SOCIOECONOMIC DETERMINANTS OF BASIC AND ADVANCED KNOWLEDGE OF HIV/AIDS IN INDIA

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SOCIOECONOMIC DETERMINANTS OF BASIC AND ADVANCED OF HIV/AIDS KNOWLEDGE IN INDIA

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Abstract

With over two million people living with HIV/AIDS in India and no current widely available cure; India is at an important stage in its fight against the AIDS epidemic. The most effective and efficient method to slow the spread of AIDS is to target the people most likely to become infected with the disease via AIDS prevention campaigns. Using data from the National Family and Health Surveys (NFHS-3), this paper analyzes the socioeconomic correlates of wealth and education; of basic and advanced AIDS knowledge between a group of high AIDS prevalent states and a group of low AIDS prevalent states in India. Results from probit analysis present that there is concern for basic and advanced knowledge among lower educated and poorer individuals. The results also suggest that there are significant differences of basic and advanced knowledge between high and low AIDS prevalent states. AIDS prevention policy recommendations are to increase AIDS awareness by targeting lower educated and poor individuals at the state level.

KEYWORDS: (HIV/AIDS, India, Knowledge)

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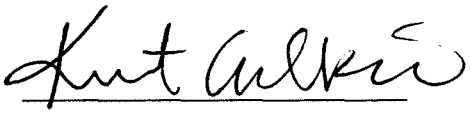

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Kurt Adkins

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CHAPTER I

INTRODUCTION

Since the first recognized case of HIV/AIDS in 1981 there has been a dramatic increase in the number of infected people until the late 1990's. Scientists were so baffled by the discovery of the new illness that it took until 1983 to discover that HIV is the virus that causes AIDS and that both are blood borne[1]. Not until the mid-1980's were governments aware of the consequences of the AIDS epidemic, and able to form HIV/AIDS prevention programs. During the time lapse of the first recognized case of AIDS and the creation of the National AIDS Control Programme in 1987, the reported number of AIDS infected people had already reached over 70,000 worldwide, with an estimated 5 to 10 million infected people[2]. Despite the presence of prevention programs, the AIDS epidemic increased rapidly throughout the 1990's in much of the world. Although the rate of reported HIV/AIDS infections has recently subsided, many developing countries still suffer from prevalence rates as high as 20% of all adult citizens[3].

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[1] F. Barre-Sinoussi et al., "Isolation of a T-Lymph tropic Retrovirus from a Patient at Risk for Acquired Immune Deficiency Syndrome (AIDS)," *Science* (1983)

[2] WHO, "'Global Statistics' in Weekly Epidemiological Record," (1987): 372.

[3] UNAIDS, "AIDS Epidemic Update Asia: Regional Summary," *Special Report on AIDS* (2007)

AIDS and HIV

Although this paper focuses on the socioeconomic determinants of HIV/AIDS, it is important to briefly describe the infection process of the disease in the human body. The acquired immune deficiency syndrome (AIDS) is defined as a set of symptoms and infections resulting from damage to the immune system in the human body[4]. The damage to the immune system is caused by the human immunodeficiency virus (HIV).

HIV is a virus that travels through bodily fluids that control the human immune system. Once an individual is infected with HIV, the virus enters blood cells and renders them ineffective for fighting diseases. There are antiretroviral medications that can fight the spread of HIV; however the human body eventually becomes resistant to these drugs and allows HIV to eventually spread entirely through the immune system[5].

There are four stages in the HIV infection process. The first stage is called the window stage; which is the window of time between when the person is infected with HIV and when the antibodies to fight the virus develop in the body. The second stage is the asymptomatic stage; this stage represents the stage in which the infected individual experiences no symptoms for an amount of time that varies from person to person. The third stage is the symptomatic stage; which is when the infected person begins to feel flu like symptoms and becomes more vulnerable to infections and cancers. The final stage of the HIV infection is AIDS, in which the human body's

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[4] Divisions of HIV/AIDS Prevention, "HIV and its Transmission," (1999)

[5] John Ritter, "AIDS Virus Spurs Body's White Blood Cells Output," *Chicago Sun-Times,* 1992,

immune system can no longer fight infections. Once the immune system has completely been infected with HIV, the onset of AIDS occurs. AIDS is a series of infections in the human body that eventually lead to the death of the host.[6]

Since there is no current method to cure HIV, the onset of AIDS is inevitable. Therefore, in this paper the term AIDS is used for individuals infected with HIV or AIDS even if the onset if AIDS has not occurred yet.

AIDS in India

Although India does not lead the world in HIV/AIDS prevalence rates, it does have much concern for the spread of the AIDS epidemic. In 1985, despite the influx of reported AIDS cases, India had not yet reported a single case of HIV or AIDS[7]. There was recognition, that this would not be the case for long, and there were concerns of how India would cope with the epidemic once it emerged. This was because India lacked the scientific laboratories, research facilities, equipment, and personnel to deal with the AIDS epidemic. Since the first discovery of HIV/AIDS in India in 1986, the spread of AIDS increased rapidly until 2001 when the rate of reported AIDS infected people subsided (Figure 1.1). In 1990 there had been an estimated 50,000 people living with HIV/AIDS in India, by 2001 this number had risen to 2,700,000[8].

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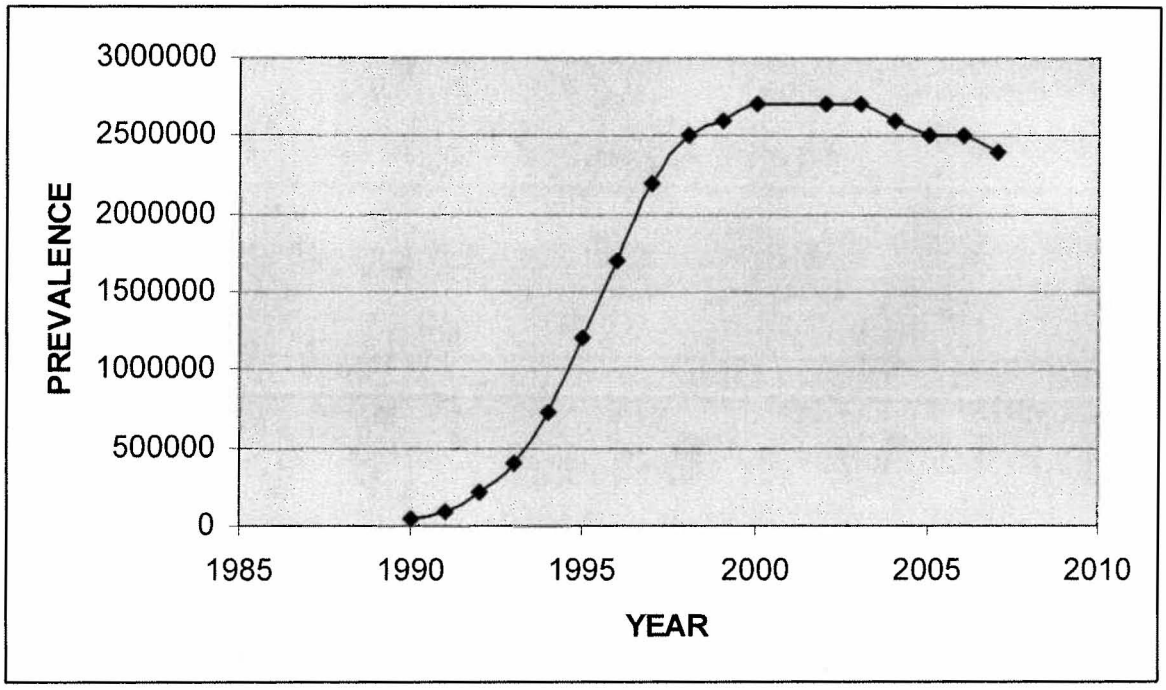
[6] Robertson, Jamie. "The Four Stages of HIV Infection." Suite101.com. 31 Dec. 2008. <http://aidshiv.suite101.com>.

[7] T. K. Ghosh, "AIDS: A Serious Challenge to Public Health," *Journal of Indian Medical Association* 84, no. 1 (1986): 29-30.

[8] UNAIDS, *AIDS Epidemic Update Asia: Regional Summary*

FIGURE 1.1

HIV/AIDS PREVALANCE IN INDIA, 1990-2007



Source: 2008 Report on the Global AIDS epidemic, UNAIDS/WHO, July 2008

In the most recent AIDS epidemic report update summary in Asia, it has been estimated that there were 2.5 million people living with HIV/AIDS in India in 2007 out of 33 million predicted persons worldwide; also the adult national prevalence rate was 0.36%[9]. However, in some states within India the prevalence rate is as high as 1.13%[10]. Although certain countries have prevalence rates as high as 20%, India's epidemic is ranked third in the world for infected persons, behind South Africa and

[9] UNAIDS, *AIDS Epidemic Update Asia: Regional Summary.*

[10] UNAIDS, *AIDS Epidemic Update Asia: Regional Summary*

Nigeria[11]. Since India has the second largest population in the world, with 1.15 billion people[12] it is considered a 'next wave' country and stands at a critical point in its epidemic[13].

The vast size and diversity of India makes it difficult to measure the demographics of HIV/AIDS of the country as a whole. India's high heterogeneous AIDS epidemic is largely concentrated in the industrialized southern and western regions of India, and the northeastern tip. The highest prevalent states are Tamil Nadu, Maharashtra, Karnataka, Andhra Pradesh, and Manipur[14]. The states bordering the northern edge of India and southernmost tip are the least HIV/AIDS prevalent states. Figure 1.2 shows a map of India with the most AIDS prevalent states labeled.

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[11] UNAIDS, *AIDS Epidemic Update Asia: Regional Summary*

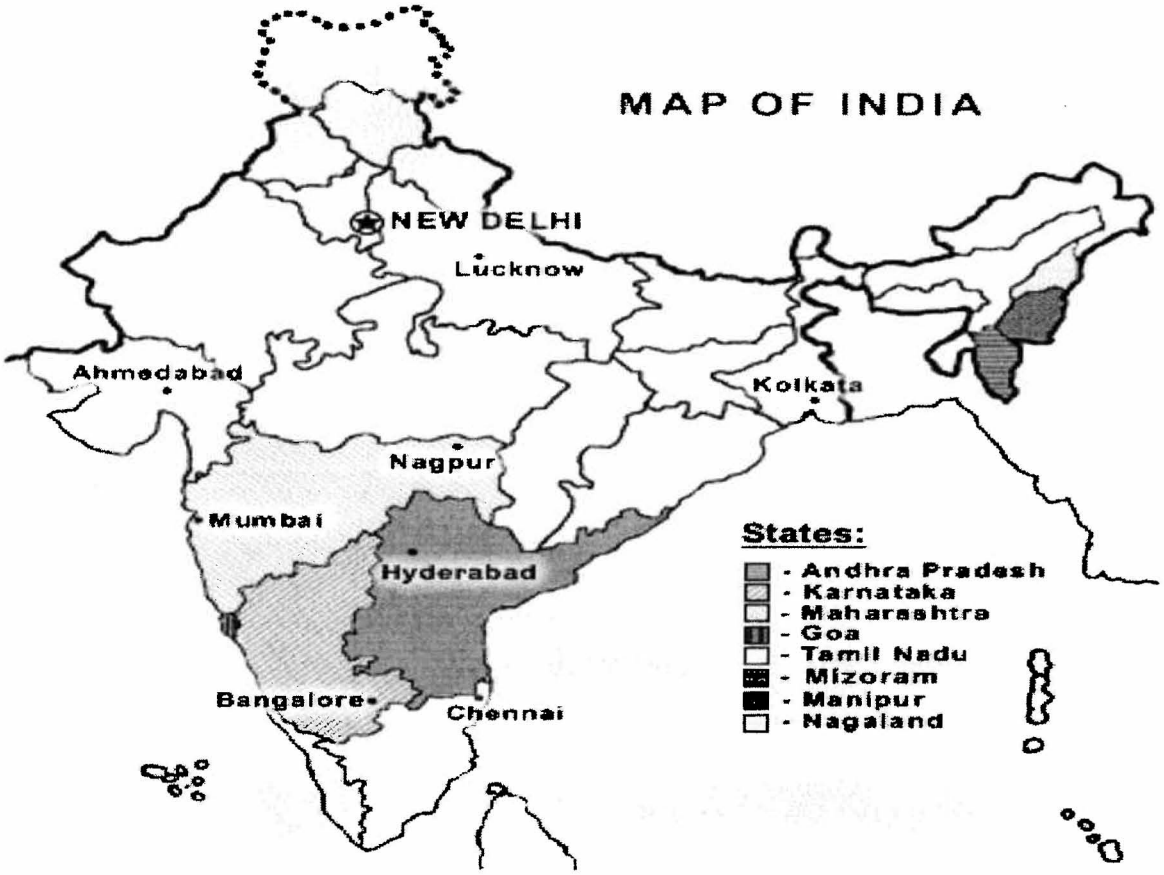
[12] "Rank Order- Population," in Central Intelligence Agency [database online]. July [cited 2008]. Available from http://www.cia.gov.

[13] National Intelligence Council, *The Next Wave of HIV/AIDS: Nigeria, Ethiopia, Russia, India, and China* National Intelligence Council, 2002), 1-32,

[14] "National Family and Health Surveys," in International Institute for Population Sciences [database online]. Deonar, India Available from www.measuredhs.com.

FIGURE 1.2

AIDS PREVALENCE MAP OF INDIA



Source: www. avert.com/aidsindia.htm

Purpose of this Study

This paper investigates the socioeconomic correlates of wealth and education; of basic and advanced knowledge of AIDS between a group of high AIDS prevalent states in India and a group of low AIDS prevalent states in India using data from the National Family and Health Surveys (NFHS-3). Also the HIV status of Indian citizens is used as a control in a separate hypothesis to investigate the socioeconomic correlates of wealth and education; of basic and advanced knowledge of AIDS

between a group of high and a group of low AIDS prevalent states within India of just HIV positive citizens. Including HIV status as a control, otherwise narrowing the population sample to only using HIV positive individuals allows the results to be comparable to the total Indian sample population. By focusing on states with high and low HIV/AIDS prevalence rates the results unmask concentrated epidemics at the regional level. All states within India are used in this analysis; however, they are split into a group of high AIDS prevalent states or a group of low AIDS prevalent states.

Although several socioeconomic determinants are evaluated to determine any discrepancies in basic and advanced knowledge of AIDS across socioeconomic lines; the variables wealth and education are the main focus of this paper. By determining the levels of AIDS knowledge of different wealth and education brackets, prevention efforts can be directed towards the least AIDS knowledgeable wealth and education classes.

The group of high AIDS prevalent states researched includes: Andhra Pradesh, Karnataka, Maharashtra, Manipur, and Tamil Nadu. These states are located in central and southern India with exception to Manipur which is located in northeastern India. The prevalence rate for these five states combined is 0.67 % of all men and women[15]. The group of low prevalent states includes the remaining twenty three states in India. The HIV prevalence of these states is 0.12 %[16]. The reason the group of high prevalent states only consists of five states and the group of low prevalent states consists of the twenty three states is because there is a distinct line

[15] UNAIDS, *AIDS Epidemic Update Asia: Regional Summary*

[16] UNAIDS, *AIDS Epidemic Update Asia: Regional Summary*

between the five highest HIV prevalent states and the remaining states in India. The fifth most HIV prevalent state in India is Tamil Nadu with a prevalence rate of 0.34% and the sixth most prevalent state is Utter Pradesh with a HIV prevalence rate of 0.07 %[17]. The HIV prevalence statistics are presented in table 1.1.

TABLE 1.1

HIV PREVELENCE RATES OF STATES IN INDIA

State	Percentage HIV positive
Andhra Pradesh	0.097
Karnataka	0.069
Maharashtra	0.062
Manipur	0.011
Tamil Nadu	0.034
Total for five high HIV prevalence states	0.067
Total for twenty three lowest HIV prevalence states	0.012

Source: www.measuredhs.com

Importance of AIDS Epidemic Research

In the absence of a vaccine and a wide available treatment for AIDS, the primary focus for HIV control programs must be on reducing transmission. Evidence from Thailand and Cambodia suggests that transmission can be reduced over time by

[17] Demographic and Health Surveys, *National Family and Health Surveys*

sustained, HIV prevalence efforts that use existing interventions and target individuals most likely to acquire and spread of AIDS[18].

Although, it has been proven that research is successful in aiding the fight against AIDS, research must be directed at the national or state level rather than sub-grouping nations based on prevalence rates. Kenya, Cambodia, and Honduras are all classified as having generalized epidemics, with infection rates of above 1% in the adult population[19]. However, the three countries have completely different patterns of exposure; Kenya's AIDS exposure is mostly due to paying for sex, but Cambodia's exposure is mostly due to heterosexual sex that is not paid for, and Honduras's exposure is due to male-male sex[20]. This is also the case at the state level in India. Infected people in the high AIDS prevalent states in central and southern India are exposed to the disease mostly through heterosexual sex that is not paid for; however, in the high AIDS prevalent states in northeastern India infected people are exposed to AIDS by paying for sex. Therefore, prevention campaigns must direct different resources to each region to be the most productive. Evidence has shown that if prevention efforts are directed towards population sectors most acceptable to the disease, the epidemic can be stopped over time[21].

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[18] Ashok Alexander and Mariam Claeson, "Tackling HIV in India: Evidence-Based Priority Setting and Programming," *Health Affairs* 27, no. 4 (2008)

[19] UNAIDS, *AIDS Epidemic Update Asia: Regional Summary*

[20] Elizabeth Pisani et al., "Education and Debate: Back to Basics in HIV Prevention: Focus on Exposure," *British Medical Journal* 2008, no. October (June 21 2003)

[21] Michael Gluck et al., "The Effectiveness of AIDS Prevention Efforts," (1995)

However, as the epidemic is slowly diminishing, the demographic segment most susceptible to AIDS contraction shifts. Pisani, Grassly, Hankins, and Ghys[22] reported that the exposure to AIDS in Cambodia shifted dramatically from being mostly due to individuals paying for sex in 1994 to heterosexual sex that is not paid for in 2002. In just 8 years, the proportion of new infections for men buying sex has dropped from 76% to 32% in Cambodia; however, the proportion of new infections transmitted within marriages has grown from 11% to 46%[23]. The demographic segments that prevention programs should target shifted completely in just eight years. The fact that the people that are the most susceptible to AIDS is constantly changing is the reason why current research to determine the size and location of key target groups is necessary.

The first step in fighting the AIDS epidemic for prevention programs is to ensure that people are aware of the existence of AIDS. Prevention campaigns aim at stopping the spread of AIDS by educating people on the modes of AIDS contraction, and methods to practice safe sex. However, before informing people on ways to avoid AIDS people must first be aware the disease exists. Once basic knowledge of AIDS is widely known, the next step is to spread advanced knowledge of AIDS. Research, such as the analysis in this paper, determines the different socioeconomic sectors that do not contain basic and advanced knowledge, which should be targeted by prevention programs.

In conclusion, since there is not a wide spread cure for AIDS the only means to stop the epidemic is to prevent transmission. Research to determine the

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[22] Pisani et al., *Education and Debate: Back to Basics in HIV Prevention: Focus on Exposure*

[23] Pisani et al., *Education and Debate: Back to Basics in HIV Prevention: Focus on Exposure*

socioeconomic determinants of AIDS contraction can be helpful for prevention policy-makers to allocate resources efficiently.

The remainder of this paper will proceed as follows. Chapter II will discuss past and current research in the field of determining socioeconomic determinants of AIDS contraction. This review will bring the reader up to date on the literature relating to methods used to determine the correlates of wealth and education; of basic and advanced knowledge of AIDS. Chapter III will explain the theory of the analysis. The fourth chapter will explain the data and methodology used. The fifth chapter will report relevant results. Lastly, the final chapter will conclude this study and discuss a framework for future research.

CHAPTER II

LITERATURE REVIEW

Research thus far has studied the relationship between which people are diagnosed with HIV/AIDS and several demographic and socioeconomic factors. Such socioeconomic factors include: education level, wealth level, age, place of residency, and marital status of a particular individual. These demographic determinants were used to test several dependent variables that reflect AIDS contraction, which in return can be used for controlling the HIV/AIDS epidemic. AIDS related stigma, sexual behavior, and knowledge of AIDS are the main areas of focus for research done thus far because they have been determined to show a direct correlation to stopping AIDS transmission.

The first section of this chapter will discuss why current research on the knowledge of AIDS in specific demographic regions is important for helping in the fight against the AIDS epidemic. Next, research linking the basic knowledge with the socioeconomic determinants of wealth and education is outlined. The final section will discuss studies that have determined socioeconomic correlates of wealth and education, of advanced knowledge in high AIDS prevalent countries throughout the world.

Knowledge of AIDS

Since the first voluntary organizations were constructed to help stop the spread of the AIDS epidemic in 1982 in the United States, the evolution of HIV/AIDS prevention programs has made considerable progress. These programs include AIDS education campaigns and condom use seminars. Most preventive programs such as these have three major goals: to increase abstinence, encourage faithfulness in relationships, and increase condom use[1]. These three goals focus on educating high risk regions on more responsible sexual behavior, rather than informing them on knowledge of AIDS.

Knowledge of AIDS can be described as basic and advanced knowledge. In research done thus far, and in this paper, basic knowledge is measured in the NFHS-3 by asking interviewees if they have ever heard of the disease called AIDS. Knowing the amount of people of a particular demographic sector that contain basic knowledge of AIDS helps policy-makers determine how to direct resources for AIDS constriction. It is simple to conclude that an individual is more likely to be infected by HIV/AIDS if they are not aware the disease exists. Therefore, it is more beneficial for government financed prevention policies to direct funding towards educating the population of the existence of AIDS in low knowledgeable areas rather then instructing them on safer sexual behaviors.

Advanced knowledge is measured in previous research using data from the NFHS-3 that asks detailed questions on AIDS. These questions include asking interviewees if they have heard of different ways to avoid contracting AIDS or if they

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[1] "Is India's Population at Risk of Contracting HIV?" 13 September 2008 [cited 2008].

have heard of different modes of AIDS transmission[2]. Advanced knowledge has also been defined in the literature by using the question in NFHS-3 that asks interviewees whether or not they know that a healthy looking person can be infected with AIDS[3]. Researching the socioeconomic determinants of advanced knowledge of AIDS has proven beneficial for prevention policy-makers to determine the quality of AIDS knowledge of certain regions, to direct resources demographically rather then nationally. This is because policy makers are aware of the most AIDS prone demographic segments rather then developing a prevention program focused towards the nation's population as a whole. Once again, an individual that is more informed on the modes of HIV contraction is less likely to become infected. Therefore, once the individual is aware AIDS exists, the next step is educating them on the ways it can be avoided[4].

Informing high prevalent regions about AIDS, in low knowledgeable areas, is the first step in stopping the spread of AIDS. It is simple to conclude that an individual is more likely to use a condom during sexual intercourse if they are first aware that condoms help avoid AIDS contraction. Therefore, there is a link between educating high prevalence regions knowledge of AIDS and informing them how to have a more responsible sexual behavior.

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[2] Rimjhim Aggarwal and Jeffery Rous, "Awareness and Quality of Knowledge regarding HIV/AIDS among Women in India," *Journal of Development Studies* 42, no. 3 (2006): 371-401.

[3] Lucia Corno and Damien de Walque, "The Determinants of HIV Infection and Related Sexual Behaviors: Evidence from Lesotho," Policy Research Working Paper 4421,

[4] Ashok Alexander and Mariam Claeson, "Tackling HIV in India: Evidence-Based Priority Setting and Programming," *Health Affairs* 27, no. 4 (2008)

Basic Knowledge

This section aims to present current and past literature relating to the socioeconomic determinants of AIDS. In research relating to the AIDS epidemic thus far, basic knowledge is measured by the respondents answer to whether or not they have heard of the disease called AIDS.

De Araujo[5] used data from the NFHS-3 in India to investigate the socioeconomic correlates of wealth, gender, marital status, education level, and place of residency; of basic knowledge. De Araujo determined that there is a direct correlation between wealth and basic knowledge, meaning general knowledge of AIDS increases as wealth increases, for both male and females. However, general knowledge and education are not directly correlated. It was determined that even though males with higher education were more likely to have heard of AIDS, they were less likely to have heard of AIDS than males with only secondary education. Boosyen and Summerton[6] used data from the 1998 South African Demographic Health survey to determine the association between wealth and basic knowledge of AIDS. Their findings were consistent with de Araujo; as wealth increased, individuals were slightly more likely to have heard of AIDS for both men and women.

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[5] Pedro de Araujo, "Socio-Economic Status, HIV/AIDS Knowledge and Stigma, Sexual Behavior in India," CAEPR Working Paper #2008-019,

[6] Frederick Booysen and Joy Summerton, "Poverty, Risky Sexual Behavior, and Vulnerability to HIV Infection: Evidence from South Africa," *J Health Popul Nutr* 20, no. 4 (2002): 285-288.

Gupta and Mitra[7] did a similar analysis as de Araujo's study using a survey from 1000 slum households in Delhi, India to determine the relationship between education and basic knowledge of AIDS. Although the results show there is very poor knowledge of AIDS, knowledge does increase with education.

Pallikadavath, Sanneh, McWhirther and Stones[8] used a multivariate analysis of data from the NFHS-2 in two high prevalent states in India (Tamil Nadu and Maharashtra) to model women's basic knowledge of AIDS. It was determined that in both states basic knowledge is predicted to be larger as wealth and education increases for both urban and rural regions. Balk and Lahiri[9] did a similar study in thirteen states in India. The results reported were consistent with Pallikadavath and others. It was reported that the lower the education and wealth women had in India, the less knowledge of AIDS they contained.

Dinkelman, Levinsohn, and Majelantle[10] used data from a national household survey in Botswana to describe the difference gap between AIDS knowledge between men and women. In this study they use gender as a socioeconomic difference to track information gaps in Botswana. The results showed there was no information gap; however, they suggested that prevention policies should learn more about what drives the heterogeneities in sexual behavior.

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[7] Indrani Gupta and Arup Mitra, "Knowledge of HIV/AIDS among Migrant in Delhi Slums," *Journal of Health & Population in Developing Countries* 2, no. 1 (1999): 26-32.

[8] Sassendran Pallikadavath et al., "Rural Women's Knowledge of AIDS in the Higher Prevalence States in India: Reproductive Health and Sociocultural Correlates," *Health Promotion International* 20, no. 3 (29 March2005 2005): 249-259.

[9] Deborah Balk and Subrata Lahiri, "Awareness and Knowledge of AIDS among Indian Women: Evidence from 13 States," *Health Transitional Review* 7 (1997): 421-465.

[10] Taryn Dinkelman, James Levinsohn, and Rolang Majelantle, "When Knowledge is not enough: HIV/AIDS Information and Risky Behavior in Botswana," NBER Working Paper 12418, Cambridge.

In conclusion, previous research has shown a general correlation between wealth and education with basic knowledge. Therefore, prevention campaigns should attempt to inform less educated and poorer individuals' basic knowledge of AIDS.

Advanced Knowledge

This section presents methods of literature determining the relationship between wealth, education, and gender with quality of knowledge.

Corno and de Walque[11] and de Araujo[12] did similar studies to determine the correlation between wealth and education of advanced knowledge. De Araujo and Corno and de Walque determined that as education and wealth increased interviewees were more likely to know that a healthy person can be infected with AIDS, for both men and women. However, de Araujo found that the likelihood of knowing this is even larger for males with secondary education and higher education compared to males with no education; however de Walque determined the opposite.

Aggarwal and Rous[13], Ambati, Ambati, and Rao[14], and Pallikadavath, Sanneh, McWhirther, and Stones[15] all did comparable studies of testing quality of knowledge with socioeconomic determinants. Aggarwal and Rous used knowledge specification as a count variable for a logistic regression. The results indicate a direct correlation

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[11] Lucia Corno and Damien de Walque, "The Determinants of HIV Infection and Related Sexual Behaviors: Evidence from Lesotho," Policy Research Working Paper 4421,

[12] de Araujo, *Socio-Economic Status, HIV/AIDS Knowledge and Stigma, Sexual Behavior in India*

[13] Rimjhim Aggarwal and Jeffery Rous, "Awareness and Quality of Knowledge regarding HIV/AIDS among Women in India," *Journal of Development Studies* 42, no. 3 (2006): 371-401.

[14] B. K. Ambati, J. Ambati, and A. M. Rao, "Dynamics of Knowledge and Attitudes about AIDS among the Educated in Southern India," *AIDS Care* 9, no. 3 (06 1997): 319-330.

[15] Pallikadavath et al., *Rural Women's Knowledge of AIDS in the Higher Prevalence States in India: Reproductive Health and Sociocultural Correlates*, 249-259.

between education and quality of knowledge. They found that achieving literacy produces the most gains in quality of knowledge suggesting that being able to read allows people to interact with AIDS awareness media. Ambati, Ambati, and Rao used a series of questions relating the modes of AIDS transmission to determine that there was a general increase in quality of knowledge as education increases; however, it is interesting to note that PhD holders have a lower quality of knowledge than undergraduate student and high school students. Pallikadavath, Sanneh, McWhirther, and Stones also reported that the quality of knowledge was larger for individuals with a secondary level of education than individuals with a higher level of education. Perhaps these results suggest AIDS prevention is directed towards middle education rather than higher education or older individuals. All three studies show a direct correlation between wealth and quality of knowledge. This may suggest that wealthier individuals come in contact with more media related AIDS prevention programs than poorer people.

De Walque[16] conducted an original study using individual level data from a cohort study following the general population of a cluster of villages in rural Uganda for twelve years. The results show that there is a substantial evolution in the AIDS/education gradient; meaning that educated individuals have been more responsive to AIDS information campaigns over the past decade in Uganda. This suggests that the Ugandan government may want to focus on educating its citizens so

[16] Damien de Walque, "How does the Impact of an HIV/AIDS Information Campaign Vary with Educational Attainment? Evidence from Rural Uganda," *Journal of Development Economics* 84 (2006): 687-714.

that AIDS awareness programs are more beneficial in the fight against the AIDS epidemic.

Strader and Beaman[17] and Li, Lin, Gao, Stanton, Fang, Yin, and Wu[18] both used college students as the basis for their analysis to test the correlation between education and AIDS knowledge. Strader and Beaman compared the quality of AIDS knowledge of college students against sexually transmitted disease (STD) clinic patients. The results showed that both college students and STD patients contained adequate knowledge of AIDS however they did differ in their knowledge of whether that AIDS is caused by the same virus as VD. Patients of STD clinics indicated this was true. Prevention programs should address this lack of knowledge to ensure that people do not believe AIDS is similar to other STDs and can be cured. Li, Lin, Gao, Stanton, Fang, Yin and Wu tested Chinese college student to determine if the level of college education correlates with quality of knowledge of AIDS. The results were inconsistent, suggesting that either China provides AIDS information on college campuses so the student body is knowledgeable of AIDS as a whole or the students obtain AIDS knowledge elsewhere.

Although advanced knowledge can be measured using several different methods, the review of relevant literature suggest a general correlation between increased education level and wealth with increased advanced knowledge of AIDS.

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[17] Marlene Strader and Margaret Beaman, "Comparison of Selected College Students' and Sexually Transmitted Disease Clinic Patients' Knowledge about AIDS, Risk Behaviors and Beliefs about Condom use," *Journal of Advanced Nursing* 16 (1991): 584-590.

[18] Xiaoming Li et al., "HIV/AIDS Knowledge and the Implications for Health Promotion Programs among Chinese College Students: Geographic, Gender, and Age Differences," *Health Promotion International* 19, no. 3 (2004)

The review of literature is important for the analysis preformed in this paper. The literature reviewed in this chapter helped to develop and outline the methods and analysis preformed in this paper. Along with developing a base of knowledge on past and current research in the field of HIV/AIDS prevention, the reviewed literature will also help to compare and contrast results and analysis methods for the advancement of further research in the field.

CHAPTER III

THEORY

The purpose of this chapter is to explain the theory and analysis that accounts for determining the socioeconomic determinants of basic and advanced knowledge of AIDS of a group of high AIDS prevalent states in India and a group of low AIDS prevalent states in India. The first part of this chapter will introduce and explain the probit model used for this analysis. Second, the theory behind capturing the socioeconomic determinants of basic and advanced knowledge of AIDS is discussed. Next, the theoretical determinants of AIDS contraction in a group of high AIDS prevalent states and a group of low AIDS prevalent states are analyzed. Then, the theory describing holding HIV status as a control will be interpreted.

Probit Analysis

Probit analysis is a binary-choice model that is valuable for qualitative choice survey data. Binary-choice models assume that individuals that are interviewed are faced with a choice between two alternatives and that their choice depends on identifiable characteristics[1]. In this paper interviewees are asked several yes or no questions. The probit analysis predicts the likelihood the interviewee will answer yes

[1] Robert Pindyck and Daniel Rubinfield, *Econometric Models and Economic Forecasts* (Boston, New York, St. Louis, San Francisco: Irwin-McGraw Hill, 1998)

to the question based on that particular individual's socioeconomic characteristics[2]. In the probit analysis for this paper, all the questions that interviewees answer yes to are assigned a value equal to one, and all answers that interviewees answer no to are assigned a value equal to zero. The equation represents finding the probability that y =1 based on the values of x, where y would equal the dependent variables and x represents the input variables[3]. A more defined representation of this model is below:

$$P(y=1|x) = F(\beta x) + \varepsilon = F(\beta_0 + \beta_1 x_1 + ... + B_k x_k) + \varepsilon \qquad (1)$$

Where β_k represents the coefficient of the independent variable, x_k. The probit equation resembles a linear probability equation; however, a function of the typical linear probability model is computed to determine the probability that the dependent variable is equal to one. The error term, ε, is continuously distributed variable independent of $x_1 ... x_k$ and the distribution of ε is symmetric about zero.

Socioeconomic Determinants

This subsection will discuss the theory behind determining the socioeconomic status of the population interviewed.

The NFHS-3 asked Indian citizens several socioeconomic questions, such as their age and education levels. These questions along with an evaluation of the

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[2] Jeffrey Wooldridge, *Econometric Analysis of Cross Section and Panel Data* Massachusetts Institute of Technology, 2002)

[3] Jeffrey Wooldridge, *Econometric Analysis of Cross Section and Panel Data* Massachusetts Institute of Technology, 2002)

household assets of each interviewee were used to separate each citizen into wealth and education brackets[4]. These brackets represent the independent variables in the probit model. Although wealth and education are the primary focus, several other socioeconomic determinants such as: age, marital status, media consumption, religion, and place of residency are used as dummy variables in the model. By including these socioeconomic variables as dummy variables into the analysis, the model is a more precise estimation of the probability the dependent variable equals one without focusing on them specifically[5].

Basic and Advanced Knowledge

Along with socioeconomic questions, the NFHS-3 also included questions relating to AIDS that are used to determine the interviewee's basic and advanced knowledge of AIDS. These questions represent the dependent variables of the probit model. Each dependent variable is analyzed using a different probit model to be examined separately.

Based on the earlier discussion of the probit model, the independent variables relating to the wealth and education status of an individual will be used to predict the probability that the same individual will have basic or advanced knowledge of AIDS.

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[4] Demographic and Health Surveys, *National Family and Health Surveys*

[5] Pindyck and Rubinfield, *Econometric Models and Economic Forecasts*

High and Low Prevalent States

This subsection discusses the theory behind determining the socioeconomic determinants of AIDS knowledge in a group of high AIDS prevalent states in India and a group of low AIDS prevalent states in India.

Within the NFHS-3, the location of each interviewee is recorded by state. This information is used to separate the total sample size into two separate data sets. The group of high AIDS prevalent states includes the five states with the highest AIDS prevalence rate and the group of low AIDS prevalent states includes the remaining twenty three states in India and New Delhi. New Delhi is the capital of India that contains its own variable in the NFHS-3. New Delhi is included in the low AIDS prevalent groups because it has a low HIV prevalence rate. By separating the data set into a high AIDS prevalent group and a low AIDS prevalent group, the results may present the reasoning behind why the AIDS epidemic hit certain regions in India harder then others.

HIV Status as a Control

This subsection introduces the theory used to determine the socioeconomic determinants of basic and advanced knowledge of AIDS using HIV status of interviewees as a control.

Within the Demographic and Health Surveys[6] website there is a separate data set along with the NFHS-3 that reports the HIV Status of interviewees. The sample population in this data set is the same population used in the NFHS-3, with exception of some individuals in the NFHS-3 that were not tested for HIV. Each interviewee in

[6] "AIDS Surveys," Available from www.measuredhs.com/aboutsurveys.

both data sets is assigned an identification number which is used to merge the two data sets together. Once the data is merged, only the HIV positive individuals are used in this analysis to determine the socioeconomic determinants of AIDS knowledge of HIV positive people.

Conclusion

This chapter has provided the theory involved in the socioeconomic determinants of wealth and education; of basic and advanced knowledge between a group of high AIDS prevalent states and a group of low AIDS prevalent states in India. In the following chapter, the data will be introduced and applied to the theory discussed in this chapter.

CHAPTER IV

DATA AND METHODOLOGY

The purpose of this chapter is to discuss the data set and empirical model that will be used to determine the socioeconomic determinants of knowledge of AIDS in India. Each variable included in the model will be addressed in this section, including the source and reliability of the data. Along with outlining the variables in the regression model the descriptive statistics will also be examined. After reviewing the data set and descriptive statistics, the model will be constructed and the methodology to test the model will be explained.

Data and Sources

The data used in this analysis is from the third wave of the National Family Health Surveys (NFHS-3) in India. The NFHS is a large scale, multi-rounded survey conducted in represented sample households throughout India. The goals of this population based survey is to provide state and national information on fertility, health, nutrition, and AIDS, and obtain essential data for the Ministry of Health and Family Welfare and other agencies for policy and program purposes. Along with the survey questionnaires the Demographic Health Surveys also collect geographic information that allows DHS data to be linked with data collected by the survey

questioners[1]. Also DHS conducted voluntary HIV testing for the use of in-depth analysis of the sociodemographic and behavioral factors associated with HIV infection.

The NFHS-3 was conducted in 2005-2006 using a representative sample of women and men in all twenty eight states in India. There were a total of 124,385 females between the ages 15-49 years old and 74,369 men between the ages 15-54 years old interviewed in the NFHS-3[2]. The amount of males that were tested for HIV in the NFHS-3 was 50,093 and the amount of females that were tested was 38,255[3]. Out of the males and females that were tested 279 males were found HIV positive and 181 females were found HIV positive.

Variables and Descriptive Statistics

There are several units of observation in the survey; however, since the purpose of this paper is to determine the socioeconomic correlates of wealth and education of basic and advanced knowledge of AIDS in a group of high and a group of low AIDS prevalent states in India, only selected variables were examined.

There are three dependent variables in this analysis. The first one measures the level of basic knowledge of AIDS, and the other two variables capture the level of advanced knowledge of AIDS. Following is a description of these variables:

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[1] "AIDS Surveys," Available from www.measuredhs.com/aboutsurveys..

[2] Demographic and Health Surveys, *National Family and Health Surveys*

[3] Demographic and Health Surveys, *National Family and Health Surveys*

Basic Knowledge:

- EHA: ever heard of AIDS - interviewees were asked if they have heard of AIDS.

Advanced Knowledge:

- DK: don't know ways to avoid AIDS – interviewees were asked if they know of any ways to avoid contracting AIDS.
- HLP: healthy looking person have AIDS - interviewees were asked if it is possible for a healthy looking person to be infected with AIDS.

The first dependent variable classifies as measuring basic knowledge of AIDS because it measures if interviewees are aware that AIDS exists. The next two variables ask specific questions about AIDS, therefore are defined as measuring advanced knowledge. The variable DK asks interviewees if they know any method to avoid contracting AIDS. This variable takes into account advanced knowledge because it determines if interviewees know any method to decrease their chance of receiving AIDS, such as abstaining from sex or wearing a condom during sexual intercourse. The variable HLP asks interviewees if they think a healthy person can be infected with AIDS, which tests specific knowledge of the effects of AIDS on a person.

Each dependent variable is also analyzed using the HIV status of interviewees as a control. Therefore each variable is examined for interviewees that are HIV positive to determine if there are any significant differences in answers of questions on the

survey between the entire sample and the HIV positive sample for both males and females.

All three dependent variables use questions from the survey that are formulated as yes or no questions. Therefore, in this analysis, if the answer to the question was yes it is assigned the value one, and if the answer in no it is assigned the value zero. A more precise description of each dependent variable is described on table 4.1. Also, the variables testing advanced knowledge of AIDS only include interviewees that obtain basic knowledge of AIDS, meaning they answered yes to having heard of AIDS. This is because it is assumed if the interviewee hasn't heard of AIDS they wouldn't have specific knowledge of AIDS.

TABLE 4.1

DETAILED DESCRIPTION OF DEPENDENT VARIABLES

Code	Variable	Definition
EHA	Ever heard of AIDS	=1 if individual has heard of AIDS; = 0 otherwise
DK	Don't know ways to avoid AIDS	=1 if the individual does not know a method to avoid AIDS; =0 otherwise
HLP	Healthy looking person have AIDS	=1 if individual believes that a healthy person can be HIV+; = 0 otherwise

Table 4.2 reports the means and standard errors for the dependent variables. There are significant differences in means between males and females and also between high and low AIDS prevalent states. Some of the indicators reported in table 4.2 are surprising. While 85% of females from high AIDS prevalent states reported they have heard of AIDS, only 66% of females in low AIDS prevalent states reported having heard of AIDS. However, 94% of males in high AIDS prevalent states have heard of AIDS and 84% in low AIDS prevalent states have heard of AIDS. Since India's population is the second largest in the world[4], these values imply that there a large number of Indian citizens that are not aware that AIDS exists with a large number of them being females from low AIDS prevalent states.

When HIV status of interviewees is used as a control, the percentages of males and females in high and low AIDS prevalent states increases considerably. In the group of high AIDS prevalent states 96% of HIV positive males and 82% of HIV positive females reported having heard of AIDS. Although the sample size for HIV positive females in low AIDS prevalent states is limited, 100% of them reported having heard of AIDS and 83% males reported having heard of AIDS.

The first variable that reports advanced knowledge of AIDS (DK) indicates that 18% of males and 29% of females in the group of high AIDS prevalent states do not know of a way to avoid contracting AIDS. Surprisingly, these values are smaller than males and females from the group of low AIDS prevalent states, 24% and 32%. Therefore even though the HIV prevalence rate is larger in high AIDS prevalent states both males and females have more AIDS knowledge in these states then low

[4] Central Intelligence Agency The World Factbook, *Rank Order- Population*

AIDS prevalent states. When HIV status of individuals is used as a control, the proportions of males and females in high and low AIDS prevalent states knowing of a method to avoid contracting AIDS are very similar. On average, males know more methods to prevent contracting AIDS then females do.

The second variable that captures advanced knowledge of AIDS (HLP) reports that 76% of males and 63% of females in high AIDS prevalent states report knowing that a healthy looking person can indeed be infected with AIDS. These numbers are similar to males and females of low AIDS prevalent states, 77% and 69%. However, when HIV status of interviewees is controlled for, 70% of females in low AIDS prevalent states and just 60% of females in high AIDS prevalent states reported knowing a healthy looking person can be infected with AIDS. On average the males reported having more advanced knowledge of AIDS then females in both high and low AIDS prevalent states, even when HIV status of interviewees is used as a control.

TABLE 4.2

DESCRIPTIVE STATISTICS OF DEPENDENT VARIABLES

	High Prevalent States					
Dependent Variables	Males			Females		
	Mean	SE	Obs.	Mean	SE	Obs.
EHA	0.943	0.0013	31,166	0.854	0.0021	32,601
DK	0.182	0.0022	29,402	0.293	0.0027	27,792
HLP	0.762	0.0025	29,402	0.633	0.0029	27,792
	Low Prevalent States					
	Males			Females		
	Mean	SE	Obs.	Mean	SE	Obs.
EHA	0.843	0.0017	43,196	0.661	0.0016	91,784
DK	0.235	0.0022	36,597	0.32	0.0019	60,603
HLP	0.771	0.0022	36,597	0.685	0.0019	60,603
	HIV as a Control					
	High Prevalent States					
	Males			Females		
	Mean	SE	Obs.	Mean	SE	Obs.
EHA	0.958	0.013	239	0.815	0.03	168
DK	0.183	0.256	229	0.27	0.0381	137
HLP	0.738	0.0291	229	0.596	0.042	137
	Low Prevalent States					
	Males			Females		
	Mean	SE	Obs.	Mean	SE	Obs.
EHA	0.825	0.0608	40	1	0	13
DK	0.212	0.0723	33	0.385	0.1404	13
HLP	0.756	0.0756	33	0.692	0.1332	13

The next step is to determine if there are any discrepancies of the responses in the descriptive statistics of the dependent variables across socioeconomic lines. However, first we need to define the independent variables. The description of each independent variable is below:

Independent Variables:

- EDUC: level of education – education is divided into four categories: no education, primary education, secondary education, and higher education. These categories represent the number of years of education: less than one year, between one and five years, between six and twelve years, and more than twelve years. (Table 4.3 gives a more detailed description of the education variables).
- WEALTH: wealth index - constructed by the NFHS-3 using household assets: is divided into 5 categories: poorest, poor, middle, rich, and richest. (Table 4.3 gives a more detailed description of the wealth variables).
- AGE: age of the interviewer – the following age categories are used: 15-19, 20-24, 25-29, 30-34, 35-39, 40-44, 45-49, 50-54[5].
- MS: marital status – the following categories are used: never married, currently married, and formally married.
- MEDIA: amount of media individual comes in contact with – this variable includes: individuals that attend a cinema at least once a month, or if they watch television at least once a week, or listen to the radio at least once a week, or if they read the newspaper or a magazine at least once a week. This

[5] Only males

variable is included to take into account the fact that individuals that are in contact with more media related AIDS awareness advertisements may contain more knowledge of AIDS.

- REL: religion – the following religions were recorded: Hindu, Muslim, Christian, Sikh, Buddhist, Jain, Jewish, Donyi Polo, no religion, and other religion.

TABLE 4.3

DETAILED DESCRIPTION OF EDUCATION AND WEALTH VARIABLES

Code	Variable Description	Definition
EDUC_0	No Education	=1 if individual has had less then a year of education; =0 otherwise
EDUC_1	Primary Education	=1 if individual has had between one and five years of education; =0 otherwise
EDUC_2	Secondary Education	=1 if individual has had between six and twelve years of education; =0 otherwise
EDUC_3	Higher Education	=1 if individual has had more then twelve years of education; =0 otherwise
WEALTH_0	Poorest Quintile	=1 if individual is in the poorest quintile computed by NFHS-3 using household assets ,=0 otherwise
WEALTH_1	Poor Quintile	=1 if individual is in the poor quintile computed by NFHS-3 using household assets ,=0 otherwise
WEALTH_2	Middle Quintile	=1 if individual is in the middle quintile computed by NFHS-3 using household assets ,=0 otherwise
WEALTH_3	Rich Quintile	=1 if individual is in the rich quintile computed by NFHS-3 using household assets ,=0 otherwise
WEALTH_4	Richest Quintile	=1 if individual is in the richest quintile computed by NFHS-3 using household assets ,=0 otherwise

This analysis focuses on the effects of education and wealth on basic and advanced knowledge of AIDS. The variables: age, marital status, media, and religion are used as controls. By controlling for these variables, the absence or presence of each category of each variable will help analyze the results; however, each category will not be specifically analyzed. Table 4.4 has the descriptive statistics for education. The variable wealth is not included in table 4.4 because its distribution is divided into uniform quintiles; therefore each category contains 20% of the sample size. Also the variables age, marital status, media, and religion are omitted from table 4.4 because they are dummy variables and their descriptive statistics are not relevant for this analysis.

It is noticeable that the proportions of each education bracket are very similar for both genders between the groups of high and low AIDS prevalent states. Therefore, on average, both males and females have similar levels of education between high and low prevalent states. This makes the results more comparable between high and low AIDS prevalent states for males and females because each education bracket contains similar proportions of individuals.

The percentage of males with no education in high AIDS prevalent states is 11.3% and 25.2% for females; with 73.6% of males in high prevalent states having secondary education or higher and just 60.8% of females have secondary education or higher. On average males are more educated then females in high AIDS prevalent states. This is the same for low AIDS prevalent states; 32.3% males have less then a secondary level of education and an alarming 49.0% of females have less then a secondary education. These discrepancies could pose a challenge for AIDS

prevention programs to direct HIV/AIDS information towards certain education brackets.

When HIV status of interviewees is used as a control, on average males are more educated then females in both low and high AIDS prevalent states; 64% of males have a secondary level of education or higher and 46.2% of females have a secondary level of education or higher in high AIDS prevalent states, and 50% of males have a secondary level of education or higher and 41.7% of females have a secondary level of education or higher in low AIDS prevalent states. It is staggering to note that 58.3 % of females in high prevalent states and 53.8% of females in low prevalent states have no education. Therefore, since the majority of HIV positive individuals in high and low AIDS prevalent states have less than a secondary level of education it may be more beneficial for AIDS prevention programs to direct AIDS epidemic awareness towards undereducated individuals than towards individuals with higher levels of education.

TABLE 4.4

DESCRIPTIVE STATISTICS FOR EDUCATION VARIABLES

	High Prevalent States					
Independent Variables	Males			Females		
	Mean	SE	Obs.	Mean	SE	Obs.
EDUC_0	0.113	0.0018	31,170	0.252	0.0024	32,601
EDUC_1	0.151	0.0020	31,170	0.141	0.0019	32,601
EDUC_2	0.561	0.0028	31,170	0.485	0.0028	32,601
EDUC_3	0.175	0.0021	31,170	0.123	0.0018	32,601
	Low Prevalent States					
	Males			Females		
	Mean	SE	Obs.	Mean	SE	Obs.
EDUC_0	0.166	0.0018	43,199	0.347	0.0016	91,784
EDUC_1	0.157	0.0017	43,199	0.143	0.0012	91,784
EDUC_2	0.539	0.0024	43,199	0.415	0.0016	91,784
EDUC_3	0.138	0.0017	43,199	0.097	0.0010	91,784
	HIV as a Control					
	High Prevalent States					
	Males			Females		
	Mean	SE	Obs.	Mean	SE	Obs.
EDUC_0	0.146	0.0229	239	0.583	0.3812	168
EDUC_1	0.213	0.0266	239	0.173	0.0292	168
EDUC_2	0.527	0.0324	239	0.381	0.0376	168
EDUC_3	0.113	0.0205	239	0.036	0.0144	168
	Low Prevalent States					
	Males			Females		
	Mean	SE	Obs.	Mean	SE	Obs.
EDUC_0	0.225	0.0669	40	0.538	0.1439	13
EDUC_1	0.275	0.0715	40	0.308	0.1332	13
EDUC_2	0.450	0.0797	40	0.462	0.1439	13
EDUC_3	0.050	0.0349	40	0.000	0.0000	13

Methodology

In this section, the data will be applied to the probit analysis discussed in the previous chapter. There are three different dependent variables in this investigation; however, each dependent variable is analyzed for a group of high AIDS prevalent states and a group of low AIDS prevalent states for males and females. The same variables are also analyzed holding HIV status of individuals as a control. The probit equations are below:

$$P(EHA=1)=F\left[\beta_0+\sum_{i=1}^{3}\beta_i EDUC_i+\gamma_0+\sum_{i=1}^{4}\gamma_i WEALTH_i+\sigma_0\right]+\delta_0 \qquad (2)$$

Where β_i represents the coefficients of education, $EDUC_i$, and γ_i represents the coefficients of wealth, $WEALTH_i$. The dummy variables are represented as σ_0. The error term is represented by δ_0, where δ_0 is continuously distributed variable of $WEALTH_i$, $EDUC_i$, and σ_2 and the distribution is symmetric about zero[6].

$$P(DK=1)=F\left[\alpha_0+\sum_{i=1}^{3}\alpha_i EDUC_i+\pi_0+\sum_{i=1}^{4}\pi_i WEALTH_i+\sigma_1\right]+\delta_1 \qquad (3)$$

Where α_i represents the coefficients of education, $EDUC_i$, and π_i represents the coefficients of wealth, $WEALTH_i$. The dummy variables are represented as σ_1.

[6] Jeffrey Wooldridge, *Econometric Analysis of Cross Section and Panel Data* Massachusetts Institute of Technology, 2002)

The error term is represented by δ_1, where δ_1 is continuously distributed variable of $WEALTH_i$, $EDUC_i$, and σ_2 and the distribution is symmetric about zero[7].

$$P(HLP = 1) = F\left[\varpi_0 + \sum_{i=1}^{3} \varpi_i EDUC_i + \theta_0 + \sum_{i=1}^{4} \theta_i WEALTH_i + \sigma_2\right] + \delta_2 \quad (4)$$

Where ω_i represents the coefficients of education, $EDUC_i$, and θ_i represents the coefficients of wealth, $WEALTH_i$. The dummy variables are represented as σ_2. The error terms are represented by δ_2, where δ_2 is a continuously distributed variable of $WEALTH_i$, $EDUC_i$, and σ_2 and the distribution is symmetric about zero[8].

Predictions

Based on the literature reviewed in the previous chapter several inferences can be made. It is predicted that as the education of a person increases their basic and advanced knowledge of AIDS would also increase because it is expected that as the level of education of an individual increases, their knowledge of most subjects increases. Also, it is anticipated that as the wealth of an individual increases their knowledge of AIDS would possibly increase, because richer people are in contact with more AIDS related media, such as television commercials. Even though the

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[7] Jeffrey Wooldridge, *Econometric Analysis of Cross Section and Panel Data* Massachusetts Institute of Technology, 2002)

[8] Jeffrey Wooldridge, *Econometric Analysis of Cross Section and Panel Data* Massachusetts Institute of Technology, 2002)

prevalence rates of the group of high AIDS prevalent states and the group of low AIDS prevalent states is substantially different, it is predicted that basic and advanced knowledge of AIDS will increase as education and wealth increases for both groups because the wealth and education brackets are defined the same for each group. Therefore, the highest educated category in the high AIDS prevalent states has the same level of education as the highest educated group in the low AIDS prevalent states and the highest wealth class in the high AIDS prevalent states contains the same level of wealth as the highest wealth class of the low AIDS prevalent states.

The results presenting HIV status as a control is expected to follow the same correlation as the results from the total population because whether or not the interviewees are aware they are HIV positive before they were tested is not considered, in this analysis. Therefore a higher educated person is expected to have the same level of knowledge of AIDS whether they are HIV positive or not, even if they were aware they were HIV positive before being tested.

Conclusion

This chapter discussed the data set and variables used this analysis. The dependent and independent variables were outlined and their descriptive statistics were analyzed. The descriptive statistics presented alarming differences in basic and advanced knowledge of AIDS between males and females and also between high and low AIDS prevalent states. However, the descriptive statistics did not show a large difference between all the interviewees and the HIV positive interviewees. The

following chapter presents a set of results from the regression analysis using the variables described in this chapter.

CHAPTER V

RESULTS AND DISCUSSIONS

The purpose of this chapter is to present and discuss the results from the analysis of the empirical model introduced and detailed in the previous chapters. The results will be evaluated for the three dependent variables: EHA, DK, and HLP for high and low AIDS prevalent states and also using HIV status of interviewees as a control. Along with presenting the results, discussion will be directed at the possible reasons for the results and the accuracy of the model.

Tables 5.1 to 5.3 display the results. The first table investigates the socioeconomic determinants of basic knowledge of AIDS, while the remaining two tables assess advanced knowledge of AIDS. All of the dependent variables are discrete and binary. The benchmark case in each regression is a fifteen to nineteen year old individual, with no education, in the poorest wealth quintile, living in a rural area, that does not attend a cinema at least once a month, or listen to the radio at least once a week, or watch television or read the newspaper or magazine at least once a week. For each of the dependent variables eight regressions are estimated; one for males in high AIDS prevalent states, one for males in low AIDS prevalent states, one for females in high AIDS prevalent states, one for females in low AIDS prevalent states, and all four of these regressions were estimated using HIV status of interviewees as a control.

HIV as a Control

The results for each regression using HIV status of individuals as a control are not presented in this paper. This is because the regressions presented very few coefficients that were significant at the 10% p-value, meaning that the probability that the dependent variable is equal to zero, rather than the desired value of one, is too large[1]. Also, the coefficients of the independent variables that are significant do not present any variations from using both HIV positive and negative interviewees.

There are several possible reasons that the results do not present a differentiation of knowledge of AIDS across socioeconomic lines between just HIV positive interviewees and the entire sample population. One possible reason is that there were not enough HIV positive individuals that were randomly tested by the Demographic and Health Surveys to allow enough variables to be significant. Also there were several independent variables in the regressions for low AIDS prevalent states that predicted that the dependent variable is equal to one perfectly, indicating that there weren't enough HIV positive interviewees to record a variation between interviewees' answers on the survey. There is also the possibility that HIV positive and HIV negative individuals have equal knowledge of AIDS, however have different sexual behaviors that explain their HIV status. If this is the case, AIDS prevention policies should be directed towards informing the Indian population on responsible sexual behaviors.

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[1] Leo Kahane, *Regression Basics* (Thousand Oaks, London, New Delhi: Sage Publications Inc., 2001), 201.

Ever Heard of AIDS

One variable in this analysis captures basic knowledge of AIDS. Table 5.1 presents results from a probit model where respondents were asked if they have ever heard of AIDS.

In table 5.1 all of the wealth and education variables are statistically significant. All of the coefficients for education and wealth are positive for males and females in high and low AIDS prevalent states meaning that they are all predicted to know that AIDS exists. However, the education coefficients for both males and females are larger for low AIDS prevalent states compared to high AIDS prevalent states. This may suggest a variation of the probabilities for lower and higher educated males and females that have ever heard of AIDS between low and high AIDS prevalent states; however, this can not be determined by just deciphering the probit coefficients.

Although the socioeconomic variables of media, marital status, and location are not the main focus of this paper their coefficients are significant and should be analyzed. The variable urban determines the probability that an individual living in an urban city is aware AIDS exists compared to an individual living in a rural town. Males and females in high and low AIDS prevalent states living in urban cities contain basic knowledge of AIDS. Although the same trend as education occurs for low AIDS prevalent states versus high AIDS prevalent states for individuals living in urban cities occurs; with the coefficients being larger for males and females in low AIDS prevalent states then their corresponding variables in high AIDS prevalent states.

The coefficient for the media variable is positive for males and females in high and low AIDS prevalent states; however, for females in high and low AIDS prevalent

states the coefficients are larger than males in those states. Although the probit coefficients do not predict average partial effects, these values are interesting considering that 91% and 81% of females in high and low AIDS prevalent states reported being exposed to a form of media at least once a week which is very similar to the males' values of 93% and 81%. This suggests that there may be a variation between the way males and females respond to AIDS awareness programs via the media.

The variables representing marital status also present a variation between males and females in both high and low AIDS prevalent states. Males that are married are predicted to know that AIDS exists compared to never married males; however the coefficients for married females in high and low AIDS prevalent states are negative, meaning that married females in high and low AIDS prevalent states are less likely to know AIDS exists compared to never married females.

The socioeconomic determinants of wealth and education of basic knowledge were presented and discussed in this paper along with the socioeconomic determinants of marital status, location, and media exposure. The following subsections will present the socioeconomic correlates of advanced knowledge of AIDS.

TABLE 5.1

EVER HEARD OF AIDS PROBIT RESULTS

	High Prevalent States		Low Prevalent States	
	Males	Females	Males	Females
Independent Variables	Coefficients	Coefficients	Coefficients	Coefficients
EDUC_1	0.2816973***	0.363839***	0.4359226***	0.5615119***
	[0.0358167]	[0.0273824]	[0.0243053]	[0.0146913]
EDUC_2	0.811759***	0.8739482***	1.0742170***	1.2214960***
	[0.0370614]	[0.0269316]	[0.0239789]	[0.0142931]
EDUC_3	1.525961***	1.866467***	2.0392680***	2.2784950***
	[0.1084011]	[0.1067603]	[0.101275]	[0.0607527]
WEALTH_1	0.2045287***	0.1523843***	0.3270476***	0.2321227***
	[0.0446972]	[0.0373921]	[0.0262084]	[0.0187455]
WEALTH_2	0.4447763***	0.340553***	0.5867407***	0.5049359***
	[0.0445084]	[0.0364961]	[0.0280757]	[0.0185636]
WEALTH_3	0.5945883***	0.4855044***	0.7616868***	0.7213279***
	[0.0504182]	[0.0399142]	[0.0324565]	[0.0197324]
WEALTH_4	0.8368049***	0.6544094***	0.9808876***	0.9486669***
	[0.0647217]	[0.0470054]	[0.0405812]	[0.0228229]
MEDIA	0.4496682***	0.7252877***	0.5784405***	0.7889719***
	[0.0377308]	[0.0284256]	[0.0207579]	[0.0145119]
URBAN	0.1939821***	0.0988391***	0.2980942***	0.2485483***
	[0.0329923]	[0.0237291]	[0.0236027]	[0.0129826]
MS_1	0.1196612**	-0.169305***	0.0558886*	-0.0699667**
	[0.052641]	[0.0370921]	[0.0323357]	[0.0190647]
MS_2	-0.0540262	-0.170339***	-0.225630***	-0.070261***
	[0.1151956]	[0.0518469]	[0.0660331]	[0.0315188]
Age Dummies	Yes	yes	yes	yes
Religion Dummies	Yes	yes	yes	yes
Observations	31,112	32,560	43,022	91,783
LR-Chi	3085.9***	6709.6***	12815.2***	46629.7***
McFadden's pseudo R^2	0.228	0.246	0.348	0.396

Note: Robust Standard Errors are in brackets. * = significant at 10% P value level, ** = significant at the 5% P value level, *** = significant at the 1% P value level

Don't Know of a Way to Avoid AIDS

There are two variables that determine the level of advanced knowledge of interviewees in high and low AIDS prevalent states. Table 5.2 displays the results for a probit model where individuals were asked if they knew of a way to avoid contracting AIDS. Only individuals that know about the existence of AIDS were used in this probit model because it is assumed individuals that have never heard of AIDS will not contain specific knowledge of the disease.

Not surprisingly, all education and wealth variables for males and females in high AIDS prevalent states and females in low AIDS prevalent states know of at least one way to avoid contracting AIDS. However, primary and secondary educated males answered yes to not knowing of a way to avoid AIDS. This is also true for males in the poor and middle wealth quintiles. This is consistent with the fact that 23.5% of males in low AIDS prevalent states reported not knowing of a way compared to 18.2% in high prevalent states. The reason for the variation between high and low AIDS prevalent states could be due to the second phase of the National AIDS Control Program (NACP) that was enacted from 2000-2006. Within the second phase of the NACP the Indian government aimed the fight against the AIDS epidemic at the state level and directed more funding to higher-risk socioeconomic groups and states[2].

The results for the media variable displayed that males and females in high AIDS prevalent states and females in low AIDS prevalent states reported knowing of a way to avoid AIDS. However, the coefficient for males in low AIDS prevalent states was not

[2] "HIV/AIDS in India," in The World Bank [database online]. August [cited 2008]. Available from www.worldbank.org/in.

significant at the 10% level, meaning that the probability that males in low AIDS prevalent states that watch television, listen to the radio, or read the newspaper, or attend a cinema at least once a month know of a way to avoid AIDS is not significantly different from males that are not in contact with this much media.

This subsection discussed the socioeconomic correlates of Indian citizens that know of a way to avoid AIDS. The next subsection will provide more insight on the level of advanced knowledge across socioeconomic lines.

TABLE 5.2

DON'T KNOW OF A WAY TO AVOID AIDS PROBIT RESULTS

	High Prevalent States		Low Prevalent States	
	Males	Females	Males	Females
Independent Variables	Coefficients	Coefficients	Coefficients	Coefficients
EDUC_1	-0.096448***	-0.139206***	0.1410175***	-0.0267438*
	[0.0305757]	[0.0277979]	[0.0242251]	[0.0193709]
EDUC_2	-0.369099***	-0.453778***	0.0340105*	-0.3002773***
	[0.0285183]	[0.0244531]	[0.0221857]	[0.0168012]
EDUC_3	-0.800343***	-1.00058***	-0.408395***	-0.810110***
	[0.0397834]	[0.0380548]	[0.0328708]	[0.0245046]
WEALTH_1	-0.0098445	-0.164182***	0.149484***	-0.0010558
	[0.0398025]	[0.0454739]	[0.0264469]	[0.030664]
WEALTH_2	-0.0836179**	-0.278002***	0.0927388**	-0.1166872***
	[]0.0380724	[0.0428939]	[0.0267237]	[0.0288615]
WEALTH_3	-0.153838***	-0.386330***	-0.0132362	-0.2127524***
	[0.0398281]	[0.0439008]	[0.0282478]	[0.0287732]
WEALTH_4	-0.247348***	-0.485469***	-0.2088623*	-0.4017625***
	[0.043327]	[0.0464486]	[0.0309236]	[0.0300101]
MEDIA	-0.105730***	-0.275207***	0.0013514	-0.1416595***
	[0.0336987]	[0.0381063]	[0.020182]	[0.024814]
URBAN	0.0274038	0.0729551***	0.1035589***	0.0096642
	[0.0211712]	[0.0199994]	[0.0169648]	[0.0124143]
MS_1	0.0060905	0.0097784	-0.085231***	-0.1275517***
	[0.0307531]	[0.027171]	[0.0228669]	[0.0173898]
MS_2	-0.030918	0.0511694	-0.165382***	-0.0491473*
	[0.0890694]	[0.0443343]	[0.0602956]	[0.0333567]
Age Dummies	yes	yes	yes	Yes
Religion Dummies	yes	yes	yes	yes
Observations	31,153	27,761	43,182	60,601
LR-Chi	1272.1	2340.9	1322.6	4061.1
McFadden's pseudo R^2	0.0445	0.0697	0.0307	0.0534

Note: Robust Standard Errors are in brackets. * = significant at 10% P value level, ** = significant at the 5% P value level, *** = significant at the 1% P value level

Can a Healthy Person Have AIDS

Table 5.3 displays the results for the probit model where respondents were asked if they knew a healthy looking person could have AIDS. This question tests interviewees on the specifics of the effects of AIDS on the human body. Once again, only individuals that know about the existence of AIDS were used in this probit model.

Males and females with at least a secondary level of education reported knowing that a healthy looking person can have AIDS with no variations between high and low AIDS prevalent states. However, males and females in high AIDS prevalent states and females in low prevalent states reported not knowing a healthy looking person has AIDS. This comes to no surprise that the less educated the individual, the less advanced knowledge of AIDS they have.

Males and females in the highest two wealth quintiles all reported knowing that a healthy looking person can have AIDS with no variations between high and low AIDS prevalent states. However, the probit coefficients males in high and low AIDS in the poor wealth quintile were significant, meaning they are not predicted to have more specific knowledge of AIDS than males in the poorest quintile. Overall, males and females in lower wealth quintiles are not expected to know that a healthy looking individual can have AIDS compared to wealthier individuals with exception to females in high AIDS prevalent states.

There were no variations between males and females or high and low AIDS prevalent states for media, marital status, or location aside from married individuals living in low AIDS prevalent states. Males in these states reported knowing that a

healthy looking person can have AIDS; however, females reported the opposite. These results are consistent with basic knowledge of AIDS.

The results between the variables DK and HLP were not consistent with each other in reporting variations across socioeconomic lines. The results suggests that AIDS prevention campaigns that are directed at educating the Indian population on advanced knowledge of AIDS may be formulated to inform them on methods to avoid contracting AIDS rather then teaching about the effects of AIDS on the human body.

TABLE 5.3

CAN A HEALTHY LOOKING PERSON HAVE AIDS PROBIT RESULTS

	High Prevalent States		Low Prevalent States	
	Males	Females	Males	Females
Independent Variables	Coefficients	Coefficients	Coefficients	Coefficients
EDUC_1	-0.0369313*	-0.110507***	-0.0177921	-0.062047***
	[0.0357468]	[0.0299553]	[0.0326849]	[0.0216461]
EDUC_2	0.0830773***	-0.0127542	0.0880702***	0.0115258
	[0.0327697]	[0.0263392]	[0.0292282]	[0.0188781]
EDUC_3	0.3407332***	0.2954747***	0.4438502***	0.360103***
	[0.0420942]	[0.0383523]	[0.0401849]	[0.0275362]
WEALTH_1	0.0205418	0.0791144*	0.0425363	0.0004922
	[0.0460371]	[0.047981]	[0.0350367]	[0.0332668]
WEALTH_2	0.0852265***	0.0736407*	0.1068765***	0.0474089
	[0.0435394]	[0.0451377]	[0.0342583]	[0.0313878]
WEALTH_3	0.1628039***	0.1694363***	0.18077***	0.1336151***
	[0.0448437]	[0.0461628]	[0.0353372]	[0.0313784]
WEALTH_4	0.3604381***	0.271878***	0.2940397***	0.2711***
	[0.048438]	[0.0488856]	[0.0380914]	[0.0328571]
MEDIA	0.0058066	0.0729768*	0.0395276*	-0.011532
	[0.0407369]	[0.0406495]	[0.0265422]	[0.0275327]
URBAN	0.1189094***	0.0354441*	0.1531981***	0.1276386***
	[0.0220147]	[0.020721]	[0.0199969]	[0.0138408]
MS_1	0.0583068***	-0.0335174	0.0482608*	-0.0427674**
	[0.0320433]	[0.0280366]	[0.0273709]	[0.0195987]
MS_2	0.0859061	-0.0044854	-0.0070449	-0.0408833
	[0.0990364]	[0.0471105]	[0.0780365]	[0.0380206]
AGE Dummies	Yes	yes	yes	yes
Religion Dummies	yes	yes	yes	yes
Observations	29,393	27,790	36,591	60,601
LR-Chi	745.6	566.5	1074.4***	1720.7***
McFadden's pseudo R^2	0.0304	0.02	0.0374	0.0304

Note: Robust Standard Errors are in brackets. * = significant at 10% P value level, ** = significant at the 5% P value level, *** = significant at the 1% P value level.

CHAPTER VI

CONCLUSION

Summary

The previous chapters shed light on the issues, relevant literature, theories, and methodology of determining the socioeconomic correlates of wealth and education; of knowledge of AIDS between high and low AIDS prevalent states in India. The main objective of this thesis was to test whether there is a difference between basic and advanced knowledge of AIDS for individuals living in high or low AIDS prevalent states in India across socioeconomic lines.

Using data from the NFHS-3 three survey questions and several socioeconomic statistics were used in a probit analysis to estimate the socioeconomic correlates of basic and advanced knowledge of AIDS. The data was split into two separate data sets containing groups of high AIDS prevalent states and a group of low AIDS prevalent in India to discover any variations between high and low risk groups.

The results were consistent with the reviewed literature in that there is a lack of basic and advanced knowledge for individuals in lower education and wealth brackets in India. However, this analysis was successful in determining a significant difference in advanced knowledge between high and low AIDS prevalent states, specifically in knowing of ways to avoid contracting AIDS.

Implications

Based upon this analysis, AIDS prevention campaigns should continue to direct their efforts at the state level. There were significant differences in basic and advanced knowledge between high and low prevalent states. The first step in AIDS prevention is to ensure that India's entire population is aware that AIDS exists because if individuals are not aware of AIDS, educating them on the specifics of AIDS is not efficient. After basic knowledge AIDS is obtained, the next step is to educate the population of ways to avoid AIDS and the effects of AIDS on the human body. By informing the Indian population on ways to avoid AIDS, safer sexual behavior will evolve.

Since there will not be a cure for AIDS in the near future, research such as the study performed in this paper is important for AIDS prevention policy makers to direct resources towards higher-risk groups. Until there is a readily available cure for AIDS it is essential that research continues to determine the most prone socioeconomic classes to become infected with AIDS because as policy makers target certain population sectors, the highest-risk groups will change[1]

Suggestions for Further Research

During the course of this study, several other research questions that can enhance this study have presented themselves. This section will suggest further methods to investigate the socioeconomic determinants of AIDS contraction.

The quickest and most useful approach to enhance this analysis is to estimate the average partial effect of each independent variable. The average partial effect is useful

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[1] Margaret Novicki, "Mixed Progress of the AIDS Epidemic," *Africa Recovery* 11#3 (1998)

because it calculates the change in the independent variables on the probability of the dependent variable.

Also, another way to continue the research performed in this paper is to determine the socioeconomic correlates of knowledge of AIDS at the state level. Within the NFHS there is a state variable that can be used to condense the nationwide sample to an individual state. By condensing the sample size to an individual state, the results may present variations across socioeconomic lines that would be useful for state governments in the formation of future AIDS prevention campaigns.

Along with the survey questions used in this study there are several other questions on the NFHS-3 that can be used to obtain a more in depth analysis of the level of knowledge of AIDS. There is a series of sixteen questions that ask interviewees if they know different ways to avoid AIDS. These questions consist of questions that have been proven as a successful method to reduce the chances of being infected with AIDS and also methods that are not a way to avoid contracting AIDS under normal circumstances. Using these questions, a more in depth research on quality of knowledge of AIDS can be performed on an individual state or a group of high and low AIDS prevalent states. Aside from using a similar probit model as used in this paper, a binomial hurdle model or a two-stage ordered probit model such as the models used in Aggarwal and Rous's[2] paper can be estimated to discover the socioeconomic determinants of the quality of knowledge of AIDS.

Further research related to determining the socioeconomic correlates of AIDS contraction is not confined to knowledge of AIDS. There are several survey questions

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[2] Aggarwal and Rous, *Awareness and Quality of Knowledge regarding HIV/AIDS among Women in India*, 371-401.

within the NFHS-3 that can be used to determine variations of sexual behavior or stigma across socioeconomic and state lines.

The most complex and perhaps the most beneficial research possibility is to utilize data from different waves of the NFHS. The Demographic and Health Surveys website contains every wave of the NFHS conducted thus far. For India, this consists of three different waves; the first wave was conducted in 1992-1993, the second wave was conducted in 1998-1999, and the most recent wave used in this study was conducted in 2005-2006. Using data from all three waves, the same analysis conducted in this paper can be researched and compared for all three waves. This would present insight on the socioeconomic classes that are responding to the AIDS prevention programs the quickest, which is beneficial for the formation of such programs.

Conclusion

In conclusion, India is at an important point in the fight against the AIDS epidemic. The HIV/AIDS prevalence rates in India have began to decrease slightly however the epidemic can quickly reverse due to the large population of India. Since there is an absence of a vaccine and widely available treatments for AIDS, the decrease in HIV/AIDS prevalence rates is due to the increase in AIDS prevention programs. educating citizens on AIDS knowledge. and safer sexual practices. The success of these programs is due to studies such as the research accomplished in this paper that helps direct prevention policy makers towards high-risk groups. The hopes and motivation behind AIDS related research is to eventually stop the spread of AIDS and win the war against the AIDS epidemic.

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