





SOCIOECONOMIC DETERMINANTS OF DRUG ABUSE IN THE UNITED STATES

 Bahram Adrang¹⁺
Margaret Anderson²

 Kambiz Raffiee³

¹W.E. Nelson Professor of Financial Economics Pamplin School of Business Administration the University of Portland, Oregon, USA.

Email: adrangi@up.edu

²University of Portland, Portland, Oregon, USA.

Email: andersom20@up.edu

³Foundation Professor of Economics College of Business Administration University of Nevada, Reno, USA.

Email: raffiee@unr.edu



(+ Corresponding author)

ABSTRACT

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We examine the association between drug abuse and several socioeconomic variables by estimating a multivariate regression model. The sample data includes seventy observations at the county-level from every state in the U.S., excluding Maryland and North Dakota, provided by the U.S. Center for Disease Control and the U.S. Census Bureau. The socioeconomic variables analyzed in the model are education, median household income, community poverty, insurance status, and employment status. The income, education, and community poverty variables are shown to have significant effect on the number of unintentional drug poisonings (drug abuse). Income is shown to have the largest effect followed by community poverty and then education. Neither insurance status nor employment status were found to be statistically significant. Empirical results suggest that encouraging higher levels of education for communities may be beneficial in reducing drug abuse and its consequences. In the short-run drug related information may can be made accessible through community centers, community clinics, and religious temples.

Contribution/Originality: Research on drug abuse in the US is mainly focused on underlying medical and psychological aspects of the problem. There is a surprising gap in the literature regarding the socioeconomic conditions associated with this problem. Our paper contributes to the existing literature by investigating the association between socioeconomic factors and drug abuse in the US.

1. INTRODUCTION

Drug abuse and addiction, along with associated drug overdoses, are a serious problem in the United States. According to the U.S. Center for Disease Control (CDC), more than 70,000 people died as a result of a drug overdose in 2018, establishing drug overdoses as a leading cause of injury-related death in the United States¹. Additionally, in the same year, the National Survey on Drug Use and Health (NSDUH) reported that 19.7 million adults (age 12 and above) were struggling with some kind of substance use disorder. It was found that approximately 38% of adults were specifically dealing with a substance abuse disorder directly related to illicit

¹ <https://www.cdc.gov/injury/features/prescription-drug-overdose/index.html>.

drugs². These disorders are mental health disorders that can have long lasting effects on both the individual experiencing the disorder and those around them. Drug abuse and addiction destroy relationships and serve as direct threats to a person's health, safety, and overall quality of life.

Substance abuse in the United States does not only serve to threaten the overall well-being of the country and at an individual level, but it also has more widespread negative effects in the form of the costs it imposes on the U.S. economy. A study conducted by Recovery Centers of America worked to calculate the total economic cost of both alcohol and drug abuse in the United States and found that, in 2016, this abuse led to a total cost of \$1.45 trillion or roughly 7 percent of the GDP. This number includes \$578 billion because of direct economic losses with the remaining \$874 billion in losses being attributed to the societal harm that substance abuse causes. The three largest contributors to the high economic costs are health care costs, loss of productivity, and the costs associated with crime (Recovery Centers of America, n.d). Although this study looks at the costs associated with both alcohol and drug abuse, drug abuse is a significant problem at both the individual and societal levels.

Drug abuse and addiction can be a difficult problem to address due to the numerous factors that can play a role in its development. According to National Institute on Drug Abuse, a large part of an individual's risk of developing an addiction and abusing drugs, about 40 to 60 percent, can be attributed to their genes and the way in which one's environment has affected their gene expression³. Although genetics play a significant role, the relationship that can exist between one's gene expression and their environment suggests the importance of addressing environmental factors when looking at drug abuse. There is no single factor that can predict whether a person will begin to abuse drugs; however, all possible risk factors need to be taken into consideration when evaluating an individual's risk level.

Although there are a multitude of environmental factors that can increase the likelihood an individual will abuse drugs, this paper will specifically examine the influence of a set of socioeconomic factors in a multivariate model. There are a few socioeconomic variables that have been consistently analyzed in research relating to risk factors for drug abuse. According to American Addiction Centers a high risk of addiction and drug abuse has often been associated with those who are disadvantaged and struggling in their daily life⁴. Therefore, we choose socioeconomic factors such as income, insurance status, and employment status in our model; however, other related variables are also analyzed.

Previous research on this subject has largely come from the medical field. Investigations that address the socioeconomic underpinnings of this serious problem are scarce. We seek to fill this gap, and contribute to the literature by undertaking the current research. We propose to use an econometric model to test the possible relationships between the drug abuse and certain socioeconomic variables that have been anecdotally identified in the medical literature as being related to drug use in the United States.

The remainder of this paper is organized into the following sections. The second section provides a brief review of the current literature that is relevant to the topic. Section III provides an overview of the data. The methodology used in the paper is covered in Section IV. The fifth section offers an analysis of the empirical results. Finally, the last section is allocated to summary and final conclusions.

2. REVIEW OF THE RELEVANT LITERATURE

There is a large volume of literature on drug abuse in general; however, there is not a substantial portion that looks at socioeconomic variables and their relationship with drug abuse. The research that has been done has

² <https://americanaddictioncenters.org/rehab-guide/addiction-statistics>

³ <https://www.drugabuse.gov/publications/drugs-brains-behavior-science-addiction/drug-misuse-addiction>

⁴ <https://www.recoveryfirst.org/blog/substance-abuse-and-socio-economic-factors/>

largely been conducted in the medical field and some are relatively outdated. Several relevant papers and their final conclusions will be summarized below.

Smart and Murray (1985) examine the relationships between the narcotic drug abuse and the socioeconomic conditions in 152 countries. The findings from the discriminant analysis showed that three variables: percentage of population with safe water, population per physician, and population per hospital bed, were predictors of the drug abuse in these countries. Their findings show that high levels of drug abuse were associated with two variables- fewer hospital beds per population and easy access to safe drinking water. Oddly, fewer physicians per population is associated with a lower level of drug abuse.

Smart and Murray (1985) concluded that the association between the substance abuse and health, education and other socioeconomic conditions is complex. Their study reveals that apart from the US, both serious and low levels of substance abuse are found in developing countries. Their study contradicts the notion that substance abuse is associated with having advanced economies.

Humensky (2010) revisits the previous literature regarding the relationship between socioeconomic status (SES) and substance abuse. It was widely believed that adolescents with low SES were more prone to substance abuse than high SES adults. However, evidence has been mounting that high SES adolescents are also at high risk for substance abuse. Humensky (2010) applied logistic regression models to the National Longitudinal Survey of Adolescent Health data on secondary school students in the U.S. Her findings show that the substance abuse in adulthood is associated with SES, as measured by parental education and income. Higher parental income and education is positively and statistically significantly associated with drug and alcohol use among adolescents. The study offers some policy directions and advice for educators and parents alike.

Oetting and Beauvais (1987) examine psychosocial factors that may be associated youth drug abuse. They show that peer groups and best friends are correlated with youth substance abuse. However, they also find high correlation between substance abuse among youth and social characteristics such as SES, neighborhood environment, family, religion and school, particularly when these lead to anger. Implications for prevention and treatment are considered.

Berenson, Stiglich, Wilkinson, and Anderson (1991) investigate the physical abuse among the tricultural sample of women. Abused women from all three racial groups of white, Hispanic and black, were more likely to have abused drugs and alcohol compared to those who were not abused. Their study shows the connection between physical abuse of women and substance abuse.

Patrick, Wightman, Schoeni, and Schulenberg (2012) investigate the association of SES indicators, namely income, wealth, and parental education for children, with drug and alcohol abuse in adulthood. They employed logistic regression models on a panel data of young adults between ages of 18-23 in the U.S. Logit regression results show that alcohol and marijuana abuse is associated with high family SES, i.e., high parental education, wealth and income.

Galea and Vlahov (2002) analyze the evidence on the consequences of substance abuse and low SES on homelessness, and incarceration among substance abusers. They find that low SES and economic factors impact the health of drug users directly through the access to resources, social welfare systems, and compliance with medication. They conclude that Public health policy may need to target the social factors that exacerbate the consequences of substance abuse.

Nelson-Zlupko, Kauffman, and Dore (1995) address the characteristics and treatment needs of substance dependent women. The authors view the substance abuse as a coping mechanism to deal with the unique social issues stemming from gender oppression. They focus on treatment needs that are required to meet the needs of women drug abusers.

Palamar and Ompad (2014) investigate the differences between powder cocaine and crack cocaine use among adolescents in the U.S. Their data consists of high school seniors who participated in the study during years 2005-

2011 (weighted $N = 65\,717$). They found that demographic and SES variables were correlated with lifetime use of powder cocaine and crack. In general, income, greater than 50 dollars per week increased the odds of cocaine use. Those with high parent education, religious beliefs were less likely to be substance users. They also showed that ethnicity played a role in odds of use of crack or powder cocaine. Their findings offered some nuances for public policy aimed at the abusers of these two types of cocaine.

Diala, Muntaner, and Walrath (2004) work to estimate gender, occupational, and socioeconomic correlates of both drug and alcohol abuse in the United States. This study looks at these correlates in relation to geography, as well, looking at specific correlations among rural, metropolitan, and urban residents. The relevant variables included in this study were education, income, and health insurance status. In the multivariate results, education was found to have no association with drug disorders in any geography and the same results were found in relation to income. However, residents of rural and metropolitan areas without health insurance were found to be more likely to have a drug disorder compared to residents in these same areas who had private health insurance coverage.

Compton, Thomas, Stinson, and Grant (2007) research the prevalence of DSM-IV 12-month drug abuse and dependence along with its associated correlates and comorbidity with other disorders by utilizing face-to-face interviews with a large representative sample of U.S. adults. The associated correlates that Compton et al. analyze that are most relevant to our study were education and income. The results show that DSM-IV 12-month drug abuse and dependence is more often associated with a lower socioeconomic status. This lower socioeconomic status corresponds with lower education and lower income. Compton et al. do not explain these connections and propose that further research needs to be conducted to understand how context could affect these socioeconomic differences.

Kallan (1998) uses data from the National Health Interview Survey and the National Death Index to examine psychoactive drug-related mortality in the United States and its possible socioeconomic determinants. This is accomplished using a multivariate analysis. Among other variables, this study includes employment, education, and income as possible socioeconomic determinants of drug abuse. Education and employment status are both found to have no significant effect in this model. However, while discussing the results, Kallan notes that employment status has been found to be associated with drug abuse in a handful of population-level studies of mortality. As was expected, lower income is found to have a significant effect on drug abuse, creating a higher risk of psychoactive drug-related mortality.

Williams and Latkin (2007) set out to examine the how neighborhood socioeconomic status and personal network attributes play a role in the use of heroin and cocaine. Using a combination of data collected via survey and data from the U.S. Census Bureau, they perform a regression analysis to analyze relationships between these variables. There are four variables that Williams and Latkin evaluate that are most relevant to our study: employment, education, income, and neighborhood poverty. They find that neither employment, education, or income had significant effects on the use of heroin or cocaine. However, in terms of neighborhood poverty, there was a significant relationship. The study ultimately observes that participants in neighborhoods that had at least a third of their residents living in poverty had 52% higher odds of reporting heroin, crack, and/or cocaine use in the past year. This effect remains the same even after controlling for significant personal and network characteristics. The relationship between neighborhood poverty and drug use found by Williams and Latkin is consistent with other research on the topic.

Finally, Johnson and Pope (1983) work to uncover relationships between a number of demographic, socioeconomic, psychological, and health status variables adult use of nonprescribed drugs. Out of all the variables included in Johnson and Pope's research, the two most related to this study are income and education. The study concludes that both variables were significantly related to the use of nonprescribed drugs. Surprisingly, education is found to be positively correlated with drug use. Whereas, income is shown to be positively related to usage alone; however, when looking at frequency of use, a negative relationship is revealed. Johnson and Pope note that these

factors, along with the other significant variables, only account for a small amount of the variation in nonprescribed drug use.

Review of the available literature is used as a justification for the inclusion of the chosen explanatory variables for the present study. Education, income, community poverty, employment status, and insurance status have all been studied in relation to drug abuse with certain variables being found to have varying effects. Additionally, as can be seen, a large portion of the literature is relatively outdated, which could largely limit the applicability and accuracy of the results in the present day. In the following sections, a regression model is developed and estimated that will analyze the relationships between the identified set of socioeconomic variables and drug abuse, using recent data, to create a model that is more representative of current connections.

3. DATA

This paper utilizes a cross-sectional data set compiled based on data from the U.S. Center for Disease Control (CDC) and the U.S. Census Bureau. The counties included in the data set were chosen randomly to create a representative sample of the United States. There is at least one county represented from each state except for Maryland and North Dakota. As noted, the counties included were chosen randomly; however, if all data on the necessary socioeconomic variables were not available for a randomly generated county, an alternate county was chosen to take its place. The final data set includes seventy observations of various counties across the United States.

The dependent variable used in this econometric model is the number of unintentional drug poisonings (overdose) per 100,000 people in each county. The data for this variable was taken from the CDC's dataset entitled "Underlying Cause of Death, 1999-2017" with the cause of death being specified as "Drug poisonings (overdose) Unintentional." Data from 2017 was used as it was the most recent year available. This variable is intended to serve as a proxy for drug abuse as data that directly reported on drug abuse or addiction at the county level were not available. An accidental overdose is the ultimate consequence of drug abuse or addiction; therefore, it can justifiably be used as a measure of these issues.

The socioeconomic explanatory variables included in the model are described below.

ED= The percentage of adults (age 18 and above) with a high school degree or less per county (2017).

I= The median household income per county (2017).

PL= The percentage of the population who fall below the poverty line per county (2017).

UI= The percentage of the civilian non-institutionalized population that is uninsured per county (2017).

unUR= The percentage of the population (age 16 and above) who are unemployed per county (2017).

The data for the above variables were taken from a variety of datasets available from the U.S. Census Bureau. More current data were available; however, data from the year 2017 were used to correspond with the data available on drug overdoses from the CDC. A brief explanation of the rationale behind including these explanatory variables in the model is as follows.

Education, and lack thereof, has often been looked at in relation to drug abuse. Lower levels of educational attainment have consistently lead to an increased risk that an individual will abuse drugs. Additionally, there is a possible connection between education and risk-taking behavior. Less education tends to lead to more risk-taking behavior possibly resulting from a lack of knowledge of the risk or some other factor. Drug use can clearly be classified as a risky behavior; therefore, it is likely that education affects the likelihood an individual will abuse drugs.

Both median household income and the prevalence of poverty in a community are factors that have been seen to be correlated with drug abuse. Research has shown mixed results regarding income and a person's likelihood of abusing drugs. Having a higher income could signify a better quality of life overall, creating less of an incentive to use drugs in the first place. However, it also increases access to drugs, indicating a possible positive correlation

between income and drug abuse. Community poverty has been shown to increase the odds of a person abusing drugs. Furthermore, the National Institute on Drug Abuse identifies community poverty specifically as a risk factor for addiction⁵.

Being uninsured is expected to increase an individual's chances of abusing drugs. The rationale behind this is that insurance would allow a person to access resources regarding their health that could prevent them from initially developing an abusive relationship with drugs or aid in treating an already developed addiction. Lack of insurance could also be a source of stress in an individual's life, increasing the likelihood they will adopt a negative coping mechanism such as drug use.

Finally, unemployment is expected to have a positive correlation with drug abuse. As mentioned, drug abuse and addiction are often associated most with those who are disadvantaged and struggling in their daily life. Being unemployed is a large source of stress for many people and can lead to an overall decrease in the quality of one's life. Therefore, it would be accurate to propose that employment status plays a role in determining a person's risk of abusing drugs.

4. METHODOLOGY

In its implicit form, the regression model is written as follows:

Deaths = f (ED, I, PL, UI, unUR).

From this, the variables are defined as

Deaths = Number of unintentional drug poisonings (overdose) in a county per 100,000 people.

The percentage of adults (age 18 and above) with a high school degree or less per county (ED).

The median household income per county (I).

The percentage of the population who fall below the poverty line per county (PL).

The percentage of the civilian non-institutionalized population that is uninsured per county (UI).

The percentage of the population (age 16 and above) who are unemployed per county (unUR).

To determine the most appropriate functional form, an initial estimation was made using a linear model. A two-factor Ramsey Reset test was then performed on this model to determine its effectiveness. The results of this test in Table 1 served as an indication that the linear model is not sufficient and the multivariate relationship would be explained by a non-linear model. Therefore, the following equation is proposed.

$$Death = \alpha ED^{\beta_1} I^{\beta_2} PL^{\beta_3} UI^{\beta_4} unUR^{\beta_5} e^u \quad (1)$$

The definition of each variable is denoted as described below:

ED = The percentage of adults (age 18 and above) with a high school degree or less per county.

I = The median household income per county.

PL = The percentage of the population who fall below the poverty line per county.

UI = The percentage of the civilian non-institutionalized population that is uninsured per county.

unUR = The percentage of the population (age 16 and above) who are unemployed per county.

u = The random regression error term.

α = Model coefficient used to account for the total effect of variables not included in the model.

To estimate the model given in Equation 1, we take the natural logarithms of both sides of the equation to transform the model to a linear form as in Equation 2.

$$LN(Death) = LN\alpha + \beta_1 LNED + \beta_2 LN(I) + \beta_3 LNPL + \beta_4 LNUI + \beta_5 LNunUR + u \quad (2)$$

Estimated β coefficients are the elasticities of Death with respect to each model variable. In the next section, we present and discuss the empirical findings of the paper.

⁵ <https://www.drugabuse.gov/publications/drugs-brains-behavior-science-addiction/drug-misuse-addiction>

5. EMPIRICAL RESULTS

Column (1) in Table 1 presents the ordinary least squares (OLS) estimation of Equation 1 in linear form. The F statistic of 2.24 indicates that the model is significant at the 10 percent level. The value of R-squared is 0.148, which shows that the model explains only a small amount of the variance in the dependent variable. However, it is well known that the R-squared of regressions based on cross-sectional data tend to be low. In the context of this model, only the level of community poverty and income are indicated to be significant. Income is significant at the 1 percent level with community poverty being significant at the 5 percent level. It is possible that variables UI, unUR, and ED are collinear with income and PL, which may explain their statistical insignificance. The Breusch-Pagan-Godfrey (B-P-G) test was used on the linear model to test for heteroskedasticity. The test resulted in a chi-square statistic of 4.77 with a corresponding p-value of .44. These values indicate that the null hypothesis of homoscedasticity should not be rejected. Therefore, the linear model does not suffer from heteroskedasticity.

While the results of the linear model appear promising, performing a Ramsey RESET two-factor test indicates that the linear functional form may not be the most suitable model of Equation 1. The Loglikelihood ratio is 6.010 and is significant at the 10 percent level. Therefore, the nonlinear functional form is statistically preferable to the linear form of the model. In the remainder of the analysis we present the OLS estimation results of variations of Equation 2.

To bolster the dependability of the estimation results of the nonlinear estimation, we repeated the B-P-G test for Equation 2. The chi-square statistic for this model was found to be 1.46 and had a corresponding p-value of .69. Just as with the linear model, these results indicate that the null hypothesis of homoscedasticity should not be rejected. Ultimately, this model also does not suffer from any issues relating to heteroskedasticity.

Table-1. OLS estimation results of alternative formulations of Equation 1.

	(1)	(2)	(3)
	Log-Linear Equation 2	Log-Linear Equation 2	Log-Linear Equation 2
Dependent Variable: Death			
Intercept	-639.453 ^a (237.586)	Intercept 51.317 ^a (9.924)	52.915 ^a (9.621)
ED	240.218 (215.335)	LN(ED) 0.917 (0.619)	0.990 ^c (0.591)
I	0.007 ^a (0.002)	LN(I) 5.091 ^a (1.003)	5.698 ^a (0.976)
PL	1236.793 ^b (551.468)	LN(PL) 2.193 ^a (0.559)	2.402 ^a (0.489)
UI	-73.784 (424.782)	LN(UI) -0.033 (0.239)	
unUR	454.247 (1010.817)	LN(unUR) 0.341 (0.442)	
F	2.238 ^c	7.280 ^a	12.095 ^a
R ²	0.148	0.362	0.354
B-P-G	4.711		
RESET (LR)	6.010 ^b		

Notes: Columns (1) reports the estimation results of a linear functional form of Equation 1. Columns (2) and (3) report the results of the variations of Equation 2 estimated by the OLS. B-P-G stands for the Breusch-Pagan-Godfrey Lagrange Multiplier (LM) test of Heteroscedasticity.

^a significant at 1% level, ^b significant at 5% level, ^c significant at 10% level.

Column 2 of Table 1 shows the OLS estimation results of the Equation 2. The F statistic is 7.25 and shows that the model is significant at the 1 percent level. The value of R-squared is 0.36. Once again, variables ED, UI and unUR are not statistically significant, possible due to being collinear with income and PL variables. The variance inflationary factor (VIF) for the regression of unemployment rate on the remaining model explanatory variables is 1.90. While this value is less than 5 as suggested by Snee (1973) it is higher than 1, indicating some

degree of multicollinearity among explanatory variables. Therefore, we delete UI and unUR, but retain ED because many past researchers have indicated that this variable may be associated with substance abuse.

Deleting both the insurance and employment variables, the nonlinear functional form was estimated again with the remaining variables. OLS estimation results of this attempt are reported in column (3) of Table 1. This estimation produced a F statistic of 12.095 with an associated p-value that indicates the model is significant at the 1 percent level. The value of R-squared is .35 again showing that removing the insignificant variables had little effect on the explanatory power of the model. Both income and community poverty are shown to be significant at the 1 percent level with education being significant at the 10 percent level.

Looking at the coefficients specifically, income is shown to increase the incidence of accidental drug overdose in the sample. A one percent increase in income leads to an almost 6-fold increase in the incidence of drug abuse in this sample. The next variable with a large impact on substance abuse is the poverty variable. Drug abuse rises by 2.5 percent for a one percent increase in this variable. This finding corroborates those of Galea and Vlahov (2002) among others who conclude that individuals who belong to poor communities are likely to end up abusing drugs.

Education variable leads to the least percentage increase in drug abuse. However, the higher percent of individuals in a community with educational attainment of a high school degree or lower is positively correlated with accidental drug overdoses. These findings confirm the findings of Humensky (2010) and Patrick et al. (2012) among others.

To further establish the robustness of the findings of the paper and investigate the interaction among the model variables, we estimate two more variations of Equation 2 by accounting for the interaction between education and income, and education and being under poverty line. For instance, it is conceivable that belonging to a poor community and low education attainment may be associated with drug abuse in the sample. We form two interaction variables, ED*PL and ED*I and re-estimate Equation 2 by including these interaction variables one at a time.

Table-2. OLS estimation results of alternative formulations of Equation 1.

(1)	(2)		
Log-Linear Equation 2	Log-Linear Equation 2		
Dependent Variable: Death			
	Intercept	-52.775 ^a (9.448)	53.816 ^a (9.857)
	LN(I)	5.668 ^a (0.932)	5.780 ^a (0.998)
	LN(PL)	1.839 ^a (0.842)	2.359 ^a (0.488)
	LN(ED*PL)	-0.489 ^c (0.276)	
	LN(ED*I)		0.091 ^c (0.053)
F	12.257 ^a		12.129 ^a
R ²	0.357		0.355

Notes: Columns (1) reports the estimation results of a linear functional form of Equation 1. Columns (1) and (2) report the results of the variations of Equation 2 estimated by the OLS. a significant at 1% level, b significant at 5% level, significant at 10% level.

Column (1) and (2) in Table 2 are variations of Equation 2 that include the interaction of education and community poverty and education and income, respectively. The results reported in Table 2 are qualitatively similar results to those in Table 1. However, the interaction between ED and PL is negative and statistically significant. This finding suggests that even educational attainment at the high school level may lower incidence of drug abuse in poor communities. In all cases reported in Table 1, belonging to poor communities was positively associated with higher incidents of drug-related death. A plausible explanation is that even low levels of education in poor communities may help community members explore various sources of public assistance and social safety

networks that are available. This finding supports observations of Palamar and Ompad (2014) regarding the positive role of education in the mitigation of drug abuse.

The model also has an R-squared value of 0.357, which is not largely different than the R-squared value of the original nonlinear estimation. Including the interaction variable, the significance of income and poverty variables do not change as they remain significant at the 1 percent level and maintains a positive relationship with accidental drug overdoses. However, the interaction variable for education and community poverty is also significant at the 1 percent level. The interaction between educational attainment and level of community poverty leads to a decrease in accidental drug overdoses in the sample as shown by the negative and statistically coefficient for the interaction variable in column (1).

Column (2) of Table 2, reports regression estimation results that includes the interaction between education and income level. A possible interaction between educational and income was estimated within a nonlinear model that also included the variables of community poverty and income alone. The estimation outcomes remain robust and qualitatively like those in Table 1. Specifically, the F statistic is significant at the 1 percent level. The value of R-squared is 0.355, roughly the same as in Table 1, indicating that the inclusion of the interaction variable does not have a large effect on the model's explanatory power. Both income and community poverty are found to be significant at the 1 percent level. The overall effects they had on accidental drug overdoses is the same as the ones reported in Table 1. The added interaction variable for educational attainment and income is significant at the 10 percent level. This shows that the interaction between income and percent of adults with a high school degree or less is positively correlated with accidental drug overdoses within the context of this model. Thus, low educational attainment, for high income communities is positively associated with incidents of death related to drug abuse.

The signs and statistical significance of the interaction of low education with belonging to poor communities on the one hand, and higher median communities on the other, shed light on the role of education for policy makers. For instance, raising community awareness regarding adverse effects of drug abuse via special publications or websites and making these resources easily accessible in poor communities, may offer an efficient and effective intervention mechanism.

It stands to reason that if the interaction of higher income and low education attainment is positively associated with drug abuse and resulting deaths, public funds may be well spent to target raising awareness and public education in higher median income communities. The signs and significance of the interaction of poverty and income with education indicate that more education, even informal community education, may be needed in both high income and poverty-stricken communities to rid them of high human and economic costs of the scourge of drug abuse.

6. SUMMARY AND CONCLUSION

This paper examines the relationship between drug abuse and a set of socioeconomic variables. To accomplish this goal, a multivariate regression model was estimated. This topic has been researched in the past; however, the focus of the present research is on socioeconomic variables that may be associated with substance abuse. The sample data includes seventy observations at the county-level from every state in the U.S., excluding Maryland and North Dakota. The data for the study were collected from the U.S. Center for Disease Control and the U.S. Census Bureau. The socioeconomic variables analyzed in the model are education, median household income, community poverty levels, insurance status, and employment status. These variables were chosen based on their use in previous studies and their identification as possible risk factors for drug abuse. The income, education, and community poverty variables all had significant effects on the number of unintentional drug poisonings (overdoses) in a county in our sample. Income is shown to have the largest effect followed by community poverty and then education. Neither insurance status nor employment status were found to have significant effects.

In relation to accidental drug overdoses, income is shown to have a significant positive relationship. For example, a one percent increase in income is associated with a roughly 5.70% increase in the number of unintentional drug poisonings (overdoses) within a county. The discovery that income has a large positive correlation with overdoses challenges previous claims that having a higher income decreases a person's likelihood of abusing drugs.

As mentioned, drug abuse is often associated with individuals who are disadvantaged and struggling in their life. The assumption is made that having a limited income can serve as a source of stress for many people which could, in turn, influence them to begin to abuse drugs. However, the results of this study indicate that there is reason to believe that income can play a different role in relation to drug use. Having a higher income allows an individual to have greater access to drugs in general. Because purchasing them becomes less of a financial burden due to a higher income, there is an increased risk that an individual will begin to abuse drugs. These findings highlight a blind spot in the current understanding of risk factors for drug abuse. If the goal is to reduce drug abuse overall, more attention should be shifted towards income's effect on accessibility of drugs as it appears to play a significant role in drug use.

Following income, community poverty has the next largest effect on instances of accidental overdoses in the sample. An increase of one percent of the people in a county who fall below the poverty line is associated with an approximately 2.40% increase in the number of unintentional drug poisonings (overdoses). These results are consistent with previous findings on community poverty and drug use, as well as, the identification of community poverty as a risk factor for drug abuse. The level of community poverty in a certain location plays an important role in defining the environment within which an individual exists. High levels of community poverty can limit access to social support systems that serve to provide individuals with emotional and other kinds of support. If this support is lacking, people can turn to alternative methods to deal with stress in their daily lives, such as drug usage. Additionally, high levels of poverty in a community can be related to the availability of important social services. This can lead to limited access to services that are intended to provide necessary help and assistance to struggling individuals. Without these necessary resources, people in a community may be unable to receive the resources that could prevent the development of a drug abuse issue or be used to treat an existing one.

The education variable in this model was found to be statistically significant and positively associated with the number of overdoses in a county. For instance, a one percent increase in the percent of adults with a high school degree or less is associated with a .99% increase in the number of accidental overdoses. These results are not surprising as lower educational attainment has often been cited as an important risk factor that needs to be considered when looking at drug abuse. A higher level of education implies that an individual has had the opportunity to learn more of the necessary skills that they need to assess risk and make well thought out decisions. Therefore, it is conceivable that a person with a lower level of education would be more prone to risk-taking behaviors such as drug usage.

Examining the interaction between education levels in counties and income and poverty levels indicates that encouraging higher levels of education for both higher income and poor communities may be beneficial in reducing drug abuse and its consequences. The policy ramifications of these findings are notable. Perhaps in the short-run drug related information can be made accessible through community centers, community clinics, and religious temples.

Our paper provides an updated look at a set of socioeconomic variables and their relationships with drug abuse. The results of this study can be used to reevaluate the most important risk factors for drug abuse and the way in which an individual's socioeconomic status can influence their drug usage. Drug abuse and addiction are shown to have a significant negative impact on a person's life and the country. Having a better understanding of the role of socioeconomic factors and their relationships with drug usage can aid in formulating policies and actions directed towards mitigating the harm that drug abuse has on the individual and societal levels.

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