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Pseudoephedrine Sales and Seizures of Clandestine Methamphetamine Laboratories in Kentucky

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To the Editor: The illicit production of methamphetamine from the precursor pseudoephedrine in clandestine laboratories fuels up to 35% of the domestic supply.¹ Public health, law enforcement, and medical associations support restricted access to methamphetamine precursors; manufacturers oppose restrictions.

Kentucky law limits pseudoephedrine sales in all counties to 7.2 g/person/month (as of July 2012, formerly 9 g/person/month), sufficient to allow a patient to take the maximum daily dose (240 mg/d) each day. Electronic tracking of sales is also required. Despite these restrictions, increases in the number of reported methamphetamine laboratory seizures (called laboratories) continue.^{2–4} We analyzed the relationship between pseudoephedrine sales and the number of laboratories reported in Kentucky.

Methods

Using county level data from 2010, we examined the association between the natural log of the number of laboratories and county pseudoephedrine sales (grams/100 residents) adjusting for the number of law enforcement officers and the percentage of high school graduates. Law enforcement regulations define laboratories as “requiring two or more chemicals or two or more pieces of equipment used in manufacturing methamphetamine.”⁵

Pseudoephedrine sales data were obtained from the National Precursor Log Exchange, the real-time electronic system mandated for use by pharmacies to track all sales of non–

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Author Contributions: Dr Talbert had full access to all of the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.

Study concept and design: Talbert, Blumenschein, Stromberg, Freeman.

Acquisition of data: Talbert, Freeman.

Analysis and interpretation of data: Talbert, Blumenschein, Burke, Stromberg, Freeman.

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Statistical analysis: Talbert, Burke, Stromberg.

Administrative, technical, or material support: Talbert.

Study supervision: Talbert, Stromberg.

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prescription pseudoephedrine medications in Kentucky. The number of full-time law enforcement officers in a county was used as a proxy for the influence of law enforcement on laboratory seizures. Data on laboratories and law enforcement officers were obtained from the Kentucky State Police. The percentage of high school graduates was used as a socioeconomic control and was obtained from the US Census.

We first visualized the relationship using a scatterplot, and then calculated a log-linear regression model using Stata version 11 (StataCorp). All reported *P* values are 2-sided, with *P* < .05 considered statistically significant. The University of Kentucky institutional review board approved the study.

Results

Four Kentucky counties reported no pseudoephedrine sales, leaving 116 counties for analysis. In 2010, Kentuckians purchased a mean 24 664 g (SD, 60 313 g) of pseudoephedrine per county (per county mean, 49 [SD, 39] g/100 residents) and there were 1072 laboratories reported (per county mean, 9.28 [SD, 20.91] laboratories). There was considerable variability in pseudoephedrine sales per county from 0.26 g/100 residents (population: 13 752) to 147 g/100 residents (population: 25 581).

Variability in the number of laboratories was also evident from 0 in many counties to 154 laboratories. The natural log of the number of laboratories reported in each county and the grams of pseudoephedrine sold per 100 residents (Figure) indicates a relationship between sales and laboratories. Regression results in the Table were consistent with the visual representation in the Figure.

Counties with greater pseudoephedrine sales were significantly associated with greater numbers of laboratories. In this model, a 1-g increase in pseudoephedrine sales per 100 people was associated with a 1.7% increase in laboratories. For a typical county, a 13-g per 100 resident increase in pseudoephedrine sales was associated with approximately 1 additional laboratory.

Comment

The strength of this study is that it is the first, to our knowledge, to provide empirical evidence that pseudoephedrine sales are correlated with the clandestine manufacture of methamphetamine. While the incidence of conditions for which pseudoephedrine is indicated is not known, and may vary by county, our results indicated a 565-fold variation in pseudoephedrine sales between Kentucky counties.

Our study is limited by the ecological design, possible underdetection and underreporting of laboratories, purchase of pseudoephedrine across county lines, and importation of pseudoephedrine into Kentucky. In addition, law enforcement's use of pseudoephedrine sales data to identify questionable pseudoephedrine purchases could have affected the association between pseudoephedrine sales and laboratories. Nevertheless, this study highlights the need for research on various approaches to containing clandestine methamphetamine production, including restriction of pseudoephedrine sales to only those patients who have a true medical need for its decongestant properties.

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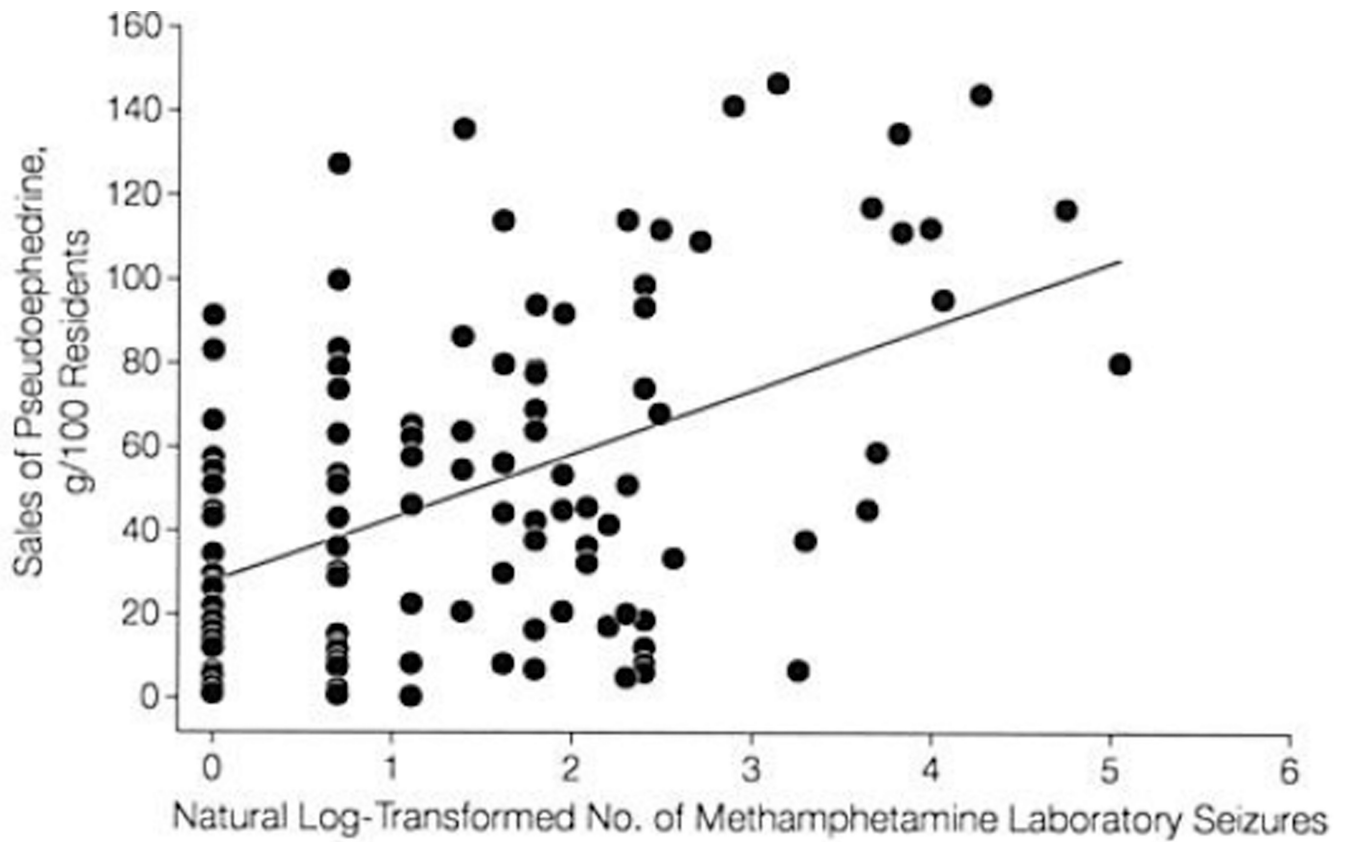


Figure.
Association Between Pseudoephedrine Sales and Reported Clandestine Methamphetamine Laboratory Seizures in Counties in Kentucky in 2010
The regression line representing a linear model was fit using Stata Graph 11.2.

Table
Statistical Modeling of Methamphetamine Laboratory Seizures in 116 Kentucky Counties in 2010^a

	Bivariate Model			Multivariate Model		
	Mean (SD)	Coefficient (SE)	P Value	Coefficient (SE)	P Value	P value
Pseudoephedrine sales, g/100 county residents	49 (39)	0.015 (0.003)	<.001	0.017 (0.003)	<.001	<.001
No. of full-time law enforcement officers/100 county residents	0.12 (0.11)	NA	NA	-1.300 (0.948)	.17	.17
Adult population with a high school diploma, %	0.76 (0.08)	NA	NA	-2.519 (1.375)	.07	.07

Abbreviation: NA, not applicable.

^a Although other models were used to fit the data, including Poisson, zero-inflated Poisson, and negative binomial, the residual distribution indicated an ordinary least-squares linear regression model on the natural log of the number of laboratories in a county as the most appropriate. No pseudoephedrine sales were reported for 4 counties (Bracken, Hancock, Owsley, and Robertson) and they were excluded from the analysis.