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STD Rates in Pennsylvania: An Investigation of Several Factors

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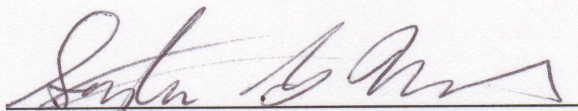
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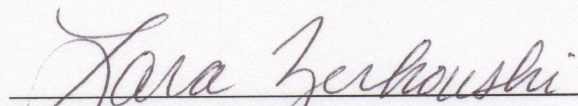
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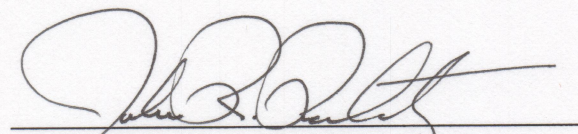
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STD RATES IN PENNSYLVANIA: AN INVESTIGATION OF SEVERAL FACTORS

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Rates in Pennsylvania: An Investigation of Several Factors

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STD Rates in Pennsylvania: An Investigation of Several Factors

While sexual activity in American teens is similar to that in other developed nations (Darroch, *et al.*, 2001), the rates for pregnancies, abortions, and sexually transmitted diseases (STD) are the highest in the U.S. among developed nations (Singh and Darroch, 2000) with over 3 million Chlamydia and 650,000 gonorrhea infections each year (Lenore *et al.*, 2006). The reason for this is unknown since the American College of Obstetricians and Gynecologists and other world leaders in public health have been advocating a more comprehensive instruction on health education programs for more than thirty years (American Public Health Association, 2006). One reason may be that in the U.S., abstinence is often viewed as the only acceptable form of sexual education so that in 1996 alone, over one billion dollars were invested by the federal US government and individual states to encourage abstinence-only programs (Kirby, 2006). A school's program was required to follow strict guidelines if they wished to receive federal funding. The Personal Responsibility and Work Opportunity Reconciliation Act (1996) states that these curriculums had to promote "...a mutually faithful monogamous relationship in the context of marriage as the expected standard of human sexual activity... (pg. 250)" which implies that there were religious motives behind these proposals.

More recently, teens and parents together have taken an active role in sexual education (Whitaker and Miller, 2000) and have pressured schools to enforce sexual education (Welshimer and Harris, 1994). Moreover, Lindau and her colleagues (2008) propose that children receiving sexual education as mandated by schools should receive accurate and medical information about STD's, contraception, abstinence, and pregnancy from trained professionals. Some schools have even enacted screening systems as to diminish the prevalence of STD's in the sexual network (Addiss *et al.*, 1993; Mertz *et al.*, 1997). It has been shown that many teens engage in sexual activity with their peers and with those that live in their locality, which helps to perpetuate STD's (Laumann and Youm, 1999; Aral, 1999; Bunnell *et al.*, 1999).

In revamping how sexual education is approached, many schools have instituted new measures so that about 95% of students in public institutes are enrolled in some type of sexual education program (National Center for Education Statistics, 1993). O'Donnel and his colleagues (1998) have found that video-based educational methods are effective in reducing risky behavior and the prevalence of STD's. While their study is useful, this correlation cannot imply causation. Many public schools are using a variety of methods to educate their students such as group discussion, projects, presentations, video methods, the use of textbooks and pamphlets, and lecture. A majority of parents (73%) also support the idea of having contraceptives and sexual education information available at any time through school-based clinics (Louis Harris and Associates, 1988) although funding is limited (Kirby and Coyle, 1997).

Although many of these policies are clearly politically and or religiously motivated, they have not been shown to be any more effective than other types of sexual education. Studies have shown that most individuals become sexually active while in their teenage years regardless of whether or not they took an abstinence pledge (Shafii *et al.*, 2004). Even more interestingly, white individuals who took the abstinence pledge in 1993 with the "True Love Waits" phenomena had higher STD rates than other white students who did not take the pledge because they were less likely to use condoms (Brückner and Bearman, 2005; Bearman and Brückner, 2001).

Even with mandated sexual education in public schools, many groups show differences in STD rates which may or may not be related to education. On a consistent basis, minority groups, specifically those being categorized as black have had the highest STD rates – gonorrhea rates are 31 times higher than that of whites (Division of STD Prevention, 1997) – because they tend to have a higher occurrence of risky tendencies (Ellen *et al.*, 1998, Laumann *et al.*, 1999; Aral, 1999). Another reason for this may be attributed to the common belief that all contraceptives will prevent STD infection and it has been shown that blacks and Hispanics more often use implant or injection contraceptives which do not offer the physical barrier that prevents many sexually transmitted infections and diseases (Piccinio and Mosher,

1998). Defining ethnicity is complicated since there are innumerable differences that define groups such as socioeconomic status (Kreiger *et al.*, 1997; Williams, 1997; Kaufman and Cooper, 1999), history Thomas and Thomas, (1999), racism (Jones, 2001), and access to medical services (Anderson *et al.*, 1994). Another issue that arises is that there are issues dealing with problems associated with ethnicity which are often falsely attributed to minority groups.

Unfortunately, because sexual education is not mandated in Pennsylvania schools (Clegg, 2009), the content is often variable and inconsistent. While states are revamping their previous instruction in trying to integrate a balance between abstinence and medical facts (Gold and Nash, 2001), there is no regulation. In this study, I analyzed the relationship between median income, STD rates, educational achievement, and racial population across all Pennsylvania counties. Furthermore, I wanted to focus on three counties to examine how the method of education students about STD's differed between the three counties. I assessed the proportion of children that obtained a high school education which include religious based schools and based part of my analysis on this. I propose that areas with more educational programs will have lower STD rates and that, in accordance with O'Donnel *et al.* (1998), and that video as the main education form will yield the best results. I also propose that within Pennsylvania, abstinence education is more widely taught than the education of STD's. For those schools that taught only abstinence I propose that these schools within the designated counties will have higher rates of STD's than those who taught STD education.

Methods

I initially contacted every public school in the three counties Berks, Montgomery, and Philadelphia. I first contacted the secretary to see who controlled the curriculum (such as the Vice President) and what was the best way to contact the Vice President or health teachers (either via phone, person, email or fax). I then contacted whomever was in charge in the appropriate fashion and asked several questions as designated in appendix I.

Initially, I called these individuals and left voice messages. After about a week of no response, I sent them emails several times for approximately a month. After no avail, I went to the schools individually and tried to meet with the instructors, often with no results. Out of the 18 public schools in Berks County, I was able to obtain data from 5 of them. Out of the 24 public schools in Montgomery County I was able to obtain data from 1 school. As for the 62 schools in Philadelphia County, I was able to obtain 2 sets of data.

Therefore, data from every county in Pennsylvania were obtained from the PA Department of Health pertaining to STD (Chlamydia, gonorrhea, and syphilis) case rates and ethnicity. Further data was obtained in the amount of education that was completed by each race as well as their income. These data were then analyzed using Analysis of Covariance. The census data were converted to proportions to obtain the proportion of each county's population that received less than a high school education, high school education but no college degree and those that obtained an associate's or higher degree. Using these percentages and the median income for each county as covariates, I ran an ANCOVA to test for differences between the races (black, white and Hispanic) in the total STD rate (rates of Chlamydia, gonorrhea, and syphilis summed). County was used as a blocking variable. Factors were considered significant at the $p = 0.05$ level. Each STD was also analyzed separately. Finally, a simple correlation was performed to see which variables were correlated for the entire data set and for each race independently. It can be noted that we treated cases independently when we examined total STD and therefore these numbers may be slightly inflated.

Results

Blacks displayed the highest case rate for the sum of all STD's while whites displayed the lowest case rates for the sum of all STD's. Blacks consistently had the highest mean for gonorrhea, Chlamydia, and syphilis case rates while whites consistently had significantly lower means (Table 1).

The ANCOVA revealed that total STD rates differ between races, $F(2, 129) = 53.88, p < 0.01$. Furthermore, the ANCOVA demonstrated that the amount of education does not affect STD case rates. There was, however, a significant difference between median income for each race which suggests that STD rate is more dependent on income level than on education. A series of Pearson correlations revealed that all of the case rates of Chlamydia and gonorrhea combined (regardless of race) are significantly negatively correlated with median income, but this not true for blacks or whites taken separately.

Another ANCOVA studying the total summed STD's revealed that the percentage of the county that received less than a high school education does not significantly affect STD rates, $F(1, 129) = 3.11, p = 0.07$. Another ANCOVA further supported that education does not affect STD case rate in that individuals who have completed high school do not affect the total summed STD case rates, $F(1, 129) = 0.40, p = 0.52$.

In studying the total summed STD's, an ANCOVA revealed that there was a significant difference in STD rates between the blocks (counties), $F(1, 129) = 7.93, p = 0.00$, race (Hispanic, white, and blacks), $F(2, 129) = 53.62, p = .00$, and counties, $F(66, 129) = 1.71, p = 0.00$.

Further analysis via a series of ANCOVA's revealed that gonorrhea may be affected by median income, $F(1, 130) = 7.24, p = 0.00$; race $F(2, 130) = 37.75, p = 0.00$; and county, $F(66, 130) = 1.43, p = 0.04$ but not educational levels (less than high school completed), $F(1, 130) = 1.30, p = 0.25$. Similar findings were also produced in that median income, $F(1, 66) = 5.51, p = 0.02$; race, $F(2, 130) = 47.36, p = 0.00$; and county, $F(66, 130) = 1.83, p = 0.00$ may effect Chlamydia case rates. These variables were not significant in studying syphilis. Figure 1 shows the relationship between race, income and STD rates based on the ANCOVA.

A series of Pearson correlations were conducted in which it was revealed that the entire data set (all races) the rates of Chlamydia and gonorrhea are significantly negatively correlated with median

income, but this not true for blacks or whites taken separately. Gonorrhea and median income were significantly negatively correlated for Hispanics, $r = -0.26$, $p = 0.00$ as was Chlamydia, $r = -0.25$, $p = 0.00$. Chlamydia and no high school diploma were also positively correlated for Hispanics, $r = 0.31$, $p = 0.01$ whereas both gonorrhea, $r = -0.27$, $p = .02$, and Chlamydia, $r = -0.24$, $p = 0.04$, were negatively correlated with median income.

From data discovered from personal surveys, only 6 out of the 18 public schools in Berks County responded. Only 2 out of the 62 schools in Philadelphia responded while 1 out of 24 schools responded in Montgomery county. Many stated that they were uncertain as to how long the sexual education programs have been running for. They also stated that their instruction (primarily lecture) of sexual education normally lasted 1-2 weeks with an emphasis on abstinence. Some schools mentioned that sexual education was presented at various grades (beginning in 5th and ending in 11th) but would not elaborate. Schools gave mixed reviews pertaining to their attendance policy and many were unsure. Most instruction pertaining to sexual education was only 3 hours per week for 2 weeks for a total of 6 hours per year. Many noted that the emphasis of their lecture was on prevention and refused to provide a further elaboration.

Discussion

This study was an attempt to investigate factors such as median income, race, and education and their relation to STD case rates within the 67 counties of Pennsylvania. I found racial (blacks, Hispanics, and whites) differences between overall case rates of the STD's studied (gonorrhea, Chlamydia, and syphilis) as well as differences between each STD. I also found that STD case rates are not affected by the amount of education obtained. In studying median income of all races the rates of Chlamydia and gonorrhea are significantly negatively correlated with median income, but this is not true for blacks or whites when considered separately. Findings also revealed that regardless of the amount of education obtained, these were not correlated to the individual case rates in the counties.

These data are interesting in that they contradict the proposed belief that STD epidemics can be prevented with more general education, not just that of sexual education. Richer counties have more high school graduates and individuals that pursue post secondary education. For example, when the richest and poorest counties in Pennsylvania were compared (Montgomery and Philadelphia), the richest county had 17.3% fewer individuals whom completed less than high school (Economic Research Service, 2000). Although these counties have higher graduation rates, my results suggest that it is the counties income, rather than level of education which contributes more to the rate of STD infection. Therefore, although in Pennsylvania educational funding is provided on a local level (Education Law Center, 2007), increased spending on education due to higher local income in more affluent counties may not directly cause a decrease in STD risk.

There is a significant difference between race and case rates with blacks having the highest case rate regardless of the type of STD. This can be attributed to a variety of factors such as socio-economic condition. For example, minorities typically live in impoverished conditions (Sandefur and Tienda, 1988) which may lead to several causes of increased STD risk. In these conditions, access to medical facilities is scarce and or expensive which can limit the treatment of STD's which can therefore allow for further propagation of the disease (Whitehead, Dahlgren, and Evans, 2001). Minorities are also known to engage in a variety of riskier behavior in contrast to their white counterparts (Frist, 2005). This behavior may lead to the acquisition and propagation of a variety of epidemics including that of STD's.

In studying the type of STD and case rates, Chlamydia yielded the highest numbers. This could be due to a variety of factors such as many individuals do not seek treatment for it since there are often no symptoms for prolonged periods of time (Department of Health and Human Services: Centers for Disease Control and Prevention, 2007). Due to the absence of symptoms, individuals may not seek treatment which may allow for the propagation of the disease. When symptoms do arise, they often

mimic those of other illnesses such as a yeast infection for women or as a urinary tract infection for men in which individuals may seek improper treatments or no treatment at all.

Interestingly, individuals who have gonorrhea also have Chlamydia and frequently acquire gonorrhea after Chlamydia (Department of Health and Human Services: Centers for Disease Control and Prevention, 2007). This may be because symptoms for this disease manifest earlier than those of Chlamydia often after 2-3 days of exposure. Also, gonorrhea symptoms are often specific and are less often mistaken for other illnesses. This may prompt infected individuals to seek the proper treatment more quickly which may inhibit the propagation of the disease. In any such case, further investigation is needed to discuss why there is an increase in co-infection.

Syphilis yielded the lowest case rates. This may be due to a variety of factors such as contraction of syphilis requires exposure to a syphilis sore. Often times, these sores are not persistent and may disappear for long periods of time. For many infected individuals, they do not know that they have the disease and do not seek treatment since the individual's immune system is often sufficient to suppress the disease (Hook and Marra, 1992).

Interestingly, Chlamydia and gonorrhea were both correlated with mean income for the total population (regardless of race), but not when blacks or whites were analyzed separately. Reasons for this are unknown but could possibly be that a large proportion of the Hispanic population may not have the language abilities to find resources to treat and or prevent the transmission of Chlamydia and gonorrhea. Further investigation needs to be performed to reach a more thorough conclusion.

These data above have shown that the rate of STD infection is dependent on race and economic status and that the current education system appears to have little influence. This is an issue that will continue to flourish and cause anguish to the infected individuals. It has been demonstrated that teaching abstinence-based programs are ineffective, time consuming, costly, and religiously biased (Silva, 2002). It has also been demonstrated that virginity pledges are dangerous and ineffective often

exposing individuals to a multitude of disease, abuse, and unwanted pregnancies (Alford, 2003; Alford, 2008; Brückner and Bearman, 2005; Santelli, 2006; Kirby, 2001). Even though there have been governmental data that supports the effectiveness of abstinence based programs (U.S. Office of Management and Budget, 2009), these data are often inaccurate. Research has found that programs that support only abstinence that are funded by the U.S Department of Health and Human Services contain misleading information regarding the effectiveness of contraceptives, provide false facts about the risks of abortion, implement religious beliefs as factual data, and propose gender stereotypes as scientific data (US House of Representatives, 2004).

It has also been demonstrated that these programs do not need more funding because the funds are often inappropriately allocated in investing in new textbooks and new equipment rather than the benefits of condoms and other forms of contraception (American Foundation for AIDS Research, 2005). The data collected in this study have also shown that areas with higher socioeconomic statuses (SES) have decreased case rates of STD's when compared to their poorer counterparts. This may be due to their accessibility to better educational methods.

These facts have led individuals to conclude that the internal issue lies within the programs themselves. Many individuals have proposed that sexual education must address contraceptive alternatives as well as abstinence (Klein, 2005; Committee on HIV Prevention Strategies in the United States, Institute of Medicine, 2000; Society for Adolescent Medicine, 2006; Boostra, 2002). Furthermore, sexual education must be especially tailored towards its focused group in that it must offer correct scientific data while being age and culturally appropriate (Alford 2003; Alford, 2008). It must also allow the individuals to clarify their values within their culture and personally (UNAIDS, 1997). The goals must be presented in a clear fashion in how HIV, pregnancy, and other STD's can be prevented (Society for Adolescent Medicine, 2006). Psychological factors must also be addressed with activities that are associated with risky behaviors (Kirby, 2001).

To further this approach of sexual education, recent studies have shown that the most effective method of learning is through video (O'Donnel *et al.*, 1998). Since resources are often limited for instructors inside and outside of the classroom, most individuals often seek the most efficient and cost effective way to educate individuals. The recent use of video in educating individuals has shown to increase achievement scores (Din and Calao, 2001), increase compliance with medical treatments (Wiese *et al.*, 2005), and condom usage (O'Donnel *et al.*, 1995). By using video as a supplement in sexual education, the demands for increased funding, supplies, time and other resources will be eliminated and may possibly yield a significant decrease in the prevalence of STD's.

There were several limitations affecting the results of the current study's original purpose to investigate sex education programs in Pennsylvania. This could not be completed as intended due to the lack of responses from schools and other government-based agencies. Therefore, the goal had to be amended and public data from the U.S. Census were used instead. These data are from the years 2000-2002 which may create confounds for some of the calculations since not all of the time frames and data were matched, although careful consideration and selection of data was used. These differences may not be significant in our statistical calculations since these trends have been noted before. Also, the STD data from the Pennsylvania Department of Health may not have been entirely accurate as there are often cases that are misdiagnosed or not reported at all. While these data are reliable, they may not accurately reflect the entire population. Another confound that may have persisted is that there is great variability within these counties and this was not taken into consideration. Within each county and within each school, education is approached in a different manner. While obtaining this data and evaluating it is impossible, a general overview and criticism was provided using recent statistical and scientific data. To control for this, we blocked the county which allowed for the removal of variation between counties.

This information is critical in our current society as the current President is considering a reform in sexual education throughout America. This research may enable policy makers to make reforms that address data in the appropriate fashion rather than an idealistic manner based off of religious beliefs (i.e. abstinence programs). It may also influence the disbursement of property taxes in a more appropriate fashion in that these programs do not use their funds in the classroom on texts but rather invest in actual condoms and videos. By doing this, costs will be reduced drastically and the remaining funds may be disbursed where needed (e.g., free clinics).

Ultimately, this study reveals that regardless of *any* factor, one is at risk of being affected by an STD. The issue lies within prevention and it is evident that past prevention programs are ineffective and something needs to be done now. Sexual education needs to be reformed as soon as possible in order to ensure the health and public welfare of our current community and future.

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Appendix

Questions that were asked to the person(s) controlling the sexual education curriculum:

- 1) How long have they had sexual education at their school?
- 2) Is this program every year?
- 3) In which grade do the children begin to attend these classes?
- 4) An explanation of the attendance policy (mandated, optional, other).
- 5) The length of class (hours per week).
- 6) Which is the primary method of teaching (lecture, video, group presentations, or other)?

Table 1

Descriptive statistics for STD case rates (Chlamydia, gonorrhea, and syphilis) separated by race

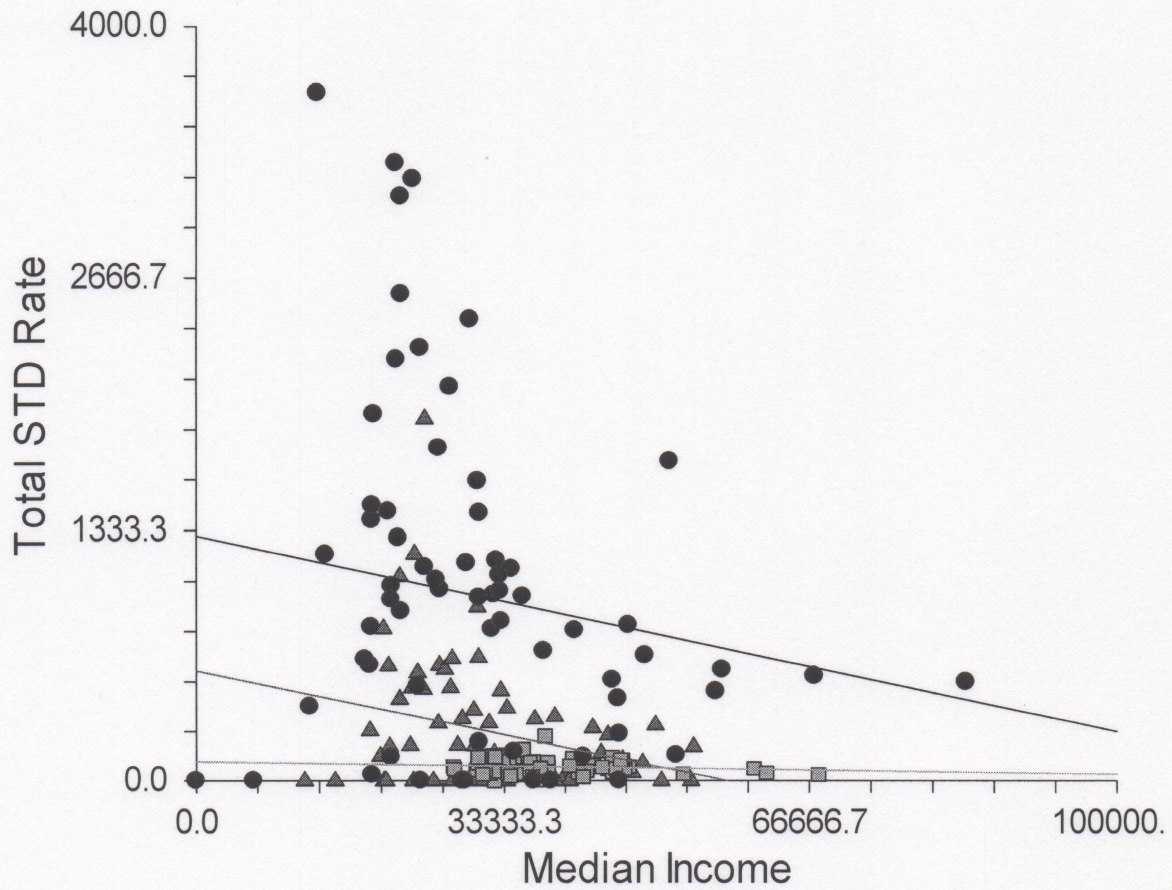
(Black, Hispanic, and white). Data presented are least-squares means and standard errors calculated from the ANCOA analysis.

Race	STD			
	Gonorrhea	Chlamydia	Syphilis	Total Sums
Black	M = 302.16 SE = 24.26	M = 658.16 SE = 41.22	M = 2.87 SE = 2.04	M = 963.19 SE = 58.77
Hispanic	M = 44.92 SE = 24.26	M = 247.80 SE = 41.22	M = 2.48 SE = 2.04	M = 295.21 SE = 58.77
White	M = 21.64 SE = 24.26	M = 62.19 SE = 41.22	M = 0.83 SE = 2.04	M = 84.67 SE = 58.77

Figure 1. Pearson correlations between total STD rate, median income, and race.

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- Race
- ▲ Hispanic
 - White
 - Black

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