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Methamphetamine Manufacturing: A Hypothesis on Who's "Cooking" Now

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Authors' contributions

This work was carried out in collaboration between all authors. All authors read and approved the final manuscript.

Short Research Article

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ABSTRACT

In the U.S., Methamphetamine (Meth) manufacture seems to follow a cycle that is in sync with unemployment rates and recessions (or slides in the economy). Correspondingly, there are alarming increases in meth lab seizure sat the start of recessions in the U.S. The recent lingering recession in the U.S., which started in December 2007, has resulted in record numbers of older workers (45 years of age or older) being unemployed. These older workers, additionally, are remaining unemployed longer when compared to younger workers (less than 45 years of age). Similarly, we have seen the rate (per 100,000) of burns associated with meth manufacturing increased more in older aged individuals when compared to younger individuals since the start of the recession. As such, we hypothesize that the recent recession and the higher employment rate among older workers in the U.S. has resulted in a shift in who's "cooking" meth in the U.S., older individuals. Since the evidence presented is circumstantial, further research is needed to substantiate the findings and better equip us to fight this plague of society. However, the current study aimed to develop a useful hypothesis that there has been a shift in which age groups are currently cooking meth in the U.S.

Keywords: *Methamphetamine; cost-effectiveness; burn injury; drug abuse.*

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1. INTRODUCTION

Despite widespread combative efforts, methamphetamine (Meth) use and production continues to be a major and costly burden for the health care industry, law enforcement, and public health. Meth use continues to increase in people aged 12 and older, with the Substance Abuse and Mental Health Administration (SAMHSA) reporting that the number of meth users increased by nearly 60% from 2008 to 2009; from 314,000 users to 502,000 users [1]. Unfortunately, to date, no empirically based national estimates of the burden of meth manufacture on society or proven reasons for the increase in meth production exist in the literature. In this paper we provide circumstantial evidence that increases in meth manufacturing over time is correlated with recessions and increases in unemployment rates. Furthermore, we conjecture that since the recent recession (starting in December 2007) has affected older workers disproportionately more [2], with their unemployment rate increasing significantly more rapid than any other age group [2], that older workers are currently more likely to be meth “cooks”, when compared to younger workers.

The genesis of this investigation was to simply explore the cost burden of burns resulting from meth manufacture on society (estimated at \$45M annually). Previous reports concerning burn injuries associated with meth has only examined small cohorts (n=11 to 54) typically seen at one facility and have focused on morbidity and mortality due to use [3-11]. The current study uses well established and valid data from a national database, the Bureau of Labor Statistics, and the US Drug Enforcement Administration and focuses on manufacture.

2. MOTIVATION

It has been well established that meth manufacturing can lead to explosions and fires that spread very quickly [11-18]. Our initial aim was to establish the cost burden associated with burns that resulted from meth manufacture. However, while addressing this aim we noticed an interesting phenomenon, the sample population increased in age over time. So in this paper we discuss our results – that recently older individuals seem to be cooking meth more – and we explain a proposed hypotheses that may explain this phenomenon. In a future planned manuscript we explore the cost burden issue.

Since these injuries are relatively rare, and in order to achieve a reasonable level of statistical inference, we needed a data base that would give us a reasonable sample size of individuals that: (1) suffered a burn injury as a primary or secondary diagnosis, (2) had a documented drug related issues and (3) had an injury that would be associated with an explosion.

We defined individuals who had at least one code in each/all of the three categories above to suffer a burn from meth manufacture.

To realize this goal we used the Nationwide Inpatient Sample (NIS), Healthcare Cost and Utilization Project (HCUP), Agency for Healthcare Research and Quality [19]. The NIS is a unique and powerful database of hospital inpatient stays that allows researchers and policymakers to identify, track, and analyze national trends in health care utilization, access, charges, quality, and outcomes [19]. The NIS is the largest publicly available all-payer inpatient care database in the United States and contains data from approximately 8 million hospital stays each year, approximately 20-percent stratified sample of US community hospitals[19].NIS data are available from 1988 to 2010, allowing analysis of trends over time. Although our team traditionally only analyzes data from 2003-2008, since co-morbidity data was not included prior to 2003 and comprehensive adjustment models cannot be developed.

3. BURN INJURY

First, we identified within the NIS dataset (n=313,366,817), individuals that suffered a burn injury (n=23,063), see Fig. 1. Burns were defined in the current study by ICD-9CM Diagnosis Codes: 940-945 and 947 (940: burns of eye and adnexa; 941: burns of face, head and neck; 942: burns of the trunk; 943: burns of upper limb; 944: burns of hands/wrists; 945: burns of lower limb; 947: burns of internal organs). ICD-9CM diagnosis code 948 (total burn surface area) was used as a covariate in secondary analyses. Note: ICD-9CM diagnosis codes 946 (multiple specified sites) and 949 (unspecified burn) were not defined as burns for this analysis; representing less than 0.2% of all burns.

4. DRUG-RELATED ISSUES

Second, we subset the burns sample above (n=23,063) to only include individuals with a drug abuse code (n=3,027), see Fig. 1. Drug abuse codes for this study were: 304.x (drug dependence), 305.x (amphetamine abuse), 969.72 (poison by amphetamine), 970.89 (poison by other central nervous system stimulant), E854.2 (accidental poison by psychostimulant), E854.3 (accidental poison by central nervous system stimulant).

**Flow Diagram to Develop Analytic Sample:
Burn Patients from an Illicit Drug Manufacturing Explosion**

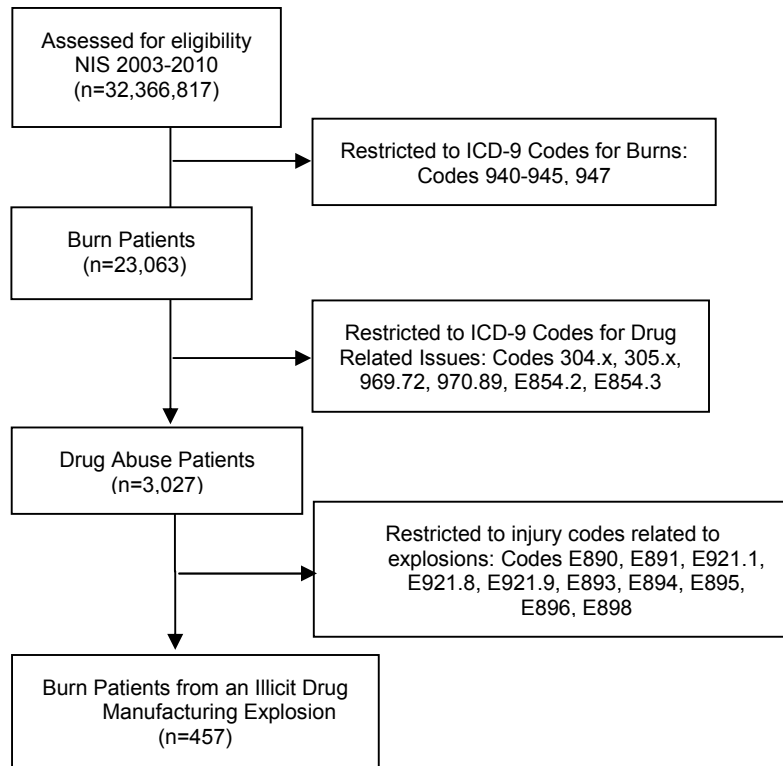


Fig. 1. The flow diagram depicting the construction of the current study's analytic sample

5. EXPLOSION INJURY CODES

Thirdly, we subset the previous sample (n=3,027) to only include injury codes that (may) indicate drug manufacturing: E890 (conflagration in private dwelling), E891 (conflagration in other building/structure), E921.1 (accidents caused by explosion of gas cylinder), E921.8 (accidents caused by explosion of specified pressure vessel, E921.9 (accidents caused by explosion of unspecified pressure vessel), E893 (accident caused by ignition of clothing), E894 (ignition of highly inflammable material), E895 (accident caused by controlled fire in private dwelling), E896 (accident caused by controlled fire in other unspecified building or structure), and E898 (accident caused by other specified fire and flames). As seen in Fig. 1. the final analytical sample was n=457. We felt that this analytical sample (n=457), while potentially conservative, provided a good representation of those individuals that suffered a burn as a result of meth manufacturing.

We then used generalized linear mixed effects modeling (GLMM) techniques to examine whether differences existed over time, between regions of the US, and between different age groups. While significant differences didn't exist over time (p=0.058), there were significant differences between regions of the US (p<0.001) and between age groups (p<0.001).

The West region of the US had significantly higher charges when compared to the rest of the nation. This finding is well established for a host of reasons (e.g., cost of living adjustments in reimbursements) and has been seen by researchers previously examining many diseases and disorders, using NIS.

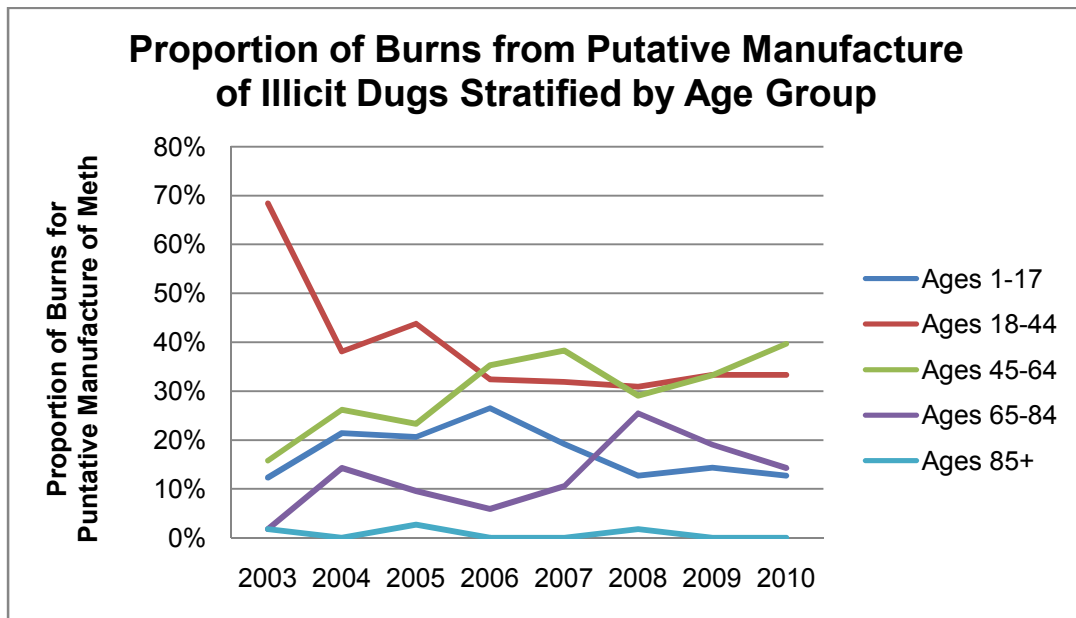


Fig. 2. Proportion of burns from putative manufacture of meth over time stratified by age group

An interaction effect between region of the US and time did not exist ($p=0.894$); although, an interaction effect existed between age group and time ($p<0.001$), as seen in Fig. 2. To test whether this was an artifact of sample sizes within the age groups, we tested and found an interaction effect between age-group and time when examining burns from the manufacture of meth per 100,000 per age group ($p<0.001$), see Fig. 3.

6. UNEMPLOYMENT AND A SHIFT IN METH “COOKS”

Since we were interested in the relationship between unemployment and meth, we focused our investigation to just three age groups: (1) those aged 18-44, (2) those aged 45-64, and (3) those age 65-84 (unemployment data on those aged 1-17 is unreliable and the incidence rate is so low for those aged 85 and older). From Fig.1. it seems that the proportion of burns from manufacture of meth decreased significantly for those aged 18-44 ($p<0.001$) and was being replaced by those aged 45-64 ($p<0.001$). This seemed to occur at two time points, first when the US had a “slide” in the economy in late 2005 [2]; and then again after the recent recession began in December 2007. In addition, a spike is seen in burns from meth manufacture in those aged 65-84 immediately following the start of the recession.

As seen in Fig. 4. the recession may have a disproportionate effect on those aged 45-64 [2]. the Bureau of Labor Statistics reports that there is “record unemployment among older workers [aged 55 and older]” [2] since the start of the recent recession. In addition, older workers spend more time unemployed (35.5 weeks) when compared to those aged 16-24 years of age. Furthermore, the Bureau of Labor Statistics suggests that older workers are in need of income after large losses in their retirement accounts and to ensure adequate income to address longer life spans [2].

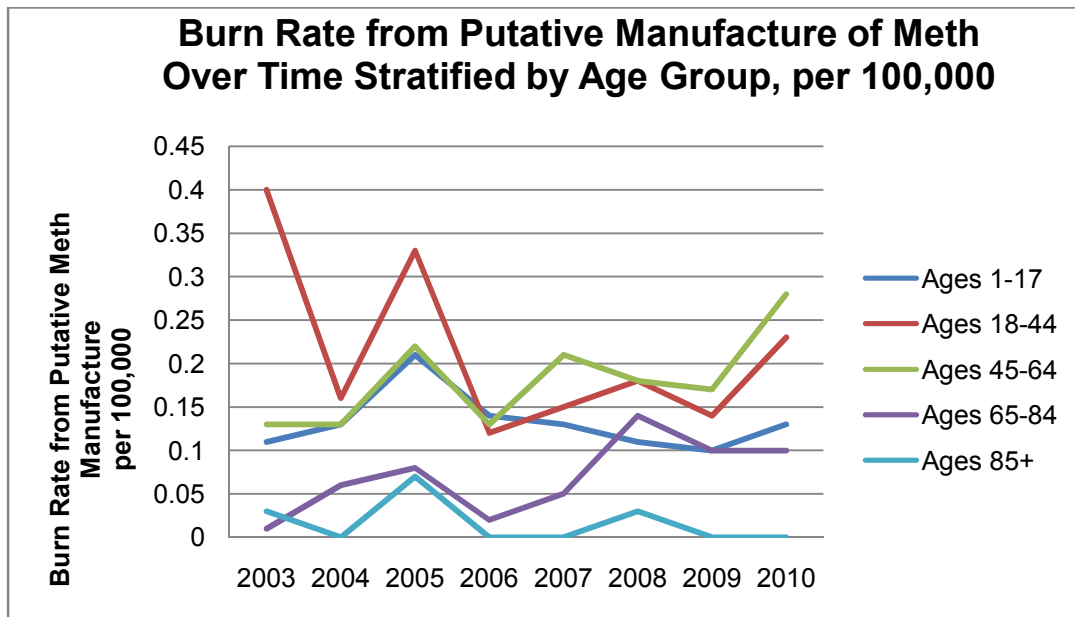


Fig. 3. Burn rate from putative manufacture of meth over time stratified by age group, per 100,000

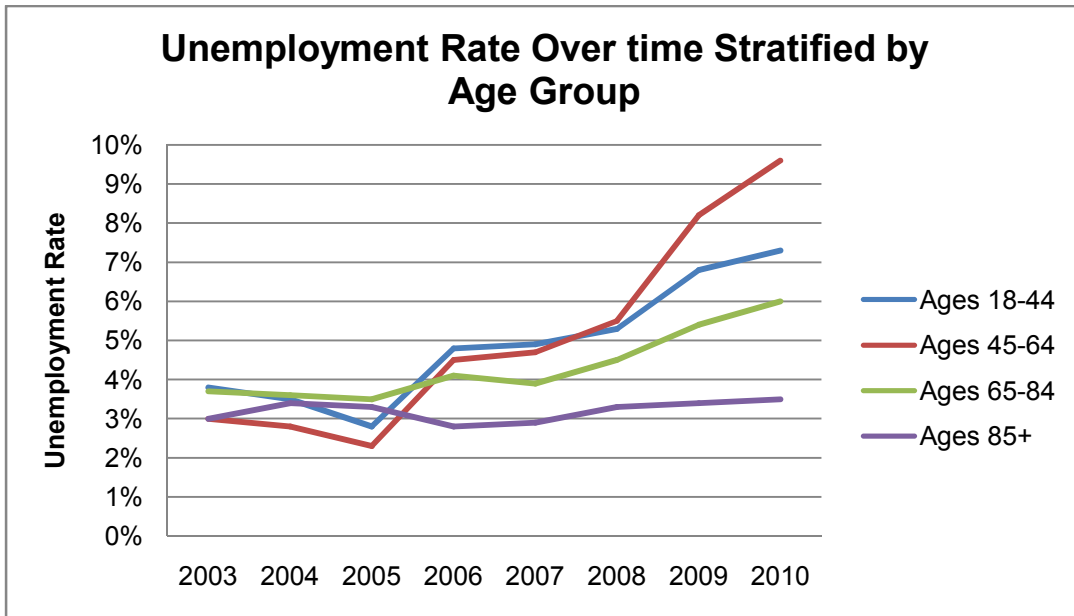


Fig. 4. Unemployment rate over time stratified by age group; as reported by the Bureau of labor statistics

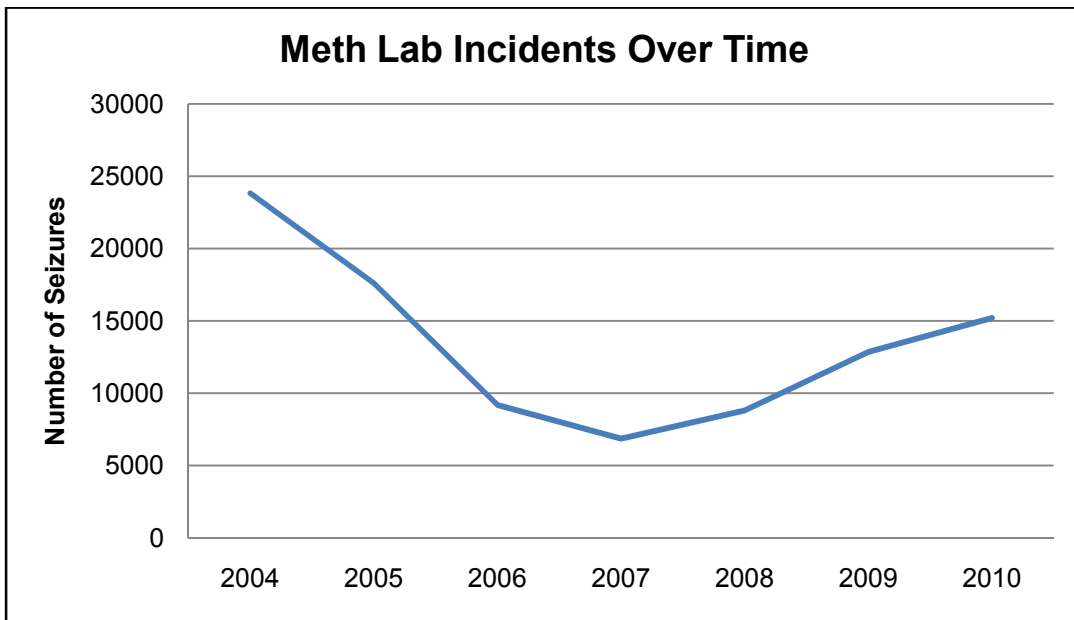


Fig. 5. Meth incidents over time as reported by the Drug Enforcement Administration. The Drug Enforcement Administration considers a meth lab incident as the seizure of a meth lab, meth “dumpsites” and/or seizure of chemicals and glassware

7. INCREASE IN METH LAB INCIDENTS

The number of Meth lab incidents has similarly increased since the start of the recent recession according to the Drug Enforcement Administration [20], see Fig. 5. The Drug Enforcement Administration considers a meth lab incident as the seizure of a meth lab, meth “dumpsites” and/or seizure of chemicals and glassware.

8. CONCLUSION

There has been a shift in who is “cooking” meth as a result of the recent and lingering recession. To overcome losses in income, children returning to the “nest”, large losses in retirement accounts, and longer life spans, unemployed older workers are turning to meth manufacturing for income during slides in the economy and recessions. Whether their involvement is limited to manufacture and they are not involved in distribution, sales and use of meth, and whether (as history indicates) they will return to legal employment after the recession, needs to be studied.

The conclusions inferred in the current study are based upon circumstantial evidence. There is no database that allows analysts to empirically investigate the conclusions/hypotheses put forth in this paper. While below we discuss a study design that could provide empirically based evidence to support or refute the proposed hypotheses, we are fearful no such data will ever exist since collecting reliable/valid data from meth manufacturers is doubtful. As such, classical association and/or cause-and-effect studies may not be possible. Correspondingly, traditional statistical modeling and analytic techniques will not be able to be employed. We feel, similar to the current paper, only hypothesis papers can and will be written. Our hope is that there will be a paradigm shift in allowing these hypothesis pieces (with circumstantial evidence) to be published in peer reviewed academic journals.

It is possible that some of the putative meth manufacturing injuries are actually injuries that resulted from manufacture of other synthetic drugs (cathinones, cannabinoids, etc.). Since there is no ICD-9 code(s) that are explicitly associated with manufacture of these drugs we cannot calculate how many of the defined meth manufacturing injuries actually resulted from manufacture of other synthetic drugs.

A majority of lab accidents are the result of human error. Older meth cooks may be more/disproportionately susceptible to injuries that need medical attention. Similarly, older cooks may have poorer eyesight, slower reaction times, and poorer ability to synthesize meth and have other contributing factors that increases risk of injury that needs medical attention. This may result in an overestimation of older meth cooks, when compared to younger meth cooks.

9. LIMITATION

There are a number of assumptions and limitations in the current study due to the data available for analysis. We would like to discuss the two biggest.

Circumstantial evidence was generated in this analysis. The biggest limitation is that only a hypothesis is derived and no inferentially based conclusion is formed. The current paper aimed to address an important problem and critical barrier in this field, requiring analysts to perform classical analyses for classical inference. We feel this is a substantial jump in

thinking that while it is (theoretically) testable, but may not be pragmatically possible. Hypothesis pieces are needed and warranted in the literature.

Another big limitation is assuming that the analyzed sample is truly a homogeneous group of meth manufacturers. It may be pragmatically difficult to validly and reliably survey individuals with burn injuries to establish whether they were manufacturing meth when they sustained their injuries. As such, the analyzed sample constructed may not represent a truly homogeneous group, but we feel this group conservatively represents meth manufacturers who sustained injuries that needed medical attention.

9.1 Testing this Hypothesis in the Future

We feel a section is needed on how our idea could be tested. To test this hypothesis a longitudinal, mixed-methods, prospective, observational study needs to be performed. The study would need to explicitly identify those individuals who suffered a burn as a result of meth manufacturing. Test for differences over time, between age groups and by employment status. In addition, the study would need a qualitative component that surveys the individuals to establish why they manufacture meth, the extent of their involvement/use and whether they will continue manufacturing meth. Only with such a study will we be able to substantiate the hypothesis proposed with empirical evidence. The results of such a study could aid law enforcement, public health officials, and the health care industry combat this devastating problem that plagues society.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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