More than half of the respondents practiced in rural Kentucky counties (61.3%), while the other 38.7% practiced in urban Fayette County. The majority of physicians who completed the survey had been practicing for at least 10 years (65.8%), and more than half (55.9%) had been practicing in the county where their office was located for at least 10 years. The median number of patients seen per week by participating physicians was 92.5 and 86.4% were outpatient-based rather than hospital-based.

RESULTS

In looking at specific substances by geographic location of the physicians' practices, alcohol was seen as significantly ($p<0.001$) more problematic in Fayette (85.9%) compared with Eastern (29.1%) and Western (48.1%) Kentucky counties. Figure 1 shows that methamphetamine was most often mentioned by Western Kentucky physicians as a serious problem for patients (26.9% versus 2.8% in Fayette and 7.3% in Eastern Kentucky counties, $p<0.001$). Prescription opiates were most often reported as having serious consequences for their patients among the Eastern Kentucky physicians (60% versus 28.2% in Fayette and 40.4% in Western Kentucky counties, $p=.002$); similar results were seen for prescription tranquilizers (12.7% in Eastern Kentucky, versus 1.4% in Fayette and 7.7% in Western Kentucky counties, $p=0.04$).

Figure 1. Most serious drugs among adult patients: Physician's perception (n=186)



Note: Missing county information for 7 of 186 respondents

Overall, almost half of the surveyed physicians (47.5%) suspected that five percent or less of their adult patients were misusing or abusing prescription drugs and this did not differ significantly between the urban-central and two rural areas. Likewise, most physicians (77.5%) suspected that fewer than five percent of their patients were using methamphetamine and this estimate did not vary significantly across the three areas of the state.

In summary, while many Kentucky physicians surveyed indicated that few of their adult patients were using or misusing methamphetamine and/or prescription opiates and benzodiazepines, most indicated that use of these substances is a growing concern in their area of practice. Those substances that were of major concern for the respondents' patients included alcohol, tobacco and prescription drugs; however, this did differ among physicians practicing in different regions of the state. Namely, prescription drugs were seen as more problematic in Eastern Kentucky, whereas methamphetamine was most often mentioned among Western Kentucky physicians.

Trauma Exposure and the Drug Endangered Child

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Overview of the Study

This study used data from the Kentucky child protective services agency, the Department of Community Based Services (DCBS) to examine the prevalence and the types of trauma exposure in young children (0-12 years of age) who live or have lived in homes with caregivers who are actively misusing substances with a special focus on children living in homes where methamphetamines are used. In this study such children are referred to as "drug-endangered children." Previous investigations have found that children living in such homes have a greater probability of being exposed to significant maltreatment, including physical abuse, sexual abuse and chronic neglect (Otero, Boles, Young, & Dennis, 2006; Haight, Jacobsen, Black, Kingery, Sheridan, & Mulder, 2005). Building on these findings we hypothesize that the types of stressful experiences that drug-endangered children experience create a phenomenologically unique set of biopsychosocial conditions that are best understood by using a conceptual framework drawn from trauma theory and research.

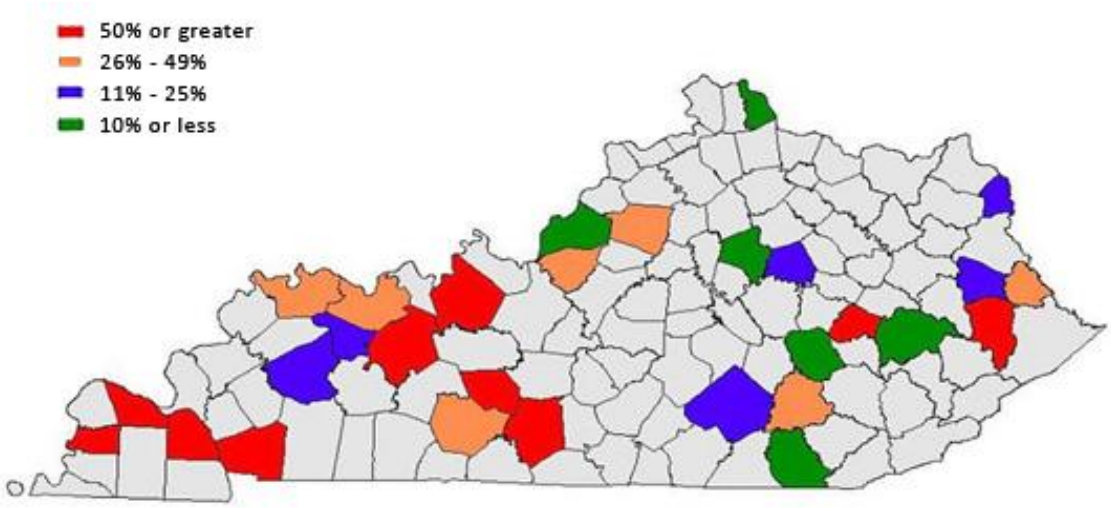
Methodology

A random sample of all open child protection records from FY 2005-2006 was drawn from a master list of cases provided by the state's child protection agency. These cases were randomly selected by choosing every third case following a random start until a sample equaling 20% of all open cases was obtained. The data presented in this report represent the experiences of the 1127 children or 753 cases selected through this process. Cases can involve multiple children. For this report, caregiver substance use variables were used to create the independent variables: 1) *No Drug Use* group: Caregiver drug use was not apparent based on the coded records (not including alcohol) (n=409); 2) *Meth Use* group: Methamphetamine use by the caregiver was endorsed in the coded record (n=144); 3) *Other Drug Use* group: Methamphetamine use by the caregiver was NOT endorsed, but other drug use was present (n=574). The caregiver drug use groups were then used to examine differences in their children's exposure to traumatic events, response to traumatic events, impairment associated with those events, and child protective services outcomes via a series of Chi Square analyses.

Sample Description

Caregivers who reported methamphetamine use (n=144) were primarily from rural areas of Kentucky, and were particularly concentrated in the western part of the state. The following map illustrates the proportion of the total caseload for the DCBS county offices that were randomly selected for this sample and that involved a methamphetamine using caregiver. As shown in Figure 1, ten of the counties with records of a methamphetamine user had 50% or greater of the families with methamphetamine use and most of those counties were in the western part of the state.

Figure 1. County distribution of records with methamphetamine using caretakers (n=144)

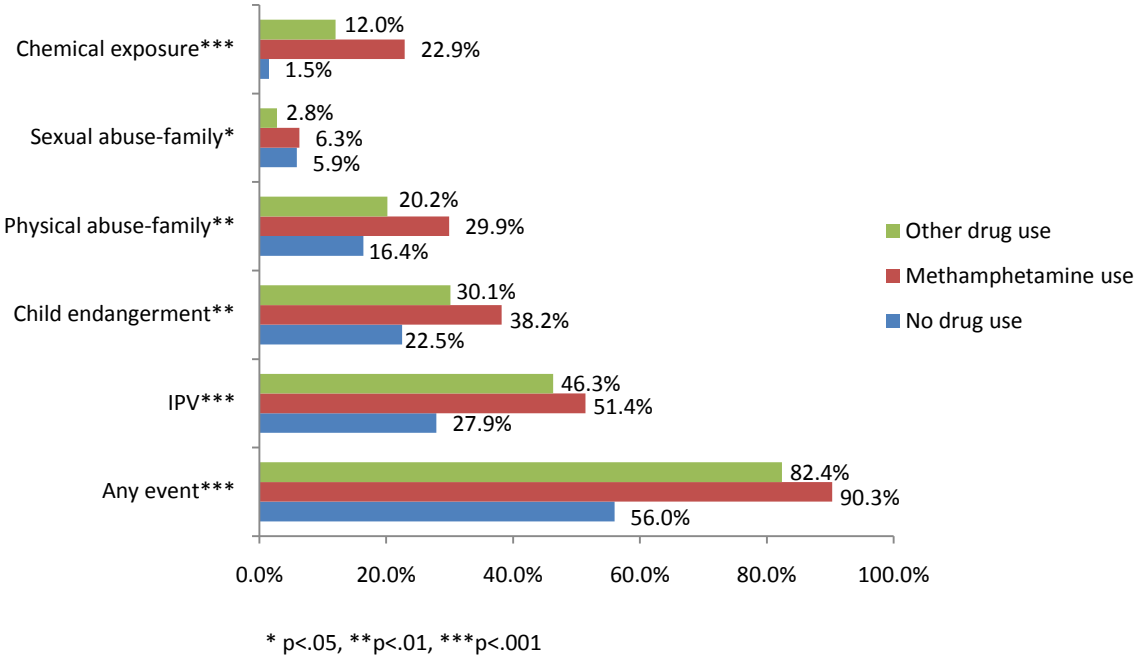


***Red (50% or greater)**: Carlisle, McCracken, Marshall, Trigg, Breckenridge, Ohio, Edmonson, Barren, Floyd, Lee; **Orange (26% - 49%):** Henderson, Daviess, Warren, Bullitt, Shelby, Laurel, Martin; **Blue (11% - 25):** Hopkins, McLean, Boyd, Johnson, Clark, Pulaski; **Green (10% or less):** Campbell, Jefferson, Fayette, Breathitt, Jackson, Whitley*

FINDINGS

As shown in Figure 2, the majority of children of caregivers who used methamphetamine (90.3%), and 82.4% of children of caregivers who reported other types of substance use were exposed to a traumatic event. One of the most commonly reported traumatic events noted in case worker records was exposure to intimate partner violence by the caregivers. More than half (51.4%) of children in homes where methamphetamines were used by caregivers had been exposed to intimate partner violence. In fact, a significantly higher percentage of children in homes where methamphetamines were used had exposure to traumatic events including child endangerment, physical abuse by a family member, sexual abuse by a family member, and exposure to hazardous chemicals.

Figure 2. Percent of children with exposure to traumatic events by caregiver drug use group



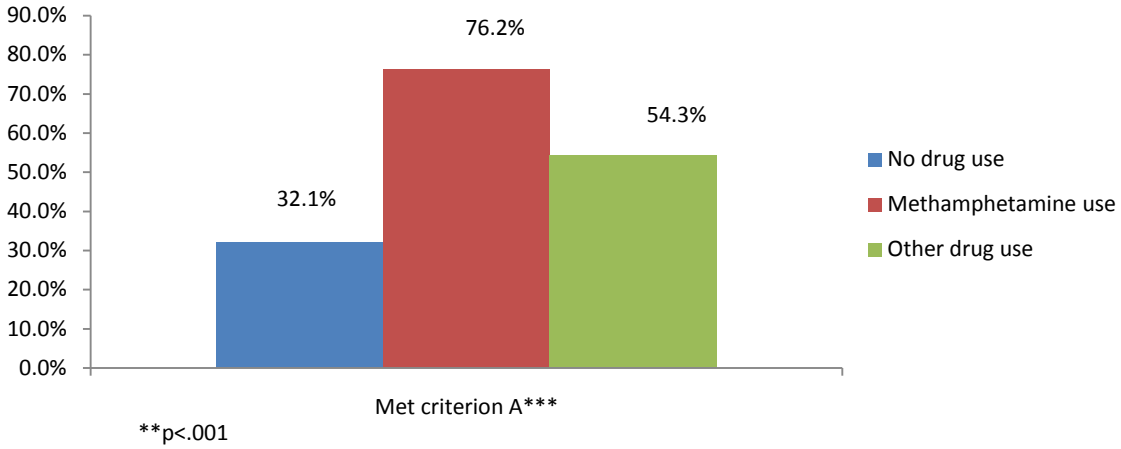
* p<.05, **p<.01, ***p<.001

Percent Meeting DSM-IV PTSD Criterion A by Caregiver Drug Use Group

Exposure to a traumatic event was operationally defined using the event criteria from the DSM-IV-TR Criterion A for Post Traumatic Stress Disorder (PTSD). Exposure to a traumatic event was endorsed if the child "experienced, witnessed, or was confronted with an event or events that involved actual or threatened death or serious injury, or a threat to the physical integrity of self or others"(Criterion A1), and if that response involved intense fear, helplessness, horror, disorganized behavior, or agitation (Criterion A2).

As shown in Figure 3, a significantly higher percentage of children of caregivers in the methamphetamine group met Criteria A1 and A2 compared to the other groups. In addition, a higher percentage of children of caregivers who used other drugs met Criteria A1 and A2 compared to the non-drug using group.

Figure 3. Percent meeting DSM-IV PTSD Criterion A by caregiver drug use group



Investigative Findings by Caregiver Drug-Use Group

Child Protective Services records include an investigative finding for all open cases. The investigative findings of physical abuse, sexual abuse, neglect, and dependency were examined by caregiver drug use group for this sample. The majority of cases (83%) examined for this study involved neglect of one or more children. When examined by caregiver drug use group, a higher percentage of children in homes with methamphetamine users were neglected compared to the other drug user group and the no drug use group.

Risk Ratings by Caregiver Drug Use Group

In addition to investigative findings on abuse and neglect, Child Protective Services also assigns a risk rating to each case. This rating provides an index of severity of maltreatment, which is used to determine whether or not a child should remain in their home environment. Assigned risk ratings were examined by caregiver drug use group for this analysis. A higher percentage of both the methamphetamine users (52.1%) and the other drug users (51.9%) were categorized as a "high risk" situation compared to the no drug use group (33.5%). This finding suggests that drug use by caregivers in the home, perhaps regardless of drug type, raises the risk level for children.

Child Protective Service Actions by Caregiver Drug Use Group

Actions taken by DCBS for each case may include removing the child to Out-of-Home care, placement of the child with a relative, or leaving the child with the parent if the environment is considered to be safe. These outcomes were examined in the DCBS records for this analysis. A higher percentage of methamphetamine users and other drug users had children removed from the home compared to the no drug use group.

Estimated Service Costs

At an average minimum cost of $678.90 per month (based on DCBS reimbursement rate schedule 8/7/00) for Out-of-Home care (OOHC) expenses (excluding medical care), the average cost to the CHFS for the time these children have spent in care (as of the time of this study) ranges from $7,186 per child in the other drug use group, $8,136 per child in the no drug use group, and $13,917 per child in those who were removed from homes where methamphetamines were used. It should be noted that these estimates most likely under-represent the total costs since OOHC is ongoing for the majority of children in the study.

CONCLUSION

This study of protective service records in Kentucky examined the specific associations of methamphetamine versus other drug use among caretakers of children with trauma exposure and PTSD criteria among those children. Examination of a random sample of 753 protective service records on 1127 children from 2005-2006 suggests that trauma exposure for children is greater in homes where caretakers use methamphetamine. While there are limitations to a study of case records, this study provides important information suggesting that parental use of methamphetamine may carry additional risks for children in terms of their exposure to traumatic events and potential for developing trauma-related symptoms. The short and long-term costs to the children, their family members, and the state may be considerable when treatment and OOHC are included.

Methamphetamine Use and the Kentucky Prison System

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INTRODUCTION

Methamphetamine use has received increased attention in the criminal justice system in the last few years with the growing number of arrests associated with the manufacture and use of the drug. Increased law enforcement attention has become necessary due to the public safety risk associated with manufacturing methamphetamine, or "cooking," which includes volatile chemicals and highly toxic by-products (Office of National Drug Control Policy [ONDCP], 2007). National data indicate an increased number of methamphetamine users in state prisons, rising from 7% in 1997 to 11% in 2004 (Mumola & Karberg, 2006). In addition, the number of individuals charged with manufacturing methamphetamine more than doubled from FY1999 to FY2000 (National Drug Intelligence Center [NDIC], 2002). Thus, increased law enforcement attention to methamphetamine manufacturing and use has contributed to a significant number of methamphetamine users entering Kentucky prisons.

In order to understand how methamphetamine users differ from other substance users who enter the Kentucky prison system, this study examined substance use, health and dental problems, and criminal justice involvement among methamphetamine users compared to other drug users. In addition, this study provides a comparison of prison-based health and dental costs for methamphetamine users compared to other drug users.

METHODOLOGY

This study included data collected as part of the Criminal Justice Kentucky Treatment Outcome Study (CJ-KTOS) which is funded by the Kentucky Department of Corrections (DOC). CJ-KTOS, conducted by the Center on Drug and Alcohol Research at UK, examines treatment outcomes of participants in Kentucky's prison and jail-based treatment programs one-year post-release. CJ-KTOS data in this report are supplemented with secondary data from the Department of Corrections Electronic Medical Record (EMR) for health and dental problems to compare substance use, criminal justice involvement, health and dental problems, and health and dental service costs between criminal justice treatment participants who reported methamphetamine use in the year prior to incarceration (n=100) with other drug users who did not use methamphetamine in the year prior to their incarceration (n=100).

FINDINGS

A comparison of demographic variables between methamphetamine users and other drug users is presented in Table 1. A significantly higher percentage of the methamphetamine user group reported being "white" compared to the other drug user group ($\chi^2(1,N=200) = 45.1$, $p<.001$). There were no other significant demographic differences between the two groups.

Table 1. Demographics by methamphetamine group (N=200)

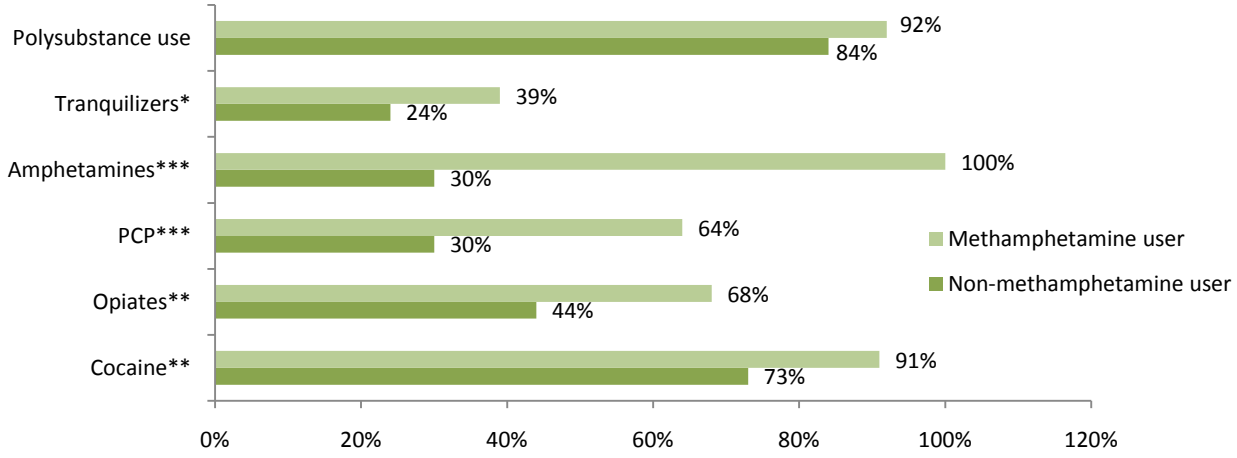
	Methamphetamine user (n = 100)	Other drug user (n = 100)
Age	33.0	33.1
Male	91%	93%
White***	98%	59%
Single, Never Married	36%	45%
Working full-time	63%	59%

NOTE: ***p<.001

Given the significant difference in race between the methamphetamine and other drug user groups, the analysis for this project was conducted in two phases: 1) presentation of bivariate group differences between methamphetamine users and other drug users; and 2) multivariate analysis to control for race across measures. In addition, even though there was no significant difference between the groups on age, age was treated as a control variable in the multivariate models for health and dental problems since age may play a role in reported health and dental problems.

Study findings indicated that a higher percentage of methamphetamine users reported lifetime use of other drugs including cocaine, opiates, PCP, amphetamines, and tranquilizers compared to the other drug user group (See Figure 1). When the variance in substance use attributed to race was controlled, methamphetamine users were 2.3 times more likely to have ever used PCP in their lifetime and 2.3 times more likely to have ever used cocaine compared to other drug user users. In addition, a higher percentage of methamphetamine users reported drug use in the year before incarceration compared to other drug users for amphetamines, PCP, and poly-drug use.

Figure 1. Lifetime substance use by methamphetamine group



NOTE: *p<.05, **p<.01, ***p<.001

In addition to the dental screening forms, clinical notes in the EMR indicating needed dental services and dental hygiene were also coded to document additional needed services and overall dental hygiene. As shown in Table 3, a higher percentage of the methamphetamine users needed additional dental services ($\chi^2(1,N=119) = 4.2$, $p<.05$). Although a higher percentage of methamphetamine users also needed a tooth extraction and were rated as having poor dental hygiene, there were no significant differences between methamphetamine and non-methamphetamine users on these variables.

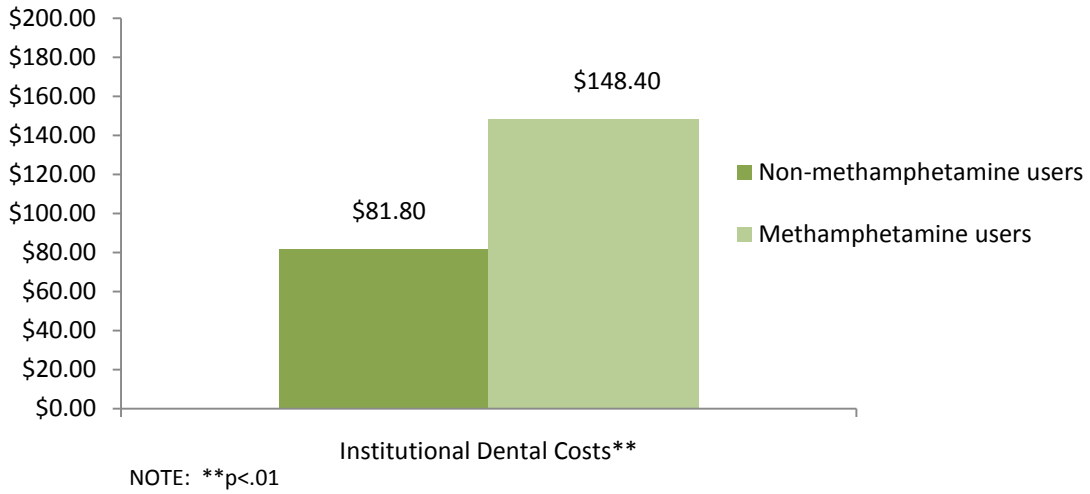
Table 3. Dental problems by methamphetamine user group

	Methamphetamine users (n=64)	Other drug user users (n=55)
Tooth extraction needed	31.3%	25.5%
Other dental services needed*	32.8%	16.4%
Rated poor dental hygiene	25.0%	12.7%

NOTE: *p<.05

Dental costs were estimated using severity of dental problems and estimates of the cost of specific dental services both within the institution and in the community. Community costs were estimated based on the necessary services needed to restore the mouth to "normal" or "healthy." As shown in Figure 2, the methamphetamine user group had a significantly higher estimated institutional dental cost compared to the other drug user group with the methamphetamine users at an average of $148.40 per inmate and the other drug users at $81.80 per inmate ($t(117) = -1.9$, $p<.01$). The estimated costs for community treatment were high for both groups, but there was no statistically significant difference (methamphetamine users – M=$7100, SD=$6029 vs. other drug user users – M=$7348, SD=$8134).

Figure 2. Average per inmate institutional dental costs by methamphetamine user group



NOTE: **p<.01

Overall, there were no significant differences between the drug use groups on health problems, but methamphetamine users reported a significantly higher number of decayed teeth compared to the other drug user group. However, when race and age were controlled, the difference attributed to methamphetamine user group was no longer significant.

As shown in Table 1, study findings indicated that a higher percentage of methamphetamine users were white compared to other drug users in the sample, which is consistent with other studies (NDIC, 2002). Once variance in substance use attributed to race was controlled, the only significant differences for the methamphetamine user groups were on PCP use and a marginal effect for cocaine use. This suggests that overall differences in substance use history may not be as powerful between the methamphetamine user groups as among racial/ethnic groups. However, the fact that cocaine was still marginally significant for the methamphetamine user group is meaningful given that both are stimulants, and it has been reported that the use of both cocaine and methamphetamine is associated with polysubstance use and increased psychological distress (Booth, Leukefeld, Faulk, Wang, & Carlson, 2006).

There were limitations to this pilot study of health and dental health among substance users in the Kentucky correctional system. First, the electronic medical system was primarily used to ascertain health problems and dental health services of the inmates. This data system may not have captured all of the health problems experienced by inmates who had a history of substance abuse. In addition, substance abuse data were supplied through inmate self-reports of their patterns of use prior to their incarceration and thus may be subject to gaps in recollection or bias.

In conclusion, this study of inmates in the Kentucky correctional system suggests that methamphetamine users present complicated clinical conditions that may place a greater demand on resources compared to other inmates. Furthermore, special effort may be needed by corrections staff to the treat various conditions presented by methamphetamine users during their stay in prison. As with other published research, this study suggests that methamphetamine use is more prevalent among white than African American users. Future research should examine the costs of treatment to the correctional system as well as the costs to society for failure to treat these medical and dental problems.

Methamphetamine in Kentucky: Geographical Inferences from Arrest Data, 1995-2004

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INTRODUCTION

Anecdotal information using the Kentucky State Police Crime and Traffic Information from 1995-2004 (DEA, 2006) suggests a west to east trend across Kentucky in increasing arrests; a movement consistent with the national trend. Using the Kentucky State Police Crime and Traffic Reports for the years 1995 and 2004, we developed estimates of the use patterns for methamphetamine in Kentucky counties. Within these reports, the heading "Other Synthetic Non-Narcotic Drugs" was used to extract arrest data for each county and compare the two years in question to determine whether there was an increase over the decade and which regions exhibited the most significant increases.

The purpose of this study was to examine the geographical trends in arrests for "other synthetic non-narcotic drugs" as a way to estimate methamphetamine distribution from western to eastern portions of the state. First, the percent distributions of the total arrests in these two years were compared. Second, regions that exhibited an increase in arrests for other synthetic non-narcotic drugs were displayed to show differences in the arrests for this class of drugs in Kentucky counties.

METHOD

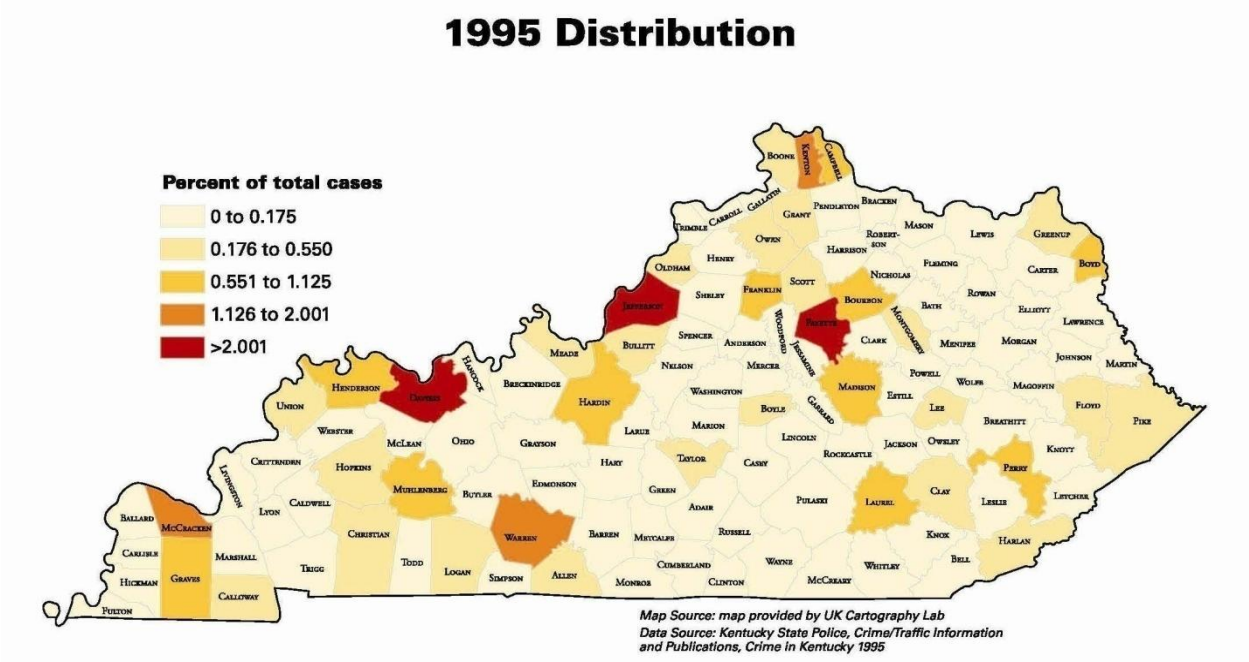
The number of arrests was extracted from Kentucky State Police records under the category "Other Synthetic Non-Narcotic" drugs. While the arrests in this section are not limited to methamphetamine and include arrests for other drugs in this category, methamphetamine constitutes the most likely drugs in this class (NIDA, 1996). The arrest data do not reflect of the number of methamphetamine labs because each lab can involve several arrests of individuals involved with the site. Arrests for the class of drugs most likely to capture methamphetamine were plotted by county to show a distribution over a ten year spread. Three maps have been developed to display methamphetamine-related arrests. Figure 1 shows methamphetamine-related arrests by county for 1995, Figure 2 displays the same data by county for 2004 and Figure 3 shows the total number of methamphetamine-related arrests by county for both years.

FINDINGS

In 1995, the majority of methamphetamine-related arrests occurred in the western portion of the state (see Figure 1). Six counties showed a high number of arrests for this class of drugs (greater than 1.126% of total Kentucky arrests) and five counties had a moderate number (0.551 to 1.125 % of total arrests). For the most part, the eastern and central portions of the state had fewer methamphetamine-related arrests, especially the south-central portion. Eighty counties in these areas had seven or fewer methamphetamine-related arrests. Twenty-two counties, mainly concentrated in the north-central, or "urban triangle," and western portions of the state, had between eight and 22 arrests (0.176 to 0.550% of the total arrests in 1995). Ten counties, three of which are

located in the western part of the state, had between 23 and 45 arrests in 1995 (0.551 to 1.125% of the total arrests in 1995). Three other counties, two of which are western, reported between 46 and 80 arrests (1.126 to 2.001% of the total arrests). Finally, three other counties, one of which is western, had 81 or more arrests in 1995 (greater than 2.001 percent of total arrests).

Figure 1. 1995 distribution of methamphetamine-related arrests

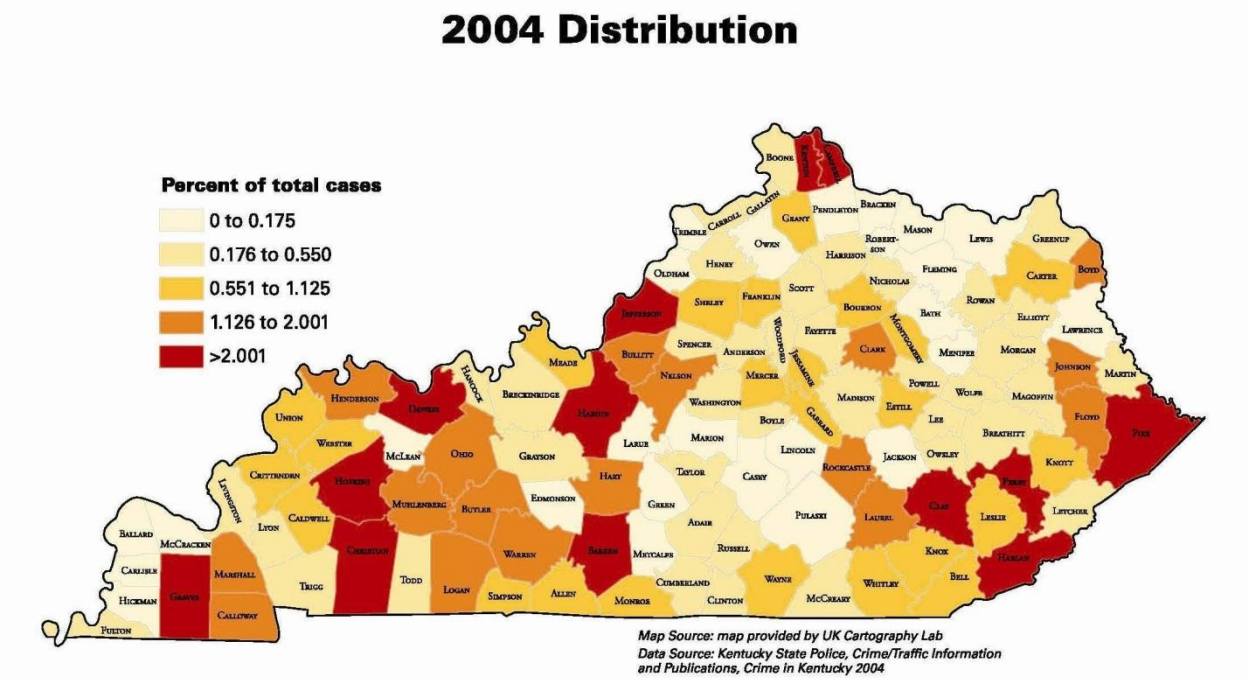


Geographically, Kentucky has had its major concentration of methamphetamine-related arrests in the western region. However, northern Kentucky as well as northern-central Kentucky also had a significant concentration of methamphetamine-related arrests. Specifically, the counties in focus are: Boone, Bourbon, Campbell, Fayette, Franklin, Grant, Jefferson, Kenton, Madison, Owen, and Scott. The Kentucky Substance Abuse Needs Assessment survey, conducted by UK Center on Drug and Alcohol Research, shows higher substance abuse prevalence rates across several substance types in this urban triangle as well. However, the methamphetamine-related arrests decrease east of the urban triangle.

Not only is methamphetamine imported into Kentucky from a likely origin in Mexico, it is also produced by residents of the Commonwealth in their homes and apartments, especially in rural areas where the possibility of detection may be perceived as lower than in concentrated population areas. Anecdotally, a methamphetamine user who knows the methods for methamphetamine production may teach those methods to up to ten other people annually (NIDA, 2006). In fact, the results of methamphetamine arrest percentages for each county in 2004 reflect this possibility. Figure 2 shows many more counties with a higher number of arrests than in 1995. This,

however, likely indicates that methamphetamine production as well as its use may be traveling eastward. Both the western and west-central portions of Kentucky in 2004 are highly saturated with methamphetamine-related arrests. The eastern portion of the state has not yet experienced this volume of methamphetamine-related arrests.

Figure 2. 2004 distribution of methamphetamine-related arrests

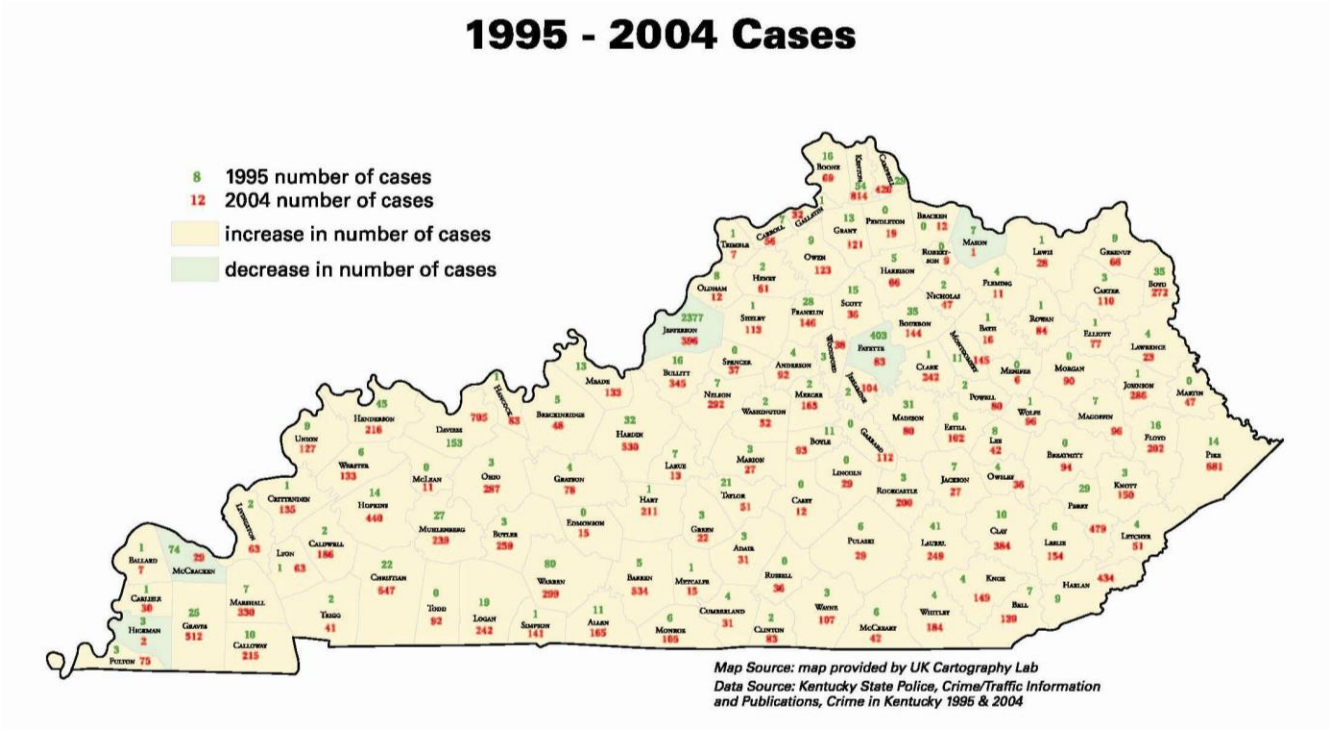


Most counties in western Kentucky had more methamphetamine-related arrests (greater than 0.551 % of total Kentucky arrests) in 2004 than in 1995 where only 12 western counties had a particularly high number of arrests for this class of drugs. Only six western counties show a very small number of methamphetamine-related arrests (0 to 0.175 % of total arrests). In the south-central sector of the state, the methamphetamine-related arrests were also more widespread in 2004 than in 1995. Specifically, the counties that form the boundary between the western and south-central portions of the state show an elevated concentration of methamphetamine-related arrests in 2004. The reason for the high number of arrests in this area may well be attributable to the presence of Interstate 65 which runs perpendicular to the state. The interstate highway system provides ample opportunity for the transport and exchange of methamphetamine and appears to be a popular route for such transfer in Kentucky. In 2004, as in 1995, the “urban triangle” between Kenton, Fayette, and Jefferson counties included counties with a high number of methamphetamine arrests as it did in 1995. However, the overall pattern suggests a greater distribution of methamphetamine arrests in the western part of the state. Southeastern Kentucky had an increase in the number of methamphetamine-related arrests in 2004 compared to 1995 with four counties having a

distinctly higher number of methamphetamine-related arrests (greater than 2.001% of Kentucky's total arrests) in 2004.

The total trend for the decade (1995-2004) is shown in Figure 3, entitled "1995-2004 Cases." The counties in light beige are counties which show an increase in the number of methamphetamine-related arrests over the ten-year span; these counties follow the trend. The counties in light green are the counties that show a decrease in the number of methamphetamine-related arrests over the same period. The green number in each county is the number of methamphetamine-related arrests in 1995 and the red number is for those in 2004. Five counties (Fayette, Hickman, Jefferson, Mason, and McCracken) do not follow the trend. The number of methamphetamine arrests over the period is not increasing as would be suggested by the west to east dissemination. All other 115 counties show an increase in the number of methamphetamine-related arrests in 2004 compared to 1995.

Figure 3. 1995-2004 trend in methamphetamine-related arrests



INTERVENTIONS AND IMPLICATIONS

Kentucky had no specific legislation aimed at curbing methamphetamine production until June 20, 2005 when Senate Bill 63 was adopted in the 2005 legislative session (DEA, 2003). Under this bill, only pharmacies are allowed to dispense any medication containing pseudoephedrine. Pharmacies are required to keep precursor ephedrine-like over-the-counter medicines in a secure location that can only be accessed by pharmacists, pharmacist interns,

and pharmacy technicians. Customers are allowed to purchase a maximum of nine grams of pseudoephedrine within a thirty-day period and must sign a logbook and submit identification information at the time of purchase. Senate Bill 63 also makes it a felony to expose children to methamphetamine labs and makes it easier for law enforcement officials to charge persons with the crime of making methamphetamine if they have two or more chemical ingredients or equipment used in the illicit manufacture of methamphetamine. Finally, the bill requires internet pharmacies to register with the Kentucky Board of Pharmacy to conduct business in Kentucky and to register with the Kentucky All Scheduled Prescription Electronic Reporting system (KASPER), the Commonwealth's controlled substance medication tracking system. The bill is intentionally designed to make methamphetamine materials more difficult to obtain and, ultimately, slowing the production of methamphetamine in Kentucky.

Congress enacted the Combat Methamphetamine Act of 2005 which, along with the implementation of regulations from the U.S. Drug Enforcement Administration, has led to these federally-mandated restrictions on distribution of ephedrine, pseudoephedrine, and phenylpropanolamine effective September 30, 2006 with the following provisions:

- All products containing one of these three specified active ingredients must be kept behind a counter or in a locked cabinet;
- Retailers must maintain a logbook to document all sales of these products, listing date and time of purchase;
- Retailers must train their employees on these new restrictions; and
- Retailers must self-certify to the federal government that they meet these requirements.

These earlier restrictions were added effective April 6, 2006:

- 3.6 gram daily sales limit;
- 9.0 gram thirty day purchase limit;
- All non-liquid dosage forms must be sold in blister packs or in unit dose packages; and
- Mail-service retailers must verify the purchaser's identification before shipping; and
- 7.5 gram thirty day sales limit for all mail-service retailers.

This analysis of methamphetamine-related arrests suggests a trend in movement from west to east from 1995 and 2004, but with a continuing high rate of methamphetamine arrests in the western part of the state. Future research should examine whether these changes represent changes in use patterns or changes in the degree of law enforcement attention. In all likelihood, some combination of factors is involved. However, this trend from west to east suggests a need for continued vigilance in the currently under-exposed regions of the state.

LIMITATIONS

This analysis of methamphetamine-related drug arrests has several limitations. The number of arrests was taken from Kentucky State Police Records under the category "Other Synthetic Non-Narcotic" drugs – a classification that can include other stimulants (NIDA, 1996). Therefore, the number of arrests is not exclusively for methamphetamine, even though this is likely the most common drug involved in these arrests. Additionally, the arrest data are not reflective of the number of methamphetamine labs in Kentucky because the data focused on the number of arrests, not the number of illicit labs.

CONCLUSION

Despite limitations in the data used for this review, a general geographic trend is inferable. In general, consistent with subjective anecdotal reports, the trend of arrests suggests a west-to-east pattern. On a positive note, some counties appear to have had moderate success in reducing the number of methamphetamine-related arrests. While it is beyond the scope of this paper, policymakers may need to examine these counties to see if law enforcement, prevention, education, or other factors help explain the decrease.

Acknowledgements: This paper was adapted from a more complete report published by the Kentucky Pharmacists Association at www.kentuckypharmacists.com. Further, invaluable assistance with the mapping portion of this project was received from Richard A. Gilbreath of the UK Cartography Lab.

Substance Use in Industry: An Application of National SAMHSA estimates 2002-2004

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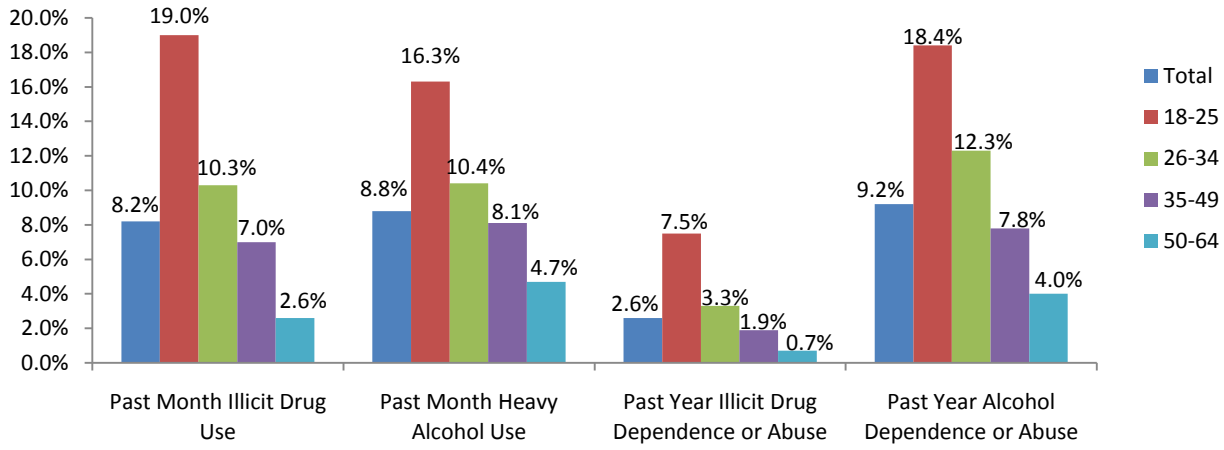
Methamphetamine and nonmedical use of prescription drugs among employed individuals presents numerous problems including work-related injury and frequent absenteeism resulting in lost wages. To study this concept, a recent SAMHSA report provides important indicators of the prevalence of illicit drug use and alcohol abuse among employed individuals and within key industries (Larson, Eyerman, Foster, & Gfroerer, 2007). Given constraints on accessing a representative sample of employed Kentuckians, this study provides estimates of the prevalence of illicit drug use and alcohol abuse or dependence by industrial categories using the SAMHSA findings prorated to Kentucky industry groups.

The SAMHSA report was based on findings from the 2002, 2003, and 2004 National Surveys of Drug Use and Health (Larson, et al., 2007). These annual SAMHSA surveys are conducted under contract by RTI International. The surveys collect information from household members in face-to-face interviews using audio computer-assisted interviewing which provides a high degree of confidentiality and privacy in communicating survey responses. Estimates for the worker substance use report were based on averages from the three years of NSDUH surveys from 2002-2004 with a combined sample size of 127,976 individuals.

For this study, the estimates by industry category were prorated to the actual number of employees in those categories in Kentucky, using labor force estimates from the U.S. Census data on Kentucky.

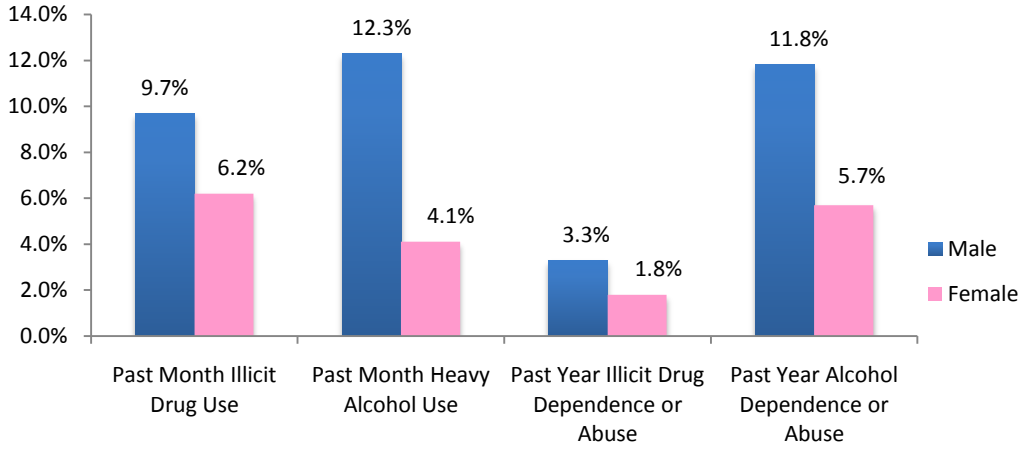
The SAMHSA report provides an overview of the national averages of substance use among full-time workers by age groups in a sample from three years of data as shown in Figure 1 (Larson, et al., 2007). The 18-25 year old group has the highest past month illicit drug use with 19.0% reporting some drug use. The same pattern holds true for heavy alcohol use, illicit drug abuse or dependence, and alcohol abuse or dependence.

Figure 1. Past month substance use and past year substance dependence or abuse among full-time workers, by age group: 2002-2004 combined



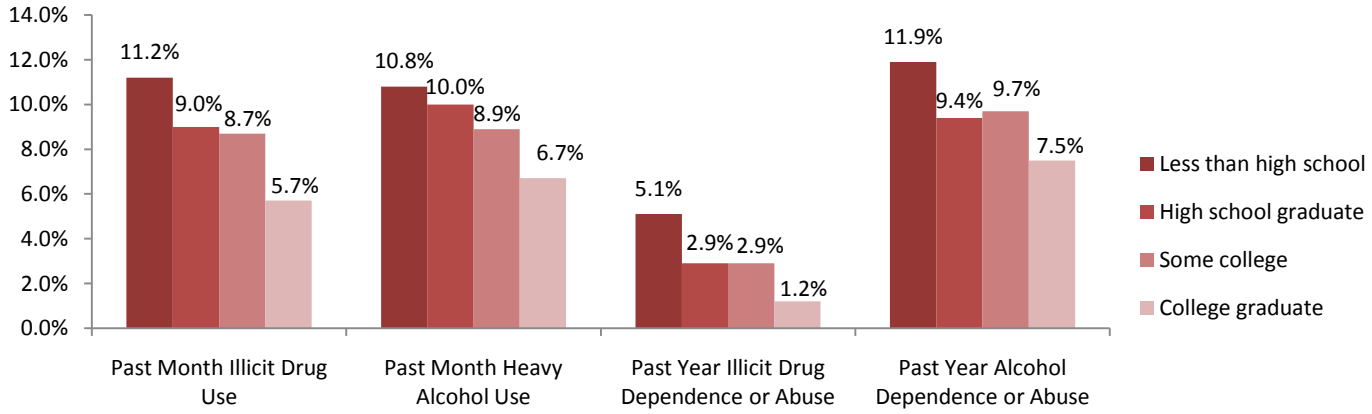
As described in the SAMHSA report, considerably more male than female workers reported using illicit drugs and alcohol in both the past month and past year, with males having about a two-to-one ratio to women. Figure 2 shows that 11.8% of males meet past year criteria for alcohol dependence or abuse compared to 5.7% of women, and 9.7% of male workers report past month illicit drug use compared to 6.2% of female workers.

Figure 2. Past month substance use and past year substance dependence or abuse among full-time workers aged 18-64, by gender: 2002-2004 combined



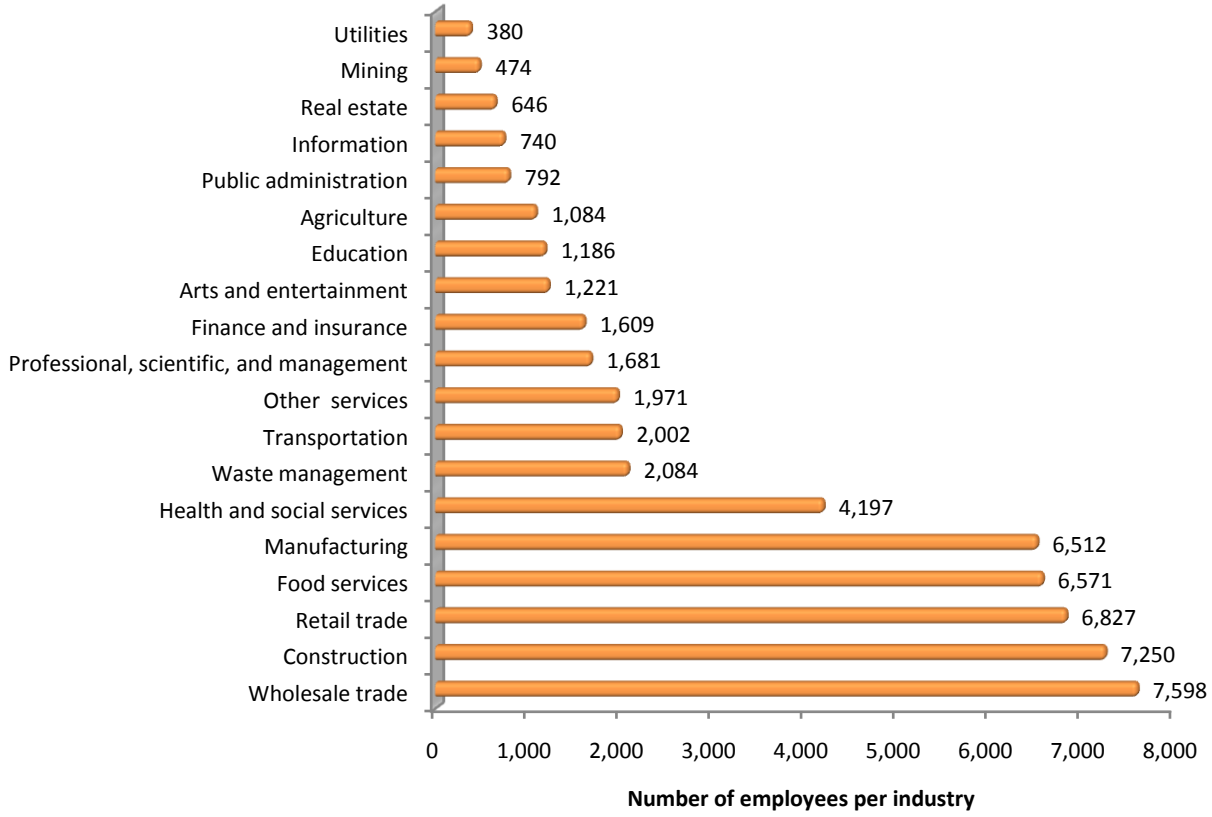
As reported by Larson, et al. in the SAMHSA report, higher educational attainment is associated with reduced reports of drug and alcohol use. Figure 3 shows the distribution of self-reported past month illicit drug use and heavy alcohol use as well as past year illicit drug abuse or dependence and alcohol abuse or dependence. There is a nearly linear relationship between substance use and education with greater education associated with less substance use across all categories.

Figure 3. Past month substance use and past year substance dependence or abuse among full-time workers aged 18-64, by education: 2002-2004 combined



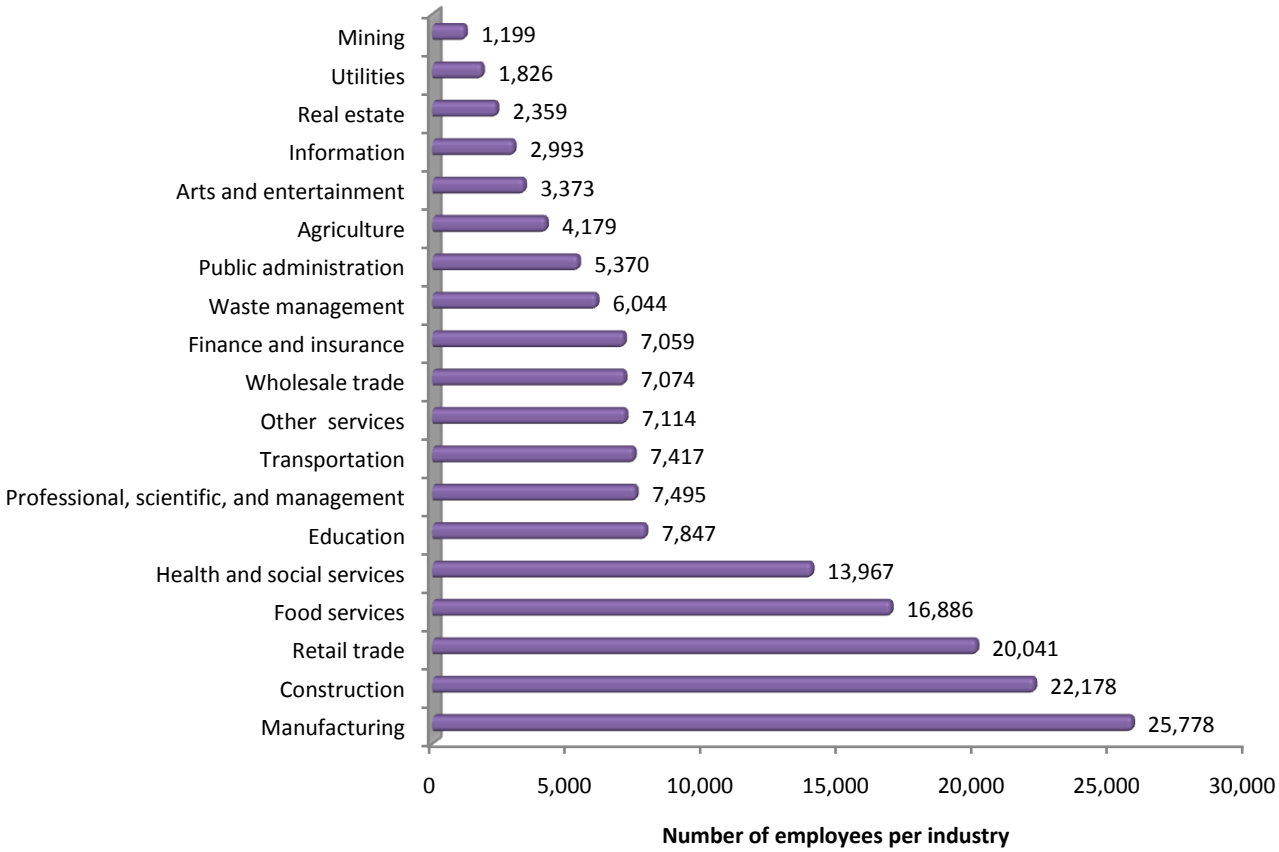
To estimate the number of workers in Kentucky with substance abuse or dependence, the national estimates as expressed in percentages were applied to the number of workers in different industry categories. Figure 4 shows the number (in hundreds) of Kentucky workers who are estimated to meet criteria for illicit drug abuse or dependence. The resulting number of workers estimated to meet the criteria for illicit drug related disorders is 54,802 individuals.

Figure 4. Estimated number of employees by industry meeting criteria for illicit drug dependence/abuse in Kentucky in the past year



Similarly, to estimate the number of workers in Kentucky meeting criteria for alcohol abuse or dependence, the SAMHSA national estimates were applied to the number of workers in different industry categories. Figure 5 shows the number (in hundreds) of Kentucky workers who are estimated to meet criteria for alcohol abuse or dependence. The resulting number of workers estimated to meet the criteria for alcohol abuse or dependence is 170,250 individuals.

Figure 5. Estimated number of employees by industry meeting criteria for illicit alcohol dependence/abuse in Kentucky in the past year



If the two disorder categories (alcohol-related and drug-related) did not include individuals who meet criteria for both disorders, the result would be an estimate of over 225,000 individuals in Kentucky. However, these two disorders often involve co-occurrence and thus the total number of employees meeting these diagnostic criteria is likely considerably less than this figure. However, the two numbers greatly exceed approximately 21,000 individuals who receive substance abuse treatment each year in state-funded programs.

Other information on drug use in industry

At the state level, obtaining clear information about substance use among persons in the work force is very difficult. Many employers are reluctant to share information or data about the problem because it is so prevalent (A. Cross, personal communication relayed from correspondence with industry representatives, 2007). Few industries have a registry that could track identified drug users across multiple employers, and there is no national or state database that maintains this information (A. Cross, personal communication relayed from correspondence with industry representatives, 2007). Many would like to see a national database or clearinghouse of drug abuse

violators which would provide employers with that information *before* the hiring process (A. Cross, personal communication relayed from correspondence with industry representatives, 2007). This could have critical implications for multistate employers and for firms like trucking or postal businesses where drug use can constitute a threat to public safety. The American Trucking Association has made several key policy recommendations including urging Congress to authorize and fund a centralized clearinghouse for positive drug and alcohol testing results of commercial drivers to ensure that motor carrier employers are aware of previous positive test results during the hiring process. The association also has asked Congress to encourage the Department of Transportation to implement an incentive-based random testing requirement and to focus on motor carriers with above-average positive test results.

The Department of Transportation recently produced a Report to Congress titled The Large Truck Crash Causation Study which examined 967 crashes involving at least one large truck.

> Each case was given a weight to allow derivation of national estimates of crash characteristics for the estimated 141,000 large trucks involved in fatal and injury crashes during the 33-month study period. The study collected information on almost 1,000 data elements associated with the drivers, the trucks and other vehicles, and the environmental conditions involved in the crash. The coding of the events surrounding the crash begins with the 'critical event,' the 'critical reason' for the critical event, and 'associated factors' for the crash. None of these variables in and of themselves should be considered the cause of the crash, but when analyzed properly, can lead to a better understanding of crash causation and guide countermeasure development (Federal Motor Carrier Safety Administration [FMCSA], 2005).

Prescription and over-the-counter drug use is a factor in a large number of truck-related collisions and accidents with 26.3% of cases involving prescription drugs (FMCSA, 2005). Over-the-counter drug use was present in 21.6% of the incidents (FMCSA, 2005). However in truck-to-auto collisions, prescription drug use in the truck driver was present in 28.7% of the cases, and the same drug use was present 33.9% of the time for the affected passenger in the collision (FMCSA, 2005). Alcohol was present in only .3% of truck drivers in these collisions and 9% of the passengers in truck-auto collisions. "On the other hand, the use of illegal drugs and alcohol and truck driver illness are rare" events (FMCSA, 2005).

In the Commonwealth, the Kentucky Injury Prevention Research Center (KIPRC) at the University of Kentucky has been conducting a fatality assessment for drug and alcohol-related fatal accidents. The Fatality Assessment and Control Evaluation (FACE) project has begun collecting data including toxicology screens conducted after the accidents. Each case study makes industry-specific recommendations for reducing the risk of future injury or fatality.

CONCLUSION

This application of National Survey on Drug Use and Health estimates of the prevalence of substance use in the workforce shows that substance use is not limited to the unemployed. In fact, a very large number of individuals who are in the workforce report using illicit drugs and alcohol, and even report symptoms that are consistent with the diagnostic criteria for abuse or dependence. The main effect of this use of national data is to show that policies regarding assessment and treatment need to consider individuals who are in the work force, not just those who are prison, jails, public treatment facilities and homeless shelters. In 2002, the estimated economic cost of lost productivity in the U.S. due to drug abuse was $128.6 billion dollars (Office of National Drug Control Policy [ONDCP], 2004). Further the ONDCP report estimated that in 2002, drug abuse accounted for about 1 million person-years of lost labor (ONDCP, 2004). Adjusted for the consumer price index, this economic cost to the nation would climb to an estimated $147.7 billion in 2007 (Federal Reserve Bank of Minneapolis, 2007).

LIMITATIONS

There are, however, important limitations to the use of prorated national estimates for Kentucky populations. First, this approach assumes that Kentucky shares economic and cultural characteristics with all the other states. Clearly, there are state-by-state differences in all the factors that relate to risk for substance abuse or dependence. Kentucky, as a rural state, has different substance user patterns from the rest of the country but this includes higher rates for certain substances (prescription opioids) and lower rates for others (cocaine). In addition, the national study of truck-related crashes may not have included a representative number of crashes in Kentucky. The use of national estimates applied to state populations gives merely a suggestion of the scope of a problem; it does not define the limits or character of those substance related problems.

Cost Implications

William Hoyt, Ph.D.

Robert Walker, M.S.W., L.C.S.W.

WHAT ARE THE COSTS OF SUBSTANCE USE?

The costs generally associated with substances, illegal or legal, are considered very different from the costs associated with most of the goods we purchase on a day-to-day basis. For most goods, the primary costs are the direct costs associated with the costs of producing and marketing the goods which are fully reflected in the price of the good. For substances, production costs are generally considered relatively minor and, in fact, are typically ignored in cost calculations. Far more relevant are the indirect costs associated with the adverse health, employment, and social consequences associated with substance use.

Adding to the complexity of understanding the costs of substance use is the fact that the costs are not borne by a single individual, the user, but by numerous other individuals and organizations in society. Substances, both legal and illegal, have costs that accrue to the individual using the substance and costs that the rest of society accrues. Economists refer to the costs borne by the direct consumer as *private costs* while costs borne by others as *externalities,* or *external costs*. Private costs, including the cost of purchasing the substance, are costs incurred by the user and his or her household. External costs are costs associated with drug use that are borne by the government, victims of crimes committed by substance users, and private insurance. Examples of these indirect costs can be found in the NIDA/NIAAA reports discussed below. The reports include several factors: health care expenditures related to drug and alcohol abuse, which included substance abuse-related illnesses such as hepatitis; premature deaths; impaired productivity; motor vehicle crashes; crime, including corrections costs and victim costs of crime; and social welfare costs. The table below provides a very general summary of costs as well as the party bearing these costs. Costs borne by the user should be considered private costs; costs borne by other parties (government, victims of crime) are external costs.

A few points regarding this delineation of costs are worth mentioning. Many of the external costs associated with any substance exist because of our extensive social welfare system, particularly with respect to health care and income assistance. In the absence of a social welfare system, costs associated with the treatment of health consequences or employment loss from substance use would presumably be borne by the substance user and probably his or her immediate family. However, with an extensive social safety net, many of these costs have been shifted from the user to the government and, therefore, to taxpayers. Thus, to fully measure the costs of substances, careful attention must be paid to measuring and understanding how substance use affects the use of our health and social welfare system.

To understand the true costs of substance use, it is also important to understand the distinction between *explicit* and *implicit* costs and the need to account for both. Explicit costs are relatively easy to understand, they require an explicit monetary payment; implicit costs do not require a payment from one party to another but are costs nonetheless. One example of the distinction between explicit and implicit costs might be the costs associated with

dentistry for methamphetamine users. Explicit costs only occur when the dental damage is treated; however, there is still an implicit cost associated with the dental damage (discomfort, pain) even if the damage is not treated. Treatment of the dental damage is not an additional cost and, in fact, presumably reduces costs. The study in this report suggests that dentists in this survey estimated that restoring dental health to methamphetamine users could cost over $5,000 per patient. However, for many substance users, the treatment is primarily a transfer of costs from them to a third party, either private insurance or, more likely, a government agency or program. In a similar way, mental health costs and the impact that substance use may have on relationships may not involve any payments but are clearly other costs of substance use. Understanding and accounting for implicit costs are particularly important for evaluating the costs and benefits of treatment programs for substance use. One of the goals of these programs is to treat the health and employment consequences of substance use. As a result of this increased treatment, the explicit costs of these programs can be quite high, but in fact much of what these programs are doing is transforming implicit costs from the user into explicit costs for a government agency. When considering both implicit and explicit costs, it is important to keep in mind that treatment of the consequences of substance use is likely to reduce the total costs of substance use. Table 1 shows the distribution (who pays) and type of cost, explicit or implicit, associated with substance abuse.

Table 1. Explicit and implicit costs associated with substance abuse

Cost	Party Bearing Cost	Type of Cost
Purchase/Production of Substance	User	Explicit
Health Consequences		
Costs associated with absence of treatment	User	Implicit
Costs of treatment	User (if paid for by consumer)	Explicit
	Private Insurance (if consumer is covered)	Explicit
	Government (Medicaid)	Explicit
Employment/Productivity		
Loss of Income	User/Household	Implicit
Public Assistance	Government	Explicit
Criminal Justice Involvement		
Opportunity Cost	User	Implicit
Legal Costs	User/Government	Explicit
Incarceration Cost	User/Government	Explicit
Victim Costs	Victims	Explicit
Social Costs		
Well-being of User and Household	User/Household	
Care of relatives	Household/Government	Explicit/Implicit
Adverse Social Behavior (driving)	User/Victims	Explicit/Implicit

EXISTING STUDIES OF THE COSTS OF SUBSTANCE USE

The study of economic costs associated with substance use is complicated for a number of reasons with the most obvious being the illicit nature of drug use making it difficult to obtain important data on substance use and the costs associated with that use.

Three major studies have been published on overall economic costs related to alcohol abuse and drug abuse in the United States. The first of these estimated costs of alcohol and drug abuse to the U.S. in 1992. At that time, the economic costs to society from the abuse of both substance types were estimated at $246 billion with alcohol abuse accounting for $148 billion and drug abuse accounting for approximately $98 billion (Harwood, Fountain, & Livermore, 1998). Those costs are born chiefly by drug users and by government. Only a small portion is born by private insurance (Swan, 1998).

In addition, the 1992 estimates identified "opportunity costs" to capture the idea of resources that are directed away from usual productive uses and result in a net reduction in goods or services. Several estimation approaches had to be used because direct cost data are often insufficient. However, the 1992 study included an examination of the lost productivity that can be attributed to drug or alcohol abuse. One way to examine this is to compare wages and earnings of alcohol and drug users to non-users (Harwood, Fountain, & Livermore, 1992). In addition, lost work hours due to illness can contribute to these costs. Certain industries may experience differences in these economic costs due to differences in the age and gender of employees. For example, an industry that hires proportionately more young males may experience higher costs related to lost productivity due to drug abuse because this group has a higher prevalence of substance abuse. In addition, there are productivity losses for the victims of crimes committed by individuals who abuse drugs. All of these lost opportunities for production in society must be factored into an estimation of the economic costs of drug abuse. While the National Institute on Drug Abuse (NIDA) and the National Institute on Alcohol Abuse and Alcoholism (NIAAA) studies differentiated alcohol and illicit drug use, they did not examine cost differences by drug type. Hence, there are no data to show that a methamphetamine user has a higher economic cost to society than a user of prescription opiates. The Rand study of 1997, however, makes an important point about the evaluation of costs of substance users to society and their implications for treatment allocations.

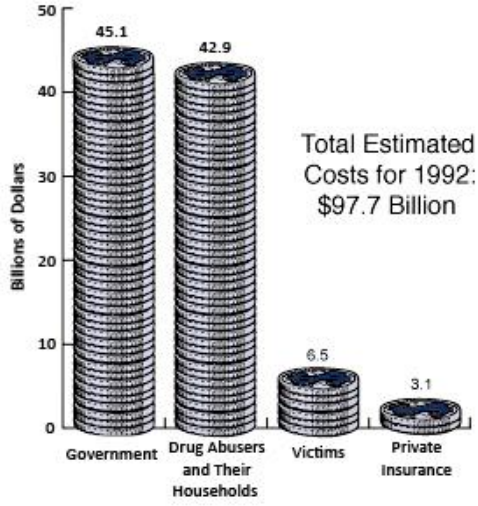
> The result of equal weighting of alcohol and drug treatment need is that total estimates of substance abuse treatment need across states are dominated by alcohol dependence, which is approximately three times more prevalent than drug dependence in the household population. Although both alcohol and drug dependence are very costly to society and to the affected individuals, it is likely that the social costs associated with an individual drug abuser are, on average, *substantially higher than those associated with an individual case of alcohol abuse* (Italics

added). That is because so many of the costs of drug abuse are crime-related and are borne by society rather than by the individual.

(Burnam, et al., 1997)

NIDA and NIAA funded an update to these estimates due to changes in the drug use patterns in society. These changes in drug use patterns also suggested changes in costs resulting from drug abuse. As the researchers began to update costs using 1995 data, the cost of alcoholism and alcohol abuse has climbed to $166.5 billion and drug abuse to $109.8 billion (Harwood, 2000). The increased costs of alcohol and drug abuse to society are significant while Federal Block Grant funding to the states remains at about $1.2 billion per year (Burnam et al., 1997). In addition, Federal Block Grant funds are applied to treatment primarily for low income individuals (Burnam, et al., 1997) and thus the funding has limited ability to have an impact on reducing costs of substance abuse among employed persons. Figure 1 below shows the NIDA-estimated distribution of drug abuse costs.

Figure 1. Who bears the cost of drug abuse?



Source: National Institute on Drug Abuse, NIDA NOTES, 13, (4), November, 1998

THE COSTS OF METHAMPHETAMINE USE

While no existing study explicitly looks at the social or economic costs associated with the use of methamphetamine, there are a number of reasons to think that these costs, particularly for Kentucky, are not trivial. The following provides a brief description of a few considerations that are likely to influence the costs of methamphetamine.

A major driver of the costs associated with substance abuse is expense associated with the criminal justice system. Studies of Drug Courts, for Kentucky and other states, have documented the high costs of lengthy criminal proceedings, incarceration, and parole (Logan, Hoyt, & Leukefeld, 2005). The criminal justice involvement of methamphetamine accounts for no small part of its visibility to society. It is entirely likely that methamphetamine users represent a more costly case than other drug users. This issue raises concern about the backdrop of changes in the national policies regarding increased use of prison as a solution to drug-related crime. Robert Lawson recently authored articles that place this issue in a larger social cost context.

> In the early 1970s, Kentucky held about 3,000 convicted felons in its prisons. It had two major prisons for men, a small prison for women, and a separate facility for juveniles. It had no inmates in private prisons, had none housed permanently in county jails, and "had not engaged in major prison construction for more than three decades." By late 2005, the state held more than 19,850 felons in custody, an increase of more than 650 percent since the early 1970s. It operated thirteen state prison facilities (ten major prisons for men, a major prison for women, and two smaller facilities); it had more than 1,500 inmates housed in private prisons; and with all its prisons full, the state held more than 5,600 inmates in county jails across the state. Kentucky opened a new prison for men (almost 1,000 beds) in July 2005, and not long thereafter, the state contracted for an additional 400-bed private prison for women. Near this time, the state looked ahead and concluded that it would have 26,527 inmates by 2010 and 31,057 by 2014. This means that the state will need a new 1000-inmate prison every year for the next decade and will incur truly staggering increases in prison operating costs.
>
> (Lawson, 2007)

The continued application of prison as the major form of addressing methamphetamine or other drug use will certainly lead to increased social and economic costs. An average prison cost of about $19,000 per inmate per year only states part of the cost. The addition of 1,000 new inmates equates to $19 million per year in housing costs to the Department of Corrections in Kentucky. Further, that cost does not cover the lost income that the person might be earning if rehabilitated in the community.

This report on methamphetamine and other drug use in Kentucky has summarized prevalence rates of drug abuse among several key industries by using prorated national estimates to state employment numbers. While conducting an evaluation of the economic costs of drug abuse to these industries goes far beyond the scope of this report, it is clear that if principles from the NIDA/NIAAA studies are applied to the contemporary work setting, significant costs would emerge. What remains unclear is whether drug use prevalence among employed Kentuckians is any higher or lower than other parts of the nation. Hence, it is also unclear whether Kentucky's anecdotes about extensive drug use affect the recruitment of potential employers to the Commonwealth.

However, in these limited pilot studies, evidence of costs has emerged that are like those identified in the NIDA and NIAAA studies. Dentists in their survey estimated that bringing a "meth mouth" to a state of general health would cost over $5,600 – a substantial cost. Likewise, the cost of out-of-home care for children removed from families that have used methamphetamine was assigned a minimal cost of more than $13,000 per child. And these costs merely reflect direct social and health service outlays. It is important to remember that even in the absence of this dental treatment and out-of-home care, the costs associated with untreated health consequences and disrupted families as a result of methamphetamine use still exist – not addressing these problems through treatment and intervention does not reduce the costs.

PUBLIC POLICY TOWARDS METHAMPHETAMINE AND AVOIDED COSTS

Perhaps more relevant than the costs of methamphetamine to Kentucky are the costs and *avoided costs* associated with programs and policies aimed at reducing methamphetamine use. Policies that are involved with the treatment of substance use and its consequences are frequently expensive and many of the most effective ones require substantial investments of health and counseling services. Effectively measuring the benefits and costs of these programs requires not only an understanding of the costs of the programs but whether and to what extent they result in reductions in methamphetamine use and its associated costs. While the cost of the programs is generally explicit and direct, the benefits (the avoided costs) are less apparent. To effectively evaluate these programs, an assessment of how they affect methamphetamine use and its associated costs including health consequences, employment outcomes, and criminal justice involvement needs to be undertaken.

Numerous studies exist on the economic benefits of treatment for drug and alcohol problems that might serve as a framework for evaluating the effectiveness of proposed or existing treatment programs for methamphetamine. A standard (and ideal) approach is to examine two groups, one of which is in the program and one group that is not, and examine their outcomes (labor market performance, criminal justice involvement, public assistance) before and after the treatment. An example of this approach is found in the evaluation of the Kentucky Drug Court System by TK Logan, William Hoyt, and Carl Leukefeld (2003). In 2005, Steven Belenko and colleagues published a report summarizing the findings of 109 peer-reviewed studies of various aspects of cost benefits from substance abuse treatment (Belenko, Patapis, & French, 2005). The authors synthesized costs of treatment findings and also examined the cost offsets or benefits reported in other studies. Cost benefits show net saving effects to the taxpayer or to society at large and may be expressed as a net gain per $1.00 spent on treatment. Belenko et al. (2005) reported a typical range of cost-to-benefit ratios of roughly $2.50 to $5.20. That is, for every dollar spent on treatment, there was a net gain to society of about $2.50 to $5.20. In the Commonwealth, the Kentucky Treatment Outcome Study has reported similar cost offsets for the past 4-5 years with the analysis of follow-up reductions in substance abuse and criminal conduct resulting in a ratio of $1.00 to $4.00 - $5.00 (Walker et al., 2006).

Measuring Methamphetamine Costs

The measurement of costs of substances is difficult for a number of reasons. First and most obvious, the illicit nature of use makes the collection of data difficult. Second, the myriad of different costs, some explicit and some implicit, spread among different parties sometimes makes it difficult to even conceptually identify what costs are relevant and what are not. Finally, it is difficult to determine what a cost of substance use actually is; that is, what is a consequence of use and what is a behavior associated with users. For example, while we might find that methamphetamine users have lower earnings and lower labor force participation than non-users with similar education and training, it would probably be erroneous to assume these differences are solely attributable to substance use. There is the possibility that unemployment might facilitate methamphetamine use.

As suggested by our earlier discussion, it is probably more important to understand the costs and benefits of reducing methamphetamine use rather than simply evaluating the costs of its use. Evaluating an actual program designed to reduce methamphetamine use also provides the data necessary to evaluate methamphetamine costs.

An ideal study design would be based on implementing a program designed to reduce methamphetamine use for a sample of users with another similar sample of users not in the program. Critical to the study would be to document the behaviors of the users before and after the program with these behaviors including labor market outcomes, public assistance use, health, criminal justice involvement, and recidivism. By engaging in this type of study of a specific policy, we are better able to see if proposed policies reduce methamphetamine use and, if so, how this reduced use affects associated costs.

In conclusion, the examination of economic costs of substance abuse in general or of methamphetamine, or prescription drug use in specifically, is very complex. Carefully designed studies would be needed to provide policymakers in Kentucky with a better understanding of the economic and social costs of substance abuse. While these studies add a cost to methamphetamine and prescription drug abuse, it is only through an understanding of economic costs and avoided costs that society can make informed decisions about interventions.

CONCLUSIONS AND RECOMMENDATIONS OF THE SPECIAL COMMISSION ON METHAMPHETAMINE AND OTHER DRUG USE IN KENTUCKY

UNIVERSITY OF KENTUCKY

This study, sponsored by the President of the University of Kentucky, examined two major classes of substance use in Kentucky – methamphetamine and nonmedical use of prescription drugs. Media reports to the public have suggested a picture of a serious, even epidemic, problem of methamphetamine use in the Commonwealth. These pilot studies, while certainly finding evidence of serious clinical problems associated with methamphetamine users, do not suggest an epidemic scale of methamphetamine use. In fact, other drugs, including the less sensational drugs of alcohol and marijuana, still have the greatest prevalence in the Commonwealth. More specifically, the pilot findings suggest that while methamphetamine users have a host of dental and physical health problems as well as more complex drug use patterns, the overall prevalence of users remains much smaller than for most other drugs. Indeed, apart from the justice system, the overall prevalence of methamphetamine use appears far lower than media stories claim. The number of primary methamphetamine users is, in fact, rather low – both in Kentucky and, according to SAMHSA, nationally as well. In this sense, this report provides some reassurance to the residents of Kentucky that the methamphetamine problem is serious but not a tidal wave sweeping across the state. On a positive note, the finding that dentists are interested in obtaining more education and training about methamphetamine and other emerging drug use patterns among their patients is very encouraging. The growing sensitivity of dentists and physicians to substance use problems is an important finding that can be used to bolster education and training efforts.

One of the studies in this project focused on records of children who have been under the care of the state's protective service agency, and the data suggest that children in families where caregivers used methamphetamine had more expensive Out-of-Home care. Obviously, greater complexity of effects on children from parental drug use in general, and methamphetamine use in particular, has enormous implications for the state.

This project examined methamphetamine and nonmedical use of prescription drugs from a variety of perspectives in order to better understand the scope of effects on service systems across the state. Given the low estimates of methamphetamine use among general clinical populations, but the severe effects of these drugs, the major impact of methamphetamine and nonmedical use of prescription drugs is on the state-funded agencies responsible for corrections, child protective services, and state-funded substance abuse treatment systems.

This group of studies has several limitations because they were designed to examine several areas of substance use that potentially affect health, corrections, and other systems of care; therefore, the studies were conducted with relatively limited scope and narrow focus. The dental and primary care surveys asked a minimum of practitioner demographics to keep the surveys brief. A lack of detailed practice data, however, may limit the ability to demonstrate the representativeness of the sample and thus limit generalizability of findings. In addition, the inability to gain information from industries and corporations about drug use among employed persons limited this study to the application of national norms to the number of person employed in different categories in Kentucky.

Despite these limitations, these pilot studies provide an important starting point for further and more detailed study of these types of drug use in the state. The studies represent the first statewide effort to obtain current and policy-relevant findings that can be used to guide policy development and further research into the scope and effects of substance abuse on one state. It is important to recognize that this Special Commission focused on two classes of drug use that were brought to the attention of President Todd and that have occupied the public media over the past few years. Substance abuse problems remain complex and varied across different age groups and among special clinical populations. This report adds some preliminary information to better understand the scope of two classes of drug abuse in Kentucky. More research will help the state to understand more completely the cost and extent of these problems.

RECOMMENDATIONS

DENTAL HEALTH

- **Kentucky dentists may need more training about how to identify patients with substance use disorders as part of routine dental practice.**
- **Training needs to be developed using a variety of methods (CD, web-based, with CEUs) to better assess and refer patients with dental health problems related to substance abuse.**

PHYSICAL HEALTH AND PRIMARY CARE

- **Physicians may need more training on how to identify drug abuse problems among their patients.**
- **Closer collaboration needs to be considered between primary care and the agencies and clinics that provide substance abuse assessment and treatment.**
- **Greater distribution of referral information may be important for substance abusers to obtain physician referrals.**
- **Wider availability of pain specialty clinics that use behavioral and other medical approaches may reduce opioid prescribing.**

DRUG ENDANGERED CHILDREN

- **Child protective services may need additional assessment and intervention resources to further assess the longer-term effects of parental methamphetamine use on children.**
- **Trauma needs to be more closely assessed and treated among children in drug-exposed families.**
- **Further research is needed to better understand the impact of trauma in children who live with drug-abusing parents.**
- **The Kentucky Department of Community Based Services should be supported in developing programs to provide substance abuse treatment, mentoring, and other intensive monitoring activities to help parents attain abstinence and retain custody of their children.**
- **Further research is needed to determine the availability of trauma-informed treatment for children who have been in drug-exposed homes.**

ARREST RATES AND CORRECTIONS-BASED HEALTH CARE

- **Policymakers may need to consider more resources to fully restore prisoners' dental and physical health, and to address their substance addictions in order to enhance their employability when released from prison and to reduce the cost of recidivism.**

- **Further study is needed to examine whether arrest patterns (including counties with increased *or* with decreased methamphetamine-related arrests) reflect changes in use patterns or changes in law enforcement activity.**
- **Given the number of inmates in Kentucky correctional facilities, more consideration should be given to community-based treatment alternatives and to aftercare for prisoners returning to the community.**

EMPLOYMENT AND SUBSTANCE ABUSE

- **State industrial associations and labor leaders should be enlisted to assist in developing a comprehensive study of substance use among different employment categories in Kentucky.**
- **Further research needs to be done to estimate the extent of substance abuse problems among the work force in Kentucky across all industries as a way of better preparing Kentucky for recruiting employers to the state.**
- **Research may also be needed to examine whether popular beliefs about drug abuse in Kentucky have an effect on the recruitment of employers to the Commonwealth.**

FINAL REMARKS FROM THE PRESIDENT

I am appreciative of the efforts expended by our University faculty and staff, as well as the many Deans and Department Chairs who have contributed time to this report and its pilot studies. I believe several overall findings have considerable importance to the Commonwealth. First, while methamphetamine clearly presents a challenge to our Commonwealth, it is not an "epidemic" and should not be characterized as such for it may lead to erroneous assumptions about the safety and overall health of our Commonwealth. Second, the problems presented by methamphetamine users appear to be most concentrated in two areas: (1) the law enforcement and correctional systems; and (2) the child protective services area. The University of Kentucky as well as state policy makers need to conduct further research into these two areas to examine how harmful methamphetamine use is to children and to what extent methamphetamine use contributes to more serious crime. I also note that our Commonwealth experiences problems relating to the nonmedical use of prescription drugs such as pain killers and tranquilizers. While there is no doubt that this pattern is of concern to the Commonwealth, other states are beginning to experience similar problems and again, overstating the extent of the problem may miss a larger point about the need for more specialty treatment in the community for chronic pain.

I also want to express appreciation for the broader research being carried out here at the University of Kentucky on methamphetamine and other drug use such as prescription drug abuse. Drs. Leukefeld, Rush, Dwoskin, Clayton, Walsh, Bardo, and Kelly, as well as others are all making important contributions to the science of substance abuse and methamphetamine or stimulant abuse in particular. Their efforts are leading to both a better understanding of the problem and better ideas about treatment.

The College of Dentistry and Dean Turner have taken a lead in this study and that is also commendable, given what we are learning about the kinds of damage that methamphetamines use can cause to dental health.

Lastly, I want to thank the Center on Drug and Alcohol Research for lending organizational and authorial support to this project.

I hope that the policy makers in state government will consider some of the recommendations that come from this series of pilot studies. The University of Kentucky stands ready and willing to lend a hand to state government in further exploring issues surrounding substance abuse in the Commonwealth.

Lee. T. Todd, Jr.
President

UNIVERSITY OF KENTUCKY

REFERENCES

American Dental Association (ADA). (2007). *Methamphetamine use (meth mouth).* Retrieved October 17, 2007, from http://www.ada.org/prof/resources/topics/methmouth.asp.

American Psychiatric Association. (2000). *Diagnostic and Statistical Manual of Mental Disorders, IV-Text Revisions.* Washington, DC: American Psychiatric Association Press.

Ashton, H. (1994). Guidelines for the rational use of benzodiazepines. When and what to use. *Drugs, 48*, 25-40.

Belenko, S., Patapis, N. & French, M. (2005). *The Economic Benefits of Drug Treatment: A Review of the Evidence for Policy Makers*. Philadelphia, PA: Treatment Research Institute at the University of Pennsylvania.

Blanco, C., Alderson, D., Ogburn, E., Grant, B.F., Nunes, E.V., Hatzenbuehler, M.L., & Hasin, D.S. (2007). Changes in the prevalence of nonmedical prescription drug use disorders in the United States: 1991-1992 and 2001-2002. *Drug and Alcohol Dependence, 90*(2-3), 252-260.

Booth, B.M., Leukefeld, C., Falck, R., Wang, J., Carlson, R.G. (2006). Correlates of rural methamphetamine and cocaine users: Results from a multi-state community study. *Journal of Studies of Alcoholism, 67*, 493-501.

Burnam, M.A., Reuter, P.H., Adams, J.L., Palmer, A.R., Model, K., Rolph, J.E., Heilbrunn, J., Marshall, G.N., McCaffery, D.F., Wenzel, S.L., & Kessler, R. (1997). *Review and Evaluation of the Substance Abuse and Mental Health Services Block Grant Allotment Formula*. The Rand Corporation.

Center on Drug and Alcohol Research. (2007). Kentucky needs assessment project 2004 adult household survey report. Retrieved October 26, 2007, from http://cdar.uky.edu//knap/04-Welcome.htm.

Cicero, T.J. & Inciardi, J.A. (2005). Diversion and abuse of methadone prescribed for pain management. *Journal of the American Medical Association, 293*, 297-298.

Drug Enforcement Administration (DEA). (2002). *OxyContin: Pharmaceutical diversion*. Drug Intelligence Brief. Arlington, VA.

Drug Enforcement Administration (DEA). (2003). Facing the methamphetamine problem in America. Statement of Rogelio E. Guevara, Chief of Operations, Drug Enforcement Administration, before the House Committee on Government Reform Subcommittee on Criminal Justice, Drug Policy and Human Resources, July 18, 2003. Retrieved March 29, 2006, from: http://www.usdoj.gov/dea/pubs/cngrtest/ct071803.htm.

Drug Enforcement Administration (DEA). (2006). Methamphetamine Factsheet. Retrieved March 29, 2006, from http://www.dea.gov/concern/meth_factsheet.html#3.

El Paso Intelligence Center. (2007). Methamphetamine. Retrieved October 26, 2007, from http://www.usdoj.gov/dea/concern/18862/meth.htm#Strategic.

Federal Motor Carrier Safety Administration. (2005). *Report to Congress on the Large Truck Crash Causation Study*. U.S. Department of Transportation. Retrieved November 24, 2007, from http://ai.fmcsa.dot.gov/ltccs/data/documents/reportcongress_11_05.pdf.

Federal Reserve Bank of Minneapolis. (2007). *What is a dollar worth?* Retrieved October 24, 2007 from http://minneapolisfed.org/Research/data/us/calc/index.cfm.

Floden, S. (2006). *Office of Drug Control Policy releases latest methamphetamine numbers of Kentucky*. Justice and Public Safety Cabinet. Frankfort, KY. Retrieved May 20, 2007, from http://www.kentucky.gov/Newsroom/justice/pr0419b.htm.

Haight, W., Jacobsen, T., Black, J., Kingery, L., Sheridan, K., & Mulder, C. (2005). "In these bleak days": Parent methamphetamine abuse and child welfare in the rural Midwest. *Children and Youth Services Review, 27*(8), 949-971.

Hamby, L.M., & Fink, J.L. (2006). *Geographical dissemination of clandestine methamphetamine lab operations across Kentucky: 1995-2004*. Kentucky Pharmacy Association Meeting. Retrieved November 7, 2007, from www.kentuckypharmacists.com.

Harwood, H. (200). *Updating Estimates of the Economic Costs of Alcohol Abuse in the United States: Estimates, Update Methods, and Data*. Report prepared by The Lewin Group for the National Institute on Alcohol Abuse and Alcoholism. Based on estimates, analyses, and data reported in Harwood, H.; Fountain, D.; and Livermore, G. *The Economic Costs of Alcohol and Drug Abuse in the United States 1992*. Report prepared for the National Institute on Drug Abuse and the National Institute on Alcohol Abuse and Alcoholism, National Institutes of Health, Department of Health and Human Services. NIH Publication No. 98-4327. Rockville, MD: National Institutes of Health, 1998.

Harwood, H., Fountain, D., & Livermore, G. (1998). *The Economic Costs of Alcohol and Drug Abuse in the United States 1992.* Report prepared for the National Institute on Drug Abuse and the National Institute on Alcohol Abuse and Alcoholism, National Institutes of Health, Department of Health and Human Services. NIH Publication No. 98-4327. Rockville, MD: National Institutes of Health.

Howe, A.M. (1995). Methamphetamine and childhood and adolescent caries. *Australian Dental Journal, 40*, 340.

OxyContin Testimony: Hearing before the House Committee on Appropriations, Commerce, Justice, State, and Judiciary, (2001).

Indiana Criminal Justice Institute. (2006). Meth in Kentucky. Prepared by the Indiana Criminal Justice Institute on behalf of the Midwestern Governors Association Regional Meth Summit. Retrieved October 26, 2007, from http://www.in.gov/cji/methfreeindiana/pdfs/Kentucky_Meth_Fact_Sheet.pdf.

Inciardi, J., & Goode, J.L. (2003). OxyContin and prescription drug diversion. *Consumers' Research Magazine, 86*, 22-25.

Katz, R.S., & Whitaker, S. (2001). Explaining accommodation and resistance in Kentucky. *Crime, Law, and Social Change, 35*, 295-318.

Kentucky State Police. (2005). Crime in Kentucky. Retrieved October 26, 2007, from http://www.kentuckystatepolice.org/pdf/cik2005.pdf.

King, G.R., & Ellinwood, E.H. (2005). Amphetamines and other stimulants. In J. H. Lowinson, P. Ruiz, R. B. Millman, & J.G. Langrod, (Eds.), *Substance Abuse: A Comprehensive Textbook, Fourth Edition,* (pp. 277-302). Philadelphia, PA: Lippincott Williams & Wilkins.

Larson, S.L., Eyerman, J., Foster, M.S., & Gfroerer, J.C. (2007). *Worker Substance Use and Workplace Policies and Programs* (DHHS Publication No.SMA 07-4273, Analytic Series A-29). Rockville, MD: Substance Abuse and Mental Health Services Administration, Office of Applied Statistics.

Lawson, R.G. (2007). Turning jails into prisons—collateral damage from Kentucky's "War on Crime." *Kentucky Law Journal, 95*(1), 1-43.

Lindsey, S. (2007). OxyContin maker, executives plead guilty. Lexington Herald-Leader, pp. A11.

Lipman, A.G. (2003). What have we learned from OxyContin? *Journal of Pain and Palliative Care Pharmacotherapy, 17*, 1-4.

Logan, T., Schenck, J., Leukefeld, C., Meyers, J., & Allen, S. (1999) Rural attitudes, opinions, and drug use. *Substance Use and Misuse, 34*(4-5), 545-565.

Manchikanti, L., Pampati, V., Damron, K.S., Beyer, C.D., Barnhill, R.C., & Fellows, B. (2003). Prevalence of prescription drug abuse and dependency in patients with chronic pain in Western Kentucky. *Journal of Kentucky Medical Association, 101*, 511-517.

McGrath, C., & Chan, B. (2005) Oral health sensations associated with illicit drug abuse. *British Dental Journal, 198*, 159-162.

Methamphetamines: An Epidemic of Clandestine Labs and Health Risk. Retrieved March 31, 2006 from: http://www.health.state.mn.us/divs/eh/meth/lab/mchesley.pdf.

Migliore, S. (1994). Gender, emotion, and physical distress: The Sicilian-Canadian "nerves" complex. *Cultural Medical Psychiatry, 18*, 271-297.

Miller, N.S., & Greenfeld, A. (2004). Patient characteristics and risks factors for development of dependence on hydrocodone and oxycodone. *American Journal of Therapeutics, 11*, 26-32.

Mumola, C.J. , & Karberg, J.C. (2006). Drug use and dependence, state and federal prisoners, 2004. Bureau of Justice Statistics, U.S. Department of Justice, Office of Justice Programs. Retrieved June 4, 2007, from www.ojp.usdoj.gov/bjs.

National Drug Intelligence Center (NDIC). (2002). Kentucky drug threat assessment: Methamphetamine. Retrieved June 6, 2007, from www.usdoj.gov/ndic/pubs1/1540/methamphetamine.htm.

National Drug Intelligence Center (NDIC). (2005). National Drug Threat Assessment 2005 Summary Report. Retrieved on May 20, 2007, from http://www.usdoj.gov/ndic/pubs11/13846/meth.htm#Trends.

National Institute on Drug Abuse (NIDA). (1996). Facts about methamphetamine. NIDA Notes, 11(5). Retrieved March 24, 2006, from http://www.drugabuse.gov/NIDA_NOTES/NNVol11N5/Tearoff.html.

National Institute on Drug Abuse (NIDA) (2006). *Methamphetamine Abuse and Addiction*. NIDA Research Report - Methamphetamine Abuse and Addiction: NIH Publication No. 06-4210, Printed April 1998, Reprinted January 2002. Revised September 2006. Retrieved on December 6, 2007 from: http://www.nida.nih.gov/ResearchReports/Methamph/Methamph.html.

Office of Applied Statistics. (2006) Disposition of emergency department visits for drug-related suicide attempts by adolescents: 2004. *The New DAWN Report, 6*.

Office of Applied Statistics. (2004) Oxycodone, Hydrocodone, and Polydrug Use, 2002. *The New DAWN Report, July 2004*. Retrieved November 15, 2007, from http://www.oas.samhsa.gov/2k4/oxycodone/oxycodone.pdf

Office of National Drug Control Policy [ONDCP] (2007). *The Economic Costs of Drug Abuse in the United States, 1992-2002.* Washington, DC: Executive Office of the President (Publication No. 207303).

Office of National Drug Control Policy [ONDCP] (2007). *Facts and figures: Methamphetamine*. Office of National Drug Control Policy. Retrieved June 7, 2007 from: www.whitehousedrugpolicy.gov/drugfact/methamphetamine/index.html.

Otero, C., Boles, S., Young, N.K., & Dennis, K. (2006). Methamphetamine addiction, treatment, and outcomes: Implications for child welfare workers. Retrieved November 3, 2007, from www.ncsacw.samhsa.gov/Meth%20and%20Child%20Safety.pdf.

Shaner, J.W. (2002). Caries associated with methamphetamine abuse. *Journal of the Michigan Dental Association, 84*, 42-47.

Special report: Prescription for pain. (2003, a reprint of stories from January-February). *Lexington Herald-Leader.*

Staton-Tindall, M., McNees, E., Walker, R., & Leukefeld, C. (2007). *Criminal Justice Kentucky Treatment Outcome Study: FY 2007 Follow-Up Report.* Retrieved on November 20, 2007 from: http://cdar.uky.edu/CJKTOS/reports.html.

Substance Abuse and Mental Health Services Administration (SAMSHA). (1999). *National Household Survey on Drug Abuse, 1999*. Rockville, MD.

Substance Abuse and Mental Health Services Administration (SAMHSA) (2000). *National Household Survey on Drug Abuse, 2000* (Office of Applied Studies, NHSDA Series: H-13, DHHS Publication No. SMA 01-3549). Rockville, MD.

Substance Abuse and Mental Health Services Administration. (2001). *Results from the 2001 National Household Survey on Drug Abuse: Volume I. Summary of National Findings* (Office of Applied Studies, NHSDA Series H-17, DHHS Publication No. SMA 02-3758). Rockville, MD.

Substance Abuse and Mental Health Services Administration (SAMHSA) (2002). *National Survey on Drug Use and Health, 2002* (Office of Applied Studies, NHSDA Series H-22, DHHS Publication No. SMA 03-3836). Rockville, MD.

Substance Abuse and Mental Health Services Administration (SAMHSA) (2003). *National Survey on Drug Use and Health, 2003* (Office of Applied Studies, NHSDA Series H-25, DHHS Publication No. SMA 04-3964). Rockville, MD.

Substance Abuse and Mental Health Services Administration (SAMHSA). (2006). State estimates of past year methamphetamine use. *The National Survey on Drug Use and Health, 37*.

Substance Abuse and Mental Health Services Administration (SAMHSA). (2007). Patterns and trends in nonmedical prescriptions pain reliever use: 2002-2005. *The National Survey on Drug Use and Health, April 6, 2007*.

Swan, N. (1998). Drug abuse cost to society set at $97.7 billion, continuing steady increase since 1975. *NIDA NOTES, 13*(4). Washington, DC: National Institute on Drug Abuse.

van Schaik, E. (1989). Paradigms underlying the study of nerves as a popular illness in Eastern Kentucky. *Medical Anthropology, 11*, 15-28.

Walker, R., Mateyoke-Scrivner, A., Cole, J., Logan, T., Stevenson, E., Leukefeld, C., & Jackson, T. (2007). *Kentucky substance abuse treatment outcome study: FY 2005 follow-up findings.* Retrieved October 26, 2007 from: http://cdar.uky.edu//ktos/KTOSFollow.html.

Willens, T.E. & Spencer, T.J. (1998). Pharmacology of amphetamines. In R.E. Tarter, R.T. Ammerman, & P.J. Ott, (Eds.), *Handbook of Substance Abuse: Neurobehavioral Pharmacology.* (pp. 501-513), New York, NY: Plenum Press.

Woolf, C. J. & Hashmi, M. (2004). Use and abuse of opioid analgesics: Potential methods to prevent and deter nonmedical consumption of prescription opioids. *Current Opinion in Investigational Drugs, 5,* 61-66.

Zacny, J., Bigelow, G., Compton, P., Foley, K., Iguchi, M., & Sannerud, C. (2003). College on Problems of Drug Dependence taskforce on prescription opioid nonmedical use and abuse: Position statement. *Drug and Alcohol Dependence, 69*, 215-232.

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