The Effect of Strict Alcohol Policies on America's Sexually Transmitted Disease Rates

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ABSTRACT

This paper was created to investigate the role that alcohol policies play on America's sexually transmitted disease (STD) rates. Alcohol consumption has been linked with risky sexual behavior and poor decision making. Risky sexual behavior includes multiple sex partners and unprotected sex; both enhancing the probability of contracting an STD. Enforcing strict alcohol policies may reduce or help control the chances of this event from occurring. This paper attempts to locate the relationship between alcohol policies (alcohol tax, legal drinking age and blood alcohol concentration level) with STD rates, specifically Gonorrhea and Chlamydia, of 15-24 year olds in America for the year 2008.

INTRODUCTION

Sexually transmitted diseases have been uncovered for many years, yet the exchange from one person to another still exists. According to the Center of Disease Control and Prevention, in 2008, just in America alone, there are over 300,000 reported cases of gonorrhea and over 1.2 million reported cases of Chlamydia. In both instances, age groups 15-19 and 20-24 were held accountable for the majority of these cases, by overwhelming percentages. The concentration of this study is placed upon youths and young adults, because they face this higher risk then any other age group. Incidence rates of Chlamydia and gonorrhea – the two most common reportable STDs—are highest among American teenagers and young adults (Grossman, Kaestner and Markowitz, 2004). This is quite alarming since antics such as sexual education, television/radio commercials promoting safe sex with condoms, awareness and unlimited amount of information is set out to educate the youth of America; yet, decades after STDs were first discovered, individuals are still practicing unsafe sex and endangering themselves and others.

One major cause could be due to alcohol consumption and the risks that come along with drinking alcohol. Consuming alcohol increases the chances of experiencing unprotected sex and multiple sexual partners. The amount one consumes at one time and how frequently the alcohol is being consumed, can either increase or decrease the probability of having risky behavior even occur. Specifically, having 10 drinks a day on average results in roughly a 60% increase in the probability of possessing multiple partners within the past year (Luong). Consequently, the relationship between the amount of alcohol consumed and the frequency of engaging in sexual relations will have a positive relationship.

Behavioral economics explains such irrational actions of unprotected sex or having multiple partners, as a result of temptation. Something is considered 'tempting' when more of 'it' (whatever 'it' may be, in

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this instance, sexual activity) is consumed in a state of arousal (hot state) then in a rational state (cold state). For most of us, however, self control issues arise because we underestimate the effect of arousal (Thaler and Sunstein, 2009).Behavioral economist George Loewenstein refers to this as “hot- cold empathy gap”. Hot and cold empathy gap is when an individual in a cold state downplays the significant changes in characteristic traits, like desires and behaviors, once they find themselves in a ‘hot’ state. Temptation for sexual activity can also be stimulated or enhanced with the consumption of alcohol; which faces its own temptation. When alcohol is present, temptation for sexual activity and risky behavior prevails.

Measures can be taken to help reduce the risk of alcohol consumption and the risky behavior associated with it. One way is to try to limit the amount of alcohol one is willing consume at one time. This could be done by raising the taxes, which will raise the total price. In theory, as prices increase and disposable income is held constant, consumption should decrease. This tends to happen, because the new increased priced item will take more out of the disposable income, leaving less available funds for other goods and services. Then the individual has to assess where their greater personal utility lies; between the alcohol and the other item/s. A plausible relationship between higher alcohol taxes and the incidence of sexually transmitted diseases is predicted on a positive correlation between STDs, risky behavior, and alcohol consumption (Luong). Therefore, if overall prices are increased, consumption will fall, resulting in a lower probability that the individual will result to risky sexual behavior. Lowering the chances of risky behavior from occurring will ultimately lower the likelihood of contracting or spreading a sexually transmitted disease.

Another action that can potentially lower the rate of STD’s in America due to alcohol consumption is increasing the legal age limit on purchasing alcohol. This could decrease the availability to minors by decreasing the chances of obtaining and consuming the alcohol. If less people have the ability and the right to purchase alcohol, then theoretically, there should be less alcohol being purchased, distributed and consumed. If there is less alcohol in circulation, then the probability of minors engaging in unprotected sex with multiple partners *should* decrease. The problem here, however, is it’s difficult to determine if alcohol is the reason for casual intercourse among the youth or if these acts are occurring just as frequently in a sober manner as well.

Other economic factors that can influence alcohol consumption, for better or for worse, are household incomes, unemployment, and the gross domestic product (GDP) of the state. If these issues are playing a negative role (having little or no income due to lack of productivity) in a majority of people’s lives, this could cause people to consume alcohol. According to PeaceHealth, a medical group of the northwest region, low income populations are at a higher risk of abusing alcohol more frequently. Individuals with more stress and lower incomes tend to consume alcohol, smoke cigarettes and result to substance abuse over people who are middle class or above.

LITERATURE REVIEW

SEXUAL ACTIVITY DUE TO ALCOHOL CONSUMPTION

There have been numerous studies done on the relationship between teen-young adults binge drinking and sexually transmitted diseases, due to unsafe sexual practices. Researchers on this subject matter have mostly found a direct, positive correlation between consumption and sexual activity that has the possibility of leading to sexually transmitted diseases. For example, Graves and Leigh (1995) show that young adults who drink heavily are more likely to be sexually active and to have multiple partners, and those who are heavy drinkers are also less likely to use condoms (Grossman, Kaestner, Markowitz, 2004). This research suggests that in a [hot] state of drunkenness, peoples actions are less thought out and often more impulsive (then in a cold state), leading to irresponsible actions.

An experiment was conducted by Leif Crowe and William George to observe the effects of alcohol consumption on human responses to sexual stimuli. The results showed that alcohol and sexual inhibition was both psychological and pharmacological; meaning that alcohol alone and learned expectancies about alcohol made up a major role in the sexual activity under the influence. Thus, there is scientific basis for the belief that alcohol consumption might increase the likelihood of participating in a risky sexual encounter (Chesson, Harrison, Kassler, 2000).

ALCOHOL TAXES: THE EFFECT ON CONSUMPTION AND SEXUAL ACTIVITY

Taxes on alcohol, including beer, liquor, and wine influence prices and peoples decisions on their purchases. This is based on the theory that higher prices will result in lower consumption and vise versa. In order to enforce a stricter alcohol policy, raising the alcohol tax can have a positive influence on lowering the probability of individuals acting on risky sexual behaviors, which could lead to STDs.

According to research done in Canada by May Luong on sex, teen pregnancies, STDs and beer prices, increasing beer taxes by $1 has made a major impact in the reduction or gonorrhea and syphilis rates. Specifically, employing cross-state data from 1981-1995, they find a $1 increase in the per gallon beer tax to be correlated with 25.4% and 93.3% reduction in all-age gonorrhea and syphilis rates, respectively (Luong). This shows how a small marginal increase in the total price of alcohol, can have a significant impact on STDs by showing a decline in the consumption of alcohol first.

A similar research that was done in America by Harrell Chesson, Paul Harrison and William J. Kassler, had very comparable outcomes to the research that was done by Luong in Canada. However, instead of using such a large time frame, the American study was done on an annual basis and used both liquor and beer tax in the analysis. They estimated that a $1 increase in the per-gallon liquor tax reduces gonorrhea rates by 2.1 percent and a beer tax increase of $ .20 per six-pack reduces gonorrhea rates by 8.9 percent, with similar though more pronounced effects on syphilis rates (Chesson, Harrison, Kassler, 2000).

LEGAL AGE LIMIT

There have been many disputes and much controversy over what the legal drinking age should be in America. A few decades ago, the drinking age was 18 years old; then jumped right up to 21 years of age. Even though this might have upset a good amount of the population, the 3 year change has proven to be a good decision; at least in the terms of gonorrhea rates. A report by Chesson (2000) reports that raising the age limit lowered gonorrhea rates for ages 15 to 19. In addition, the authors find that a one year increase in the minimum legal age is associated with between a 6.5 to 8% fall in gonorrhea rates among 15 to 29 year olds (Luong). It's assumed that reducing the amount of alcohol that's allowed to be purchased would result in less alcohol winding up in the hands of minors. Other studies, focusing on America's youth, show responsiveness to both the age limit and the zero tolerance laws.

DATA

For this regression model, a cross sectional analysis of the United States was applied for the year 2008. The independent variables consisted of beer tax, liquor tax, wine tax, and the percent of the population that's legally allowed to purchase and consume alcohol. Also, I factored in the economic stress (that could lead to alcohol consumption) of unemployment rate and earnings per capita, of each state. The dependent variables are gonorrhea and Chlamydia rates per 100,000. Therefore:

$F(G,C)= \alpha + \alpha 1B + \alpha 2L + \alpha 3W + \alpha 4P + \alpha 5U + \alpha 6\ EPC.$

G = gonorrhea **W =** wine tax

C = Chlamydia **P =** percent of legal consumption age

B = beer tax **U =** unemployment

L = liquor tax **EPC =** earnings per capita

The rates were based on ages 15 to 24, because they are the highest rate of new reported cases in both categories. Gonorrhea and Chlamydia were both used because they are the highest reported as well. The taxes on beer, wine, and liquor are all based on a per gallon addition. Below, you will find the data on 45 out of the 50 states. The missing states include Nevada, Oregon, Texas, Utah, and Wisconsin. These states were left out due to missing data reports in the independent variables.

The descriptive statistics show that the mean for each variable and the standard deviation (SD), which is a measure of how spread out the numbers are. Gonorrhea and Chlamydia have means of 96.6 and 388.8, and standard deviations of 64.5 and 118, respectively. As far as independent variables are concerned liquor, wine, and beer taxes have means of $5.82, $0.77, and $0.27 and standard deviations of $4.51, $0.51, and $0.25, respectively. The mean of the percent of legal age- consumers is 73.15%, unemployment has 5.29% and earnings per capita are $39,378. Their standard deviations are 1.47%, 1.23% and $5,952, respectively.

REGRESSION MODELS

Gonorrhea Regression Results

Regression Statistics	
Multiple R	0.649643
R Square	0.422036
Adjusted R Square	0.330779
Standard Error	52.78839
Observations	45

	df	*SS*	*MS*	*F*	*Significance F*
Regression	6	77323.2	12887.2	4.624681	0.001283
Residual	38	105891	2786.614		
Total	44	183214			

	Coef.	*Std Err*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	1201.14	411.50	2.9189	0.005874	368.101	2034.1	368.10	2034.18
Spirits Tax (Per Gallon)	3.57872	2.0813	1.7194	0.0936	-0.6347	7.7922	-0.63477	7.79223
Table Wine Tax (Per Gallon)	-9.3478	21.950	-0.425	0.6726	-53.784	35.088	-53.7844	35.0887
Beer Tax (Per Gallon)	-5.02812	46.626	-0.107	0.9146	-99.417	89.361	-99.4176	89.3613
% allowed to consume alcohol	-15.4291	5.6893	-2.711	0.0099	-26.946	-3.9116	-26.9466	-3.91162
Unemployment Rate	20.9808	7.4306	2.8235	0.0075	5.93832	36.023	5.93832	36.0234
Earnings per Capita	-0.00252	0.0014	-1.785	0.0821	-0.0053	0.0003	-0.00538	0.00033

Based on these results the equation for gonorrhea would be:

$$G = 1201.145 + 3.58L - 9.35W – 5.03B -15.43P + 20.98U – 0.002EPC$$

This indicates that wine tax, beer tax and earnings per capita have a negative correlation; which was predicted to happen. This implies that as these taxes and earnings per capita grow, the rate of gonorrhea will decrease. Unemployment had a positive correlation(as expected) indicting that as the unemployment rate increases, so does the gonorrhea rate. Liquor tax and the percent of legal aged consumers had unanticipated results. Liquor tax implies that as the taxes increase the rate of gonorrhea will rise as well. This could be indicating that individuals are purchasing a higher proof liquor to make up for the extra addition on price. The percent of legal aged consumers suggests that as the percentage of legal drinkers grows the lower the rate of gonorrhea will be.

The astonishing part is with 91% confidence that the liquor tax and 99% confident the percent of legal aged consumers, has great significance on the rate or gonorrhea. In addition, wine tax and beer tax hold barely any significance at all. The most significant (and without unusual results) is the unemployment rate with 99% confidence that it is relevant to the overall rate. According to the adjusted R-Squared, the independent variables presented explain 33% based on the dependant variable (gonorrhea). *Since wine tax and beer tax obtain low significance the new equation would be:

G = 1201.145 + 3.58L -15.43P + 20.98U – 0.002EPC

Next we will analyze how the same independent variables affect the rate of Chlamydia in the United States for the year 2008.

Chlamydia Regression Results

Regression Statistics	
Multiple R	0.611802
R Square	0.374302
Adj R Square	0.275508
Stand. Error	100.9222
Observation	45

	df	*SS*	*MS*	*F*	*Significance F*
Regression	6	231533.8	38588	3.788698	0.004695
Residual	38	387040.7	10185		
Total	44	618574.5			

	Coef.	*Std Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	2837.3	786.72	3.60	0.001	1244.729	4429.99	1244.729	4429.995
Spirits Tax (Per Gallon)	-0.185	3.979	-0.04	0.963	-8.240	7.871	-8.240	7.871
Table Wine Tax (Per Gallon)	9.909	41.966	0.23	0.815	-75.046	94.863	-75.046	94.863
Beer Tax (Per Gallon)	61.149	89.141	0.68	0.497	-119.307	241.606	-119.307	241.606
% Legal Age	-34.34	10.877	-3.15	0.003	-56.361	-12.322	-56.361	-12.322
Unemployment Rate	23.202	14.206	1.63	0.111	-5.557	51.960	-5.557	51.960
Earnings per Capita	-0.002	0.003	-0.7	0.444	-0.008	0.003	-0.008	0.003

Based upon these results the equation for Chlamydia rates would be:

C = 2837.36 – 0.185 L + 9.91W + 61.149B -34.34P +23.2U -0.002EPC

In this situation, liquor tax, unemployment rate and earnings per capita had expected results. Liquor tax and earnings per share have a negative relationship with Chlamydia rates (as they raise, Chlamydia rates decrease). Unemployment had a positive relationship where Chlamydia rates increase when unemployment increases. Wine tax, beer tax, and percent of legal aged consumers had unexpected results. Wine and beer tax both shared a positive relationship; implying that they both increase the rate instead of lowering it as predicted. However, none of the explained variable have any true significance, except for the percent of legal aged consumers. With 99% confidence, the percentage has a significant impact on the Chlamydia rates; as the pool of legal aged drinkers increase, the number of Chlamydia cases decrease. The R-Square implies that 37% of the dependent variable is being explained.

Since all of the dependent variables, besides the percent of legal aged consumers, are under 90% confidence levels, they get dropped from the equation; making the new Chlamydia equation:

C = 2837.36 -34.34P

CONCLUSION

This study was done to test the effectiveness of stricter alcohol policies on the United States sexually transmitted disease rates; specifically gonorrhea and Chlamydia. What we found was unpredicted and, for the most part, somewhat surprising. Both gonorrhea and Chlamydia used the same independent variables for their separate analysis (beet tax, liquor tax, wine tax, percent of legal aged consumers, and stress variables of unemployment and earnings per capita), but received very different results. Gonorrhea was affected significantly by liquor tax, unemployment rates and earnings per capita. This indicates that both alcohol policies and economic stress pay a part in determining the gonorrhea rate. Chlamydia was only correlated with age limit; however, in a different manner then predicted. This indicates that the higher the percent of legal drinkers, the lower the rate of chlamydia will be. This could be implying that the legal age limit should either stay where it is or even become lower. If it's lowered, the percent of legal aged consumers would increase, which should result in lower rates. This could also suggest that raising the age limit has led to underage binge drinking. However, these assumptions would need further investigation.

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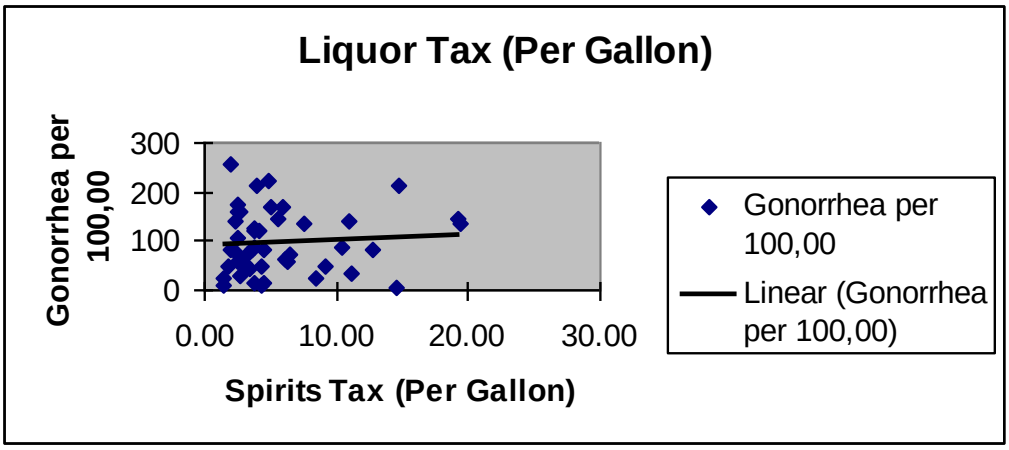
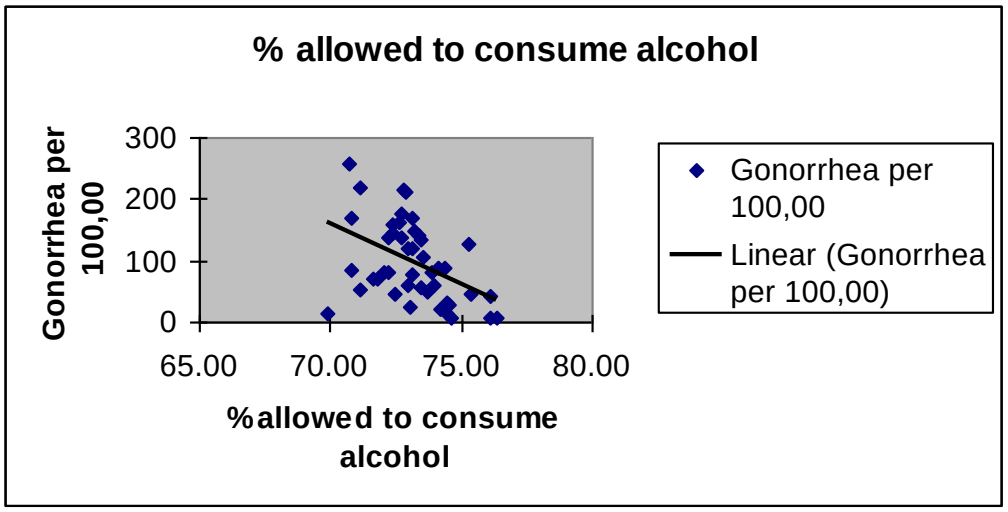
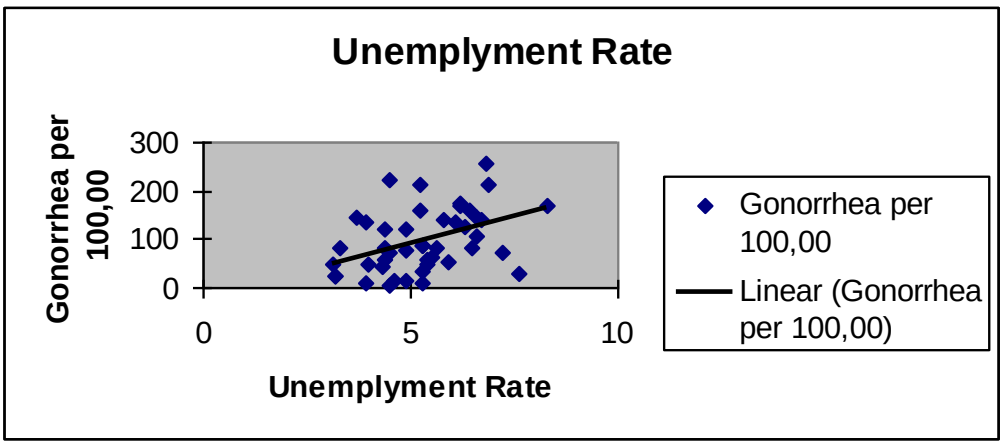
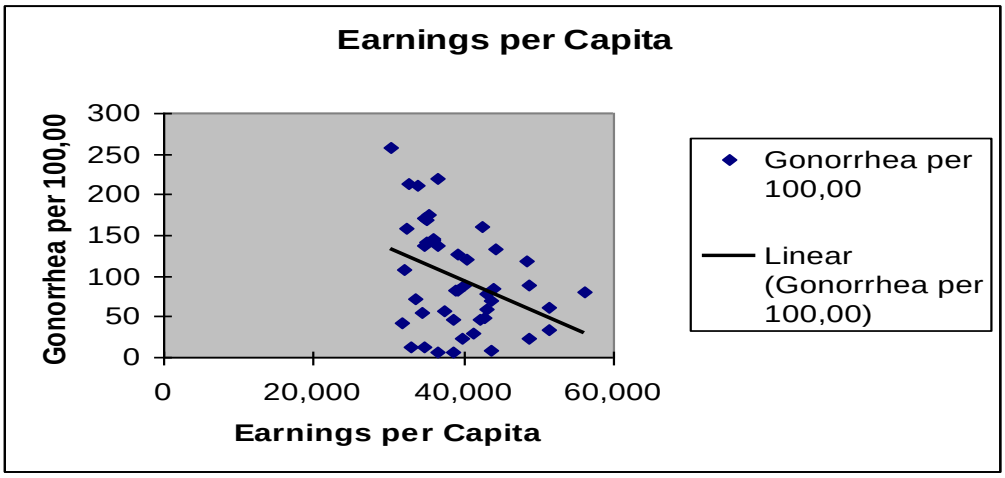
APPENDIX

GONORRHEA CHARTS









CHLAMYDIA CHARTS