THE IMPACT OF SEXUAL EXPERIENCES OF YOUNG MINORITY GROUP MEMBERS IN THE UNITED STATES, AND THE ASSOCIATED RISKS OF SEXUALLY TRANSMITTED INFECTION (STI) TRANSMISSION AMONG ADULTS IN THE UNITED STATES AND CHINA

A Thesis

by

GINNY ELIZABETH GARCIA

Submitted to the Office of Graduate Studies of
Texas A&M University
in partial fulfillment of the requirements for the degree of

MASTER OF SCIENCE

May 2006

Major Subject: Sociology

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Approved by:

Chair of Committee,	Dudley L. Poston, Jr.
Committee Members,	Jane Sell
	William Alex McIntosh
Head of Department,	Mark Fossett

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ABSTRACT

The Impact of Sexual Experiences of Young Minority Group Members in the United States, and the Associated Risks of Sexually Transmitted Infection (STI) Transmission among Adults in the United States and China. (May 2006)

Ginny Elizabeth Garcia, B.S., Texas A&M University

Chair of Advisory Committee: Dr. Dudley L. Poston, Jr.

This thesis explores incidence rates of sexually transmitted infections (STIs) among minority group teenagers in the United States and among adults aged 20-34 in the U.S. and in China. The focus is on trends and patterns in the United States compared to those in China. Research questions include whether or not the early onset of sexual activity is directly related to the incidence of STI transmission among Americans. The Chinese analysis enables addressing the question of whether or not a hidden epidemic exists in China with regard to STI transmission rates. The thesis involves three separate analyses including a comparative study of teens (age 15-19) and adults (age 20-44) in the United States, a comparative study of adults aged 20-44 in the United States and China, and a comparative analysis of urine-based results versus self-reported responses among the Chinese adults. The use of logistic regression is employed in order to model the odds of the risk of transmission among the different groups.

The results from this thesis indicate that early onset of sexual activity is indeed a risk factor for young minority group members in the United States in terms of the bacterial infections. The analysis of American adults revealed that women who have college educations and who are not minority group members are at risk of contracting

viral infections with more frequency. Finally, a hidden epidemic among Chinese women was detected with respect to the bacterial infections.

It is important to study these trends within the U.S. and abroad in China for many reasons. First and foremost, young adults are the most heavily impacted in the United States. This population should be focused on as many of the infections discussed may lead to lifelong difficulties (including infertility) if left untreated. Also, with respect to China, a large proportion of those who are infected do not know they are. Again, these infections may lead to many complications and Chinese women are at an increased risk because many are infected unknowingly due to the behavior of their partner/spouse. Finally, sexually transmitted infections amplify the transmission rates of HIV/AIDS and should be studied specifically for this reason if none other.

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On a personal note, I am most thankful for my mom (Alicia Zemanek) and dad (Cesar Garcia) who continue to advise and help me in many aspects of life. I would not have made it this far without them and hope that I have made them proud. I will continue to do my best. I would also like to thank Tyler Alexander for his unwavering support. Finally, I would like to thank all of my friends and family who have always encouraged and supported me.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

CHAPTER I

INTRODUCTION

Sexually transmitted infections (STIs) have come to the forefront of many scholarly journals and have even merited the creation of several new journals including *AIDS*, *Sexually Transmitted Diseases,* and *Sexually Transmitted Infections*. STIs are a problem of enormous import in the world today and are continuing to spread at alarming rates. Furthermore, they are increasingly affecting larger and larger populations. Specifically, there is a proliferation of certain infections such as HIV, now gaining footholds in the heterosexual populations in the United States and China. In the United States, current trends indicate that the fastest growing population of those infected with HIV is the young heterosexual population. With respect to China, the heterosexual population is equally at risk as infections are being spread via commercial sex workers in coastal provinces into Mainland China. This thesis will explore the differing impacts of certain bacterial infections in the United States and overseas in the People's Republic of China.

Though STIs are continually referred to as sexually transmitted disease (STDs) in some journals, Sexually Transmitted Infection (STI) is the most current and appropriate term to describe the infections. Previously referred to as venereal diseases (VDs) or sexually transmitted diseases (STDs), they are now known as infections for various reasons that are associated with the stigma surrounding the terms "venereal," "disease" and "sexually transmitted." Whereas a disease is indicative of a lifelong and potentially incurable affliction, infection is in reality the more appropriate referent given the

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This thesis follows the style of *Genus*.

advances in modern medicine, which have made most sexually transmitted infections curable and at the very least manageable. Furthermore, many of the infections leave no long term effects if treated in a timely manner. Presently, the only STI that carries a death sentence is the Human Immunodeficiency Virus and its resultant Acquired Immune Deficiency Syndrome (HIV/AIDS). But, even this STI can be kept at bay for a number of years with proper treatment. While, STIs have become increasingly common, most may be completely cured or managed with medical treatment.

The general acceptance of the term STI is imperative for several reasons. It has been established that a stigma surrounds the term STD. This stigma must be addressed before any real prevention and treatment strategies can be implemented. The Centers for Disease Control and Prevention identifies the American reluctance to address sexuality and its inevitable connection to the spread of STIs as a major barrier to effective prevention and treatment (2004). Moreover, the stigmatization associated with STIs is a worldwide problem. A study conducted in China indicated that a perceived stigma strongly affected infected persons' willingness to seek treatment and notify their spouses of infection. The authors stated that, "The perception of stigma blocks the acceptance of community prevention efforts among people at risk and reduces the probability that that they will inform their sexual contacts. Both factors cause continued transmission of STDs" (Liu *et al*., 2002: 336). The use of the term "infection" provides an image that is not as stigmatizing as "Thus, acceptance and transition into the term infection serve as a vital step in the battle to raise awareness and decrease rates of spread.

The terms STI and STD are still interchangeable at this point however, and many still use the term STD to describe the infections this thesis will address. Thus, both terms

will be used as necessary throughout. Eight STIs have been identified in the United States according to the Centers for Disease Control and Prevention and will serve as the main guide for identification. These eight infections are chlamydia, bacterial vaginosis (BV), gonorrhea, trichomoniasis, human papilloma virus (HPV), genital herpes, HIV/AIDS, and syphilis. However, owing to data limitations, analyses will be restricted to the three bacterial infections: chlamydia, gonorrhea, and trichomoniasis[1]. This thesis will examine self-reported responses with regard to the incidence of these STIs in the United States as well as the incidence of key STIs in the People's Republic of China.

In the United States, as part of the Healthy People 2010 STD Objectives, several goals have been named including but not limited to the following: reducing the number of adolescents with chlamydia, reducing overall cases of gonorrhea and syphilis, and reducing the number of women aged 15-44 who have ever required treatment for Pelvic Inflammatory Disease. In the United States, the reported number of cases of chlamydia is on the rise (with the most at risk group being adolescents) as is syphilis. Another bacterial infection that has not been given as much attention as chlamydia and gonorrhea is trichomoniasis. This is because it does not have the same negative long term effects (i.e. PID). This particular bacterial infection affects mainly young women, and an estimated 7.4 million new cases are diagnosed each year (CDC, 2005).

It is also imperative that China address the growing concerns related to the spread of STIs. Parish and colleagues have identified a growing epidemic of Chlamydia among middle-aged Chinese women, and several reports point to a rapid spread of many of the

[1] Data are limited for two reasons. The first is that the bacterial infections are detectable in urine and we have access to the urine results for the Chinese sample population. Second, we have no access to any kind of results other than self-reported for the American sample population. Self-reported responses are provided for chlamydia and gonorrhea in this sample.

identified STIs into China's interior. Data for the three bacterial infections are available for China and will be used to assess the implications associated with their expansion.

The available data for the Chinese also include urine results that allow for an analysis of the possible misrepresentation that could occur with respect to the underreporting via the self-reported section of the questionnaire. The analysis will include information pertaining to the self-reported responses and urinalysis on the three bacterial infections for the Chinese, but will be limited to self-reporting for the United States. Furthermore, the data on bacterial infections in the United States are additionally restricted due to the exclusion of trichomoniasis as one of the STIs for which information was gathered. This is perhaps due to the assumption that trichomoniasis requires less attention than the previously mentioned infections because it does not have the same detrimental impacts. However, the available data on chlamydia and gonorrhea are sufficient to conduct an analysis of the possible repercussions of the spread of bacterial infections in the United States.

Chlamydia is currently the most commonly reported STI in the United States and is especially common among young women ages 15-24 (MMWR, 2003: 558). The Morbidity and Mortality Weekly Report indicates that, "an estimated 2.8 million infections occur annually" (2003:558). The report further signifies that in the state of Massachusetts, there has been a marked increase in the number of reported cases since 1996 (MMRW, 2003:558). Chlamydia and gonorrhea are especially crucial to consider given that both infections are typically asymptomatic and if left untreated can lead to several long term complications including Pelvic Inflammatory Disease. Furthermore,

the rates of infection with respect to each of them are most prominent among females younger than 20 years of age (Kent *et al*., 2002: 373).

As we examine rates of infection in China we can see that the bacterial infections are spreading rapidly. However the avenues of transmission as well as the affected populations for the Chinese vary dramatically. The landmark study conducted by Parish and colleagues uncovers evidence that chlamydia is indeed spreading at an alarming rate among the Chinese but in different populations than in the U.S. It is interesting to note that chlamydia and gonorrhea are typically regarded as infections of the young in the United States (as mentioned above), but they are becoming a problem for middle-aged women in China via the sexual behavior of their husbands/steady sexual partners. In fact, a shift toward infection in the older age groups was detected between the years of 1995 and 1998 in a study conducted by Chen and colleagues (2000: 140). The most current analyses conducted by Parish and colleagues reveal that, "prevalence of chlamydial infection per 100 population for women was 2.6…gonorrheal infection prevalence was for women was .08" (2003: 1268). These rates are quite similar to those of the United States, but the infected populations vary greatly. This topic will be discussed in detail in the second chapter.

Bacterial infections should be given special attention for several reasons. The first reason and the one with the most potential for widespread devastation is that, "individuals who are infected with STDs are at least 2 to 5 times more likely than uninfected individuals to acquire HIV if they are exposed to the virus through sexual contact" (CDC, 2005). These particular infections (i.e., non-ulcerative STDs) make an infected person more susceptible to the HIV virus because they increase the concentration

of cells that are more receptive to infection (CDC, 2005). Furthermore, they increase infectiousness given that infected persons shed more cells with HIV if they have another infection. Since these particular bacterial infections are spreading swiftly through the United States and China it is imperative to analyze the impacts of not only the infections themselves but the impacts they will have on the spread of HIV/AIDS. Bacterial infections are easily treatable, and early detection and treatment can certainly help to alleviate the burden being placed upon young heterosexuals in the United States who are becoming increasingly susceptible to HIV infection. With respect to China, detection of the infections is necessary because many women are unaware of the fact that they are infected given that it is mainly due to the behavior of their spouses/steady sexual partners. Also, as the HIV/AIDS epidemic becomes more visible in China, it is imperative that these infections be made public knowledge and cured so as to prevent their further spread.

In China, there has been an increase of chlamydial infection particularly among women between the ages of 30 and 39. These infections are usually spread through contact with their husbands or steady sex partners who travel frequently and engage in commercial sex while away from home (Parish *et al*., 2003: 1271). In general, STIs are affecting those between the ages of 20 and 49 with 93 percent of those infected falling into this category (Chen *et al*., 2000: 140). Sexually transmitted infections pose special risks because if left untreated they can cause permanent damage as well as amplify the transmission of HIV infection. There has not only been an increase in the spread of infection among men who frequent commercial sex workers but also among their wives and partners. In regard to the HIV/AIDS epidemic, Beyrer has stated, “the risk of

infection among men younger than age 45 was significantly associated with unprotected sex with commercial sex workers, while the risk for women was largely associated with behaviors of their spouses or steady sex partners" (2003: 1303). This evidence indicates the presence of a more mature epidemic in China due to the spread of HIV/AIDS into the heterosexual population.

The two-fold justification detailed above provides adequate substantiation that bacterial infections deserve attention. This is proven by the capacity of bacterial infections to be present with no symptoms (thus leading to long term consequences) and their ability to amplify the spread of HIV/AIDS. If left untreated, these infections can lead to permanent damage in both sexes. For example, untreated cases of chlamydia will lead to Pelvic Inflammatory Disease in up to 40 percent of infected women. Pelvic Inflammatory Disease can further lead to chronic pelvic pain, infertility and potentially fatal ectopic pregnancy (CDC, 2005). With respect to gonorrhea, untreated cases can also lead to Pelvic Inflammatory Disease. The CDC reports the following:

> When symptoms are present, they can be very severe and can include abdominal pain and fever. PID can lead to internal abscesses (pus-filled "pockets" that are hard to cure) and long-lasting, chronic pelvic pain. PID can damage the fallopian tubes enough to cause infertility or increase the risk of ectopic pregnancy. Ectopic pregnancy is a life-threatening condition in which a fertilized egg grows outside the uterus, usually in a fallopian tube (2005).

If gonorrhea is left untreated during pregnancy the complications can include blindness, joint problems and/or blood infections for the baby.

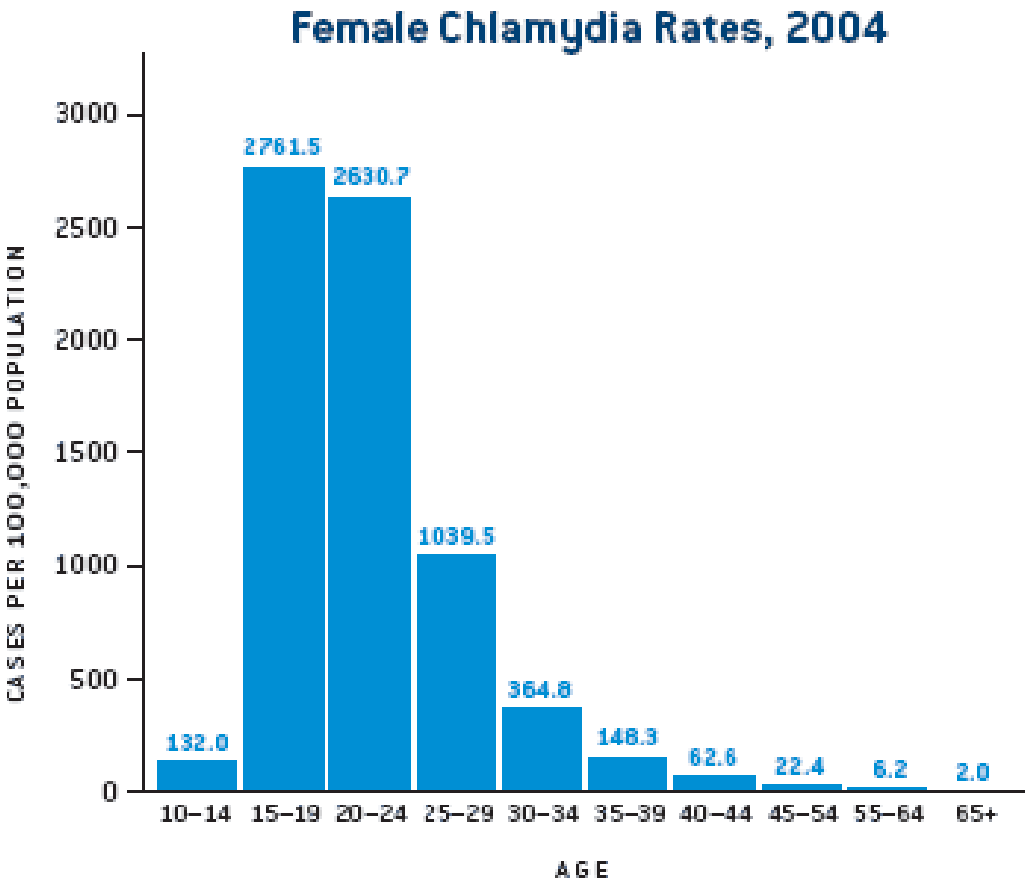
As has been discussed, sexually transmitted infections (STIs) continue to spread at an alarming rate in both the United States and China. For the U.S., the groups most at risk are adolescents, young adults, and minorities. Boonstra has stated that "new estimates published in the January/February issue of *Perspectives in Sexual and*

Reproductive Health show that nearly 19 million new STIs occurred in the United States in 2000" (2004: 1). Not surprisingly, nearly half of them were contracted by young people. The CDC confirms that almost half of the new chlamydial infections contracted each year are by young people aged 15-24 (2004). Furthermore, it has been observed that the rate of infection for chlamydia was seven and a half times higher for African American females than white females (CDC, 2004).

The second most commonly reported STI in the United States is gonorrhea with a rate of 113.5 cases per 100,000 persons in 2004 (CDC, 2004). Rates of infection for gonorrhea are also higher among minority groups in the United States. In the case of China, Parish and colleagues found prevalence rates of 2.6 per 100 women and .08 per 100 women for Chlamydia and gonorrhea, respectively. They further found that for women, "chlamydial infection was associated with older age, living near the southern coast or in cities, and being in a steady relationship with a man who earned a high income or who traveled less than 1 week per year or never traveled" (Parish *et al*., 2003: 1270).

As noted previously, the trends regarding the spread of STIs in the U.S. and China are different though both countries are experiencing a marked increase in the incidence of STI transmission. In the United States, the rate of chlamydial infection is certainly increasing. The CDC reports an increase of 5.9 percent in the number of reported cases from 2003 to 2004. Previously, there had been a steady increase in the number of reported cases from 1984 to 2004 (see Figure 1.1). These increases seem to be more predominant among young women though the discrepancies may be explained in part by a greater likelihood of screening among women.

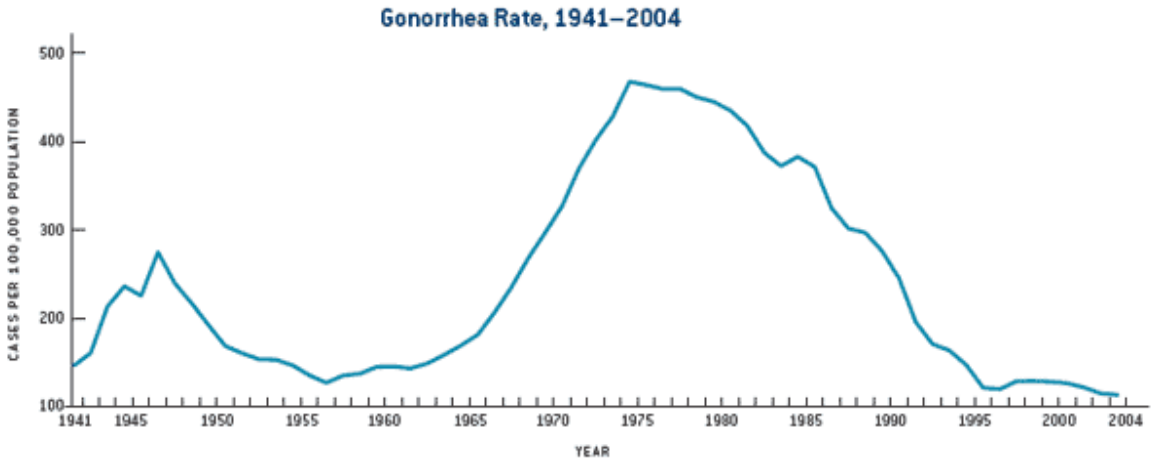
FIGURE 1.1



Chlamydia: U.S. Female Rates (U.S. Centers for Disease Control and Prevention, 2004)

In the case of gonorrhea there has been a 1.5 percent decrease in the number of reported cases (Figure 1.2). However, the CDC states that, “like chlamydia, however, gonorrhea is substantially under diagnosed and under reported, and approximately twice as many new infections are estimated to occur each year as are reported” (2004). The CDC also points out that the reporting of cases of gonorrhea may be biased toward minority/ethnic groups due to their increased likelihood of visiting a public STD clinic (2004). In the year 2004, the rates for gonorrhea were highest among females aged 15-24 and males aged 20-24; among racial groups whites saw an increase. It should be noted however that African Americans are still the most heavily affected by gonorrhea. Trichomoniasis incidence has also increased in recent years; there has been a 23.5 percent increase between 2003 and 2004 (CDC, 2004).

FIGURE 1.2



U.S. Rates of Gonorrhea per 100,000 Population (U.S. Centers for Disease Control and Prevention, 2004)

According to Parrish and colleagues, chlamydia is the most rapidly rising infection among the Chinese and has been termed a silent epidemic due to the fact that in the majority of cases no symptoms are present (2003: 1265; CDC, 2005). Many researchers are finding support for a resurgence of all STIs as well as the emergence of a severe HIV/AIDS epidemic. Chen and colleagues in conjunction with the Centers for Disease Control and the Chinese Ministry of Health (study was organized by the National Center for STD and Leprosy Control) collected data pertaining to STD incidence and prevalence in China and concluded that the rates did indeed increase from 1989 to 1998 (Chen *et al*., 2000: 138; see also Cohen *et al*., 2000: 144). Their findings indicate that rates for STDs overall are increasing, and that the rates in men were consistently higher, though the gender gap is lessening (Chen *et al*., 2000: 141). Extramarital transmission is identified as the key source of infection, and the number of persons infected in this manner significantly increased from 1995 to 1998 (Chen *et al*., 2000: 140). Specifically, the average increases were 17.3%, 18.3% and 23.3%" (Chen *et al*., 2000: 139).

Though HIV/AIDS is on the decline in the United States in most populations, this is not so among U.S. teenagers. Increases in HIV transmission are occurring among girls aged 13-19, most of whom have cited heterosexual contact as the main vessel for becoming infected (Caron *et al*., 2004: 186). In fact, data from the Youth Risk Behavior Survey indicate that half of American high school students report having had sexual intercourse (Caron *et al*., 2004: 186). Kalmuss and colleagues have stated that "in the United States, the risk of acquiring an STI is higher among teenagers than among adults" (2003: 87). This trend is nothing short of alarming. Moreover, the implications of contracting STIs due to early sexual experience can be devastating, ranging from minor

pain and irritation to chronic illness and even death. Sexually transmitted infections pose special risks because if left untreated they can cause permanent damage as well as amplify the transmission of HIV infection. This is particularly the case in China where there has recently occurred the spread of HIV/AIDS into the heterosexual population.

Prior to the founding of the Peoples' Republic of China in 1949, STIs such as gonorrhea and syphilis were fairly common (Hershatter 1997; Chen, 1999: 138). The Communist Party was able to effectively eradicate STIs under Mao's regime because it was considered patriotic to seek treatment and/or to report cases of infection. Furthermore, commercial sex work was virtually eliminated via such strategies as the closing down of brothels, forbidding prostitution, offering free treatment, and publicizing prevention and treatment programs (Chen, 2000: 138). But in the past 20 years with economic modernization and the opening of China to the world, there has occurred a marked increase in the spread of STIs. Much of this is due to the expansion of the commercial sex industry, itself heavily responsible for the spread of infection. In fact, some project that by 2010 the rate of HIV infection in China will surpass that of the United States and rival that of sub-Saharan Africa (currently with the highest prevalence in the world) (Parish, 2003: 1265; Tucker *et al*., 2005; Yang *et al*., 2005).

Historically, mass migration has led to an increase in the number of sexually transmitted infections with respect to the Chinese. Cyranowski states that, "historical precedents, such as a sex ratio imbalance caused by mass migration to Shanghai in the 1930s, have led to rampant sexually transmitted infections" (2005: 434). This brings to light the uniqueness of the Chinese situation regarding the spread of sexually transmitted infections. Migration aside, the Chinese are experiencing problems related to the

implementation of their one-child policy and its subsequent increase in the number of males born to each female. A normal sex ratio at birth (SRB) is around 105, that is, 105 males are born for every 100 females born. This is a biologically pre-determined estimate and can most likely be explained by the fact that females enjoy higher survival rates than males (Poston and Glover, 2005:123). In the late 1980's the SRB began to increase with a reported high of 120 and a most recent estimate in the year 2001 of 118 (Poston and Glover, 2005: 123). This translates into a surplus of 8.5 million men born in China between the years 1980 to 2000 (Tucker *et al.*, 2005: 540).

The current estimates (2004) pertaining to the number of surplus boys is approximately 1.7 million and is expected to reach an astounding 23.5 million by the year 2021 (Poston and Glover, 2005: 127). These excess men will be characterized by poverty, unemployment, low levels of education and the inability to find wives (Tucker *et al.*, 2005: 541). Furthermore, it is expected that these men will act as a bridging population for the spread of sexually transmitted infections into the general public. We will assume for the purposes of this thesis that the surplus boys are similar to migrant workers and can be analyzed accordingly. Thus, as migrant populations have been identified as key sources to the spread of infection, so too can the surplus men be regarded. Smith indicates the following with regard to migrant populations,

> For the most part they are young and poorly educated, and although they are in the sexually most active part of their lives, they actually have little knowledge either about STDs in general, or about HIV specifically, and almost no access to preventive education or regular health care (2005: 69).

Thus we can begin to see the negative impacts the surplus boys may well have on the spread of sexually transmitted infections in China.

In this thesis self-reported data from the National Survey of Family Growth for the incidence of chlamydia and gonorrhea will be examined for the United States. With regard to China the STIs of chlamydia, gonorrhea, and trichomoniasis will be examined as reported by self-administered responses and urine results. Equations modeling their incidence will then be estimated for both countries.

CHAPTER II

LITERATURE REVIEW

This chapter is comprised of a literature review that details the incidence and prevalence rates of sexually transmitted infections in the United States and China. It includes a full description of the bacterial infections that have been identified, and for which data are available. A theory section is included which describes the theoretical framework used for analysis. A full accounting of the current trends with respect to infection is provided for the United States. The review of STIs in China includes their history as well as the available information pertaining to their rates.

Certain articles were used mainly for statistical information such as rates of STI infection. The CDC provided the bulk of the information pertaining to the United States' rates as well as full descriptions of the related infections. Several articles were used to exemplify the nature of and extent of infection in the United States. For example, Caron's article indicates astounding rates of sexual activity amongst high school students. The NIH Condom Report provides information on who is most at risk of contracting an STI – including adolescents, young adults and minorities (Cates, 2001). Boonstra's article in the Guttmacher Report indicates high rates of STI infection (19 million new cases in 2000)(2004). Cohen's article discusses the benefits of investing in promoting sexual health including, "reduced infertility and the stigma associated with it and with HIV/AIDS" (2004). The research by Kalmuss and colleagues (2003) indicates that the number of youths having sex at an early age is increasing. With respect to trends regarding minorities and STI transmission risk in the U.S., data indicate that minorities are more likely to engage in early sex than whites. Kalmuss and colleagues have

observed that, “black teenagers are more likely to have very early vaginal sex than Hispanics, who are more likely to do so than whites…Hispanic adolescents are the least likely to have used a condom or another contraceptive method at last intercourse (2003: 88). Thus the analysis of behavior among minorities becomes important for an analysis of U.S. transmission rates. Chen and colleagues, as well as Parish and colleagues, were the main contributors as to rates of infection among the Chinese. A number of articles pertaining to newly identified at-risk groups, as well as the nature of the spread of STIs in China were used. Also reviewed were journal articles related to the impacts associated with migration and STI transmission.

The U.S. Centers for Disease Control and Prevention (CDC) has identified eight major STIs, namely, HIV/AIDS, syphilis, trichomoniasis, human papilloma virus (HPV), bacterial vaginosis, chlamydia, genital herpes and gonorrhea. It was established in the introduction of this thesis that we would be focus on the three bacterial infections of chlamydia, gonorrhea and trichomoniasis. The following paragraphs will provide an overview as to nature and symptoms of each. An analysis of Pelvic Inflammatory Disease will also be included because it is the result in many cases of untreated infections of gonorrhea and chlamydia in women.

STIs – An Overview

Chlamydia is a bacterial infection that is the most commonly reported STI in China, the United States and many other countries. It is caused by the bacterium *Chlamydia trachomatis* and if left untreated can cause particularly serious problems within a woman’s reproductive system. It is mainly transmitted through vaginal, anal and

oral sex, and can also be passed from mother to child during a vaginal delivery. Chlamydia is typically known as a "silent disease" because approximately three quarters of women and one half of infected men have no recognizable symptoms. If symptoms do occur, they normally appear within 1 to 3 weeks after exposure and can include abnormal discharge and/or burning sensation during urination. Untreated infections in women may eventually spread into the uterus or fallopian tubes and cause pelvic inflammatory disease, chronic pelvic pain or potentially fatal ectopic pregnancy (pregnancy outside the uterus). It also increases susceptibility to HIV by up to five times. In men, complications are rare though it may lead to epididymitis which can cause pain, fever and in some cases sterility. Chlamydia can be diagnosed with a laboratory test and is easily treated and cured with antibiotics (CDC, 2005).

Gonorrhea is a bacterial infection caused by the bacterium *Neisseria gonorrhoeae* and if untreated can lead to pelvic inflammatory disease in women and epididymitis (a painful condition of the testicles that often leads to infertility) in men. It is typically transmitted through contact with the penis, vagina, mouth or anus. It may also be spread from mother to child during a vaginal delivery and can cause blindness, joint infection or a life-threatening blood condition in the baby. Symptoms for men include a white, yellow or green discharge from the penis and/or burning sensation during urination. Some men experience painful or swollen testicles. Symptoms for women include painful urination, increased vaginal discharge and/or vaginal bleeding between menstrual periods. Infected persons may or may not have any of the above mentioned symptoms, but if they do, they tend to appear within two to five days after infection. Gonorrhea also increases

susceptibility to HIV. There are several laboratory tests used to diagnose gonorrhea, and it is successfully treated with several different antibiotics (CDC, 2005).

Trichomoniasis is a parasitic infection caused by the single-celled protozoan parasite *Trichomonas vaginalis.* The vagina is the most common site of infection for women and the urethra for men. Trichomoniasis is spread via penis to vagina contact and vulva-to-vulva contact. For women the symptoms include a frothy yellow-green discharge that has a strong odor, and for men a mild discharge and/or burning after urination or ejaculation. Symptoms typically occur within five to 28 days after exposure. If left untreated in women the infection can result in babies born with low birth weight and/or born premature. It also renders the patient more vulnerable to HIV infection. This STI is detected through a physical examination and laboratory test. It can be cured with the prescription drug *metronidazole* (CDC, 2005).

Pelvic Inflammatory Disease (PID) is a general term used to describe an infection of the reproductive organs in a woman. It is most often caused by gonorrhea and Chlamydia. It can be characterized by chronic pelvic pain, ectopic pregnancy, sterility, abscess formation and in some cases death (related to complications). It is caused when bacteria move from the vagina, through the cervix and into the reproductive organs. Women younger than 25 are at a greater risk for developing PID as their cervixes have not fully matured which makes them more vulnerable to the STIs that develop into PID. The most common symptom of PID is lower abdominal pain, and there may also be foul-smelling discharge, pain during sex or urination and irregular menstrual bleeding. PID is treated with several antibiotics depending upon the cause of infection; two are usually

prescribed to ensure protection against a wide range of infectious agents. Treatment does not reverse existing damage (CDC, 2005).

In the case of many of the STIs the CDC has identified, one of the major obstacles to their study in any country is the fact that they manifest themselves with no symptoms or with ambiguous ones. Many infected persons' symptoms are unrecognizable and as such go undetected. Another problem that has been identified with regard to the proliferation of STIs is the stigma associated with having a sexually transmitted infection. Many infected persons are reluctant to fully disclose information to health officials, notify their partners of infections, and/or seek treatment. The following section will describe this problem and its theoretical background.

Attribution Theory as Applied to Stigmatization

One of the many obstacles to successfully applying prevention and treatment strategies with regard to sexually transmitted infections is that of stigmatization. Stigma is defined as, "an interactional process that exists within a social or cultural context and is perpetuated by 'the acceptance of the stigma by the stigmatized'" (Radecki-Breitkopf, 2004: 4). Also, "stigma is defined as an undesirable attribute in a person that is viewed as setting that person apart from the rest of society" (Cunningham *et al*., 2002: 335). In many cases, the afflicted person feels responsible for his or her condition and in turn attributes these feelings of shame, rejection or embarrassment to the self or to others' behavior. Attribution theory, a general theory of how people assign meaning and causality, refers to this internal and external assignment of blame. The labels associated with STIs create stigma and, because, at least in some cases, the stigma is not

automatically "revealed," individuals may be unwilling to admit to or even seek help for the infection. Cunningham and colleagues' study revealed that one of the major barriers to successful STD related health care is the manner in which stigma negatively influences the decision to disclose sexual behavior (2002: 338).

Stigma can be characterized in any number of ways including "abominations of the body" or "blemishes of individual character" related to personality or behavior as described by Goffman (Radecki-Breitkopf, 2004: 4). The stigma is intensified as the risk to others (i.e. contagion) increases. Thus in the case of STIs, researchers are faced with the dilemma of underreporting since many participants are unwilling to report their condition owing to their perceptions of it. In a study conducted by Cunningham and colleagues it was found that, "adolescents report a greater reluctance to respond honestly to questions about contracting a sexually transmitted disease, frequency of sexual intercourse, anal sex, or oral sex" (2002: 335). These perceived attitudes and consequences associated with STIs constitute a major barrier to their study and subsequent elimination of the infections. Consequently, it becomes necessary that health and public officials begin to refer to sexually transmitted infections as just that – infections that are treatable and/or curable.

Evidence suggests that STIs were all but eradicated during the Maoist regime. In large part this is attributable to the reduction of the shame associated with admitting to being infected. Studies detailing the elimination of STIs during this time frame in China indicated that one of the key components of Mao's strategy involved convincing those who were infected that they should not blame themselves but rather the West and capitalism for their infections. The notion of being personally responsible for contracting

an STI was all but removed and the reluctance to get treatment and testing was eliminated as a result. An increase in STI incidence has been observed in China beginning in the 1980's, and many postulate that this increase directly coincides with an introduction to Western culture and subsequent acceptance of Western norms and beliefs. Thus as the Chinese begin to adopt Western norms more widely, they will inevitably adopt the same attitudes with regard to the stigmatization of STIs.

Attributional Theory also helps to elucidate the emotional responses invoked as a response to contracting an STI. For example, if an individual attributes the responsibility of contraction to him/herself, a response of anger or self-blame may be detected. If attribution is viewed as a form of labeling, it can be observed that afflicted individuals' behaviors will be aligned with the label – or stigma. Thus in the case of STIs, shame is the most common response and an individual will align one's behavior accordingly. . Currently, the attitude toward STIs in the United States and all over the world is one of embarrassment, shame, and repression. Accordingly, individuals who are diagnosed with STIs behave in a manner consistent with those beliefs.

The exploration of STIs within the scope of attribution as labeling should be important for application; it is necessary to know how the STI is perceived by people in order to design successful interventions. Additionally, it is possible that the degree of stigma can be lessened through information.

Sexually Transmitted Infections in the United States

With respect to trends regarding STI transmission risk in the U.S., data indicate that minorities are more likely to engage in early sex than whites. Kalmuss and

colleagues have observed that, "black teenagers are more likely to have very early vaginal sex than Hispanics, who are more likely to do so than whites…Hispanic adolescents are the least likely to have used a condom or another contraceptive method at last intercourse (2003: 88). Thus the analysis of behavior among young minorities becomes important for an analysis of U.S. transmission rates.

In the United States an estimated 19 million new cases are occurring each year, and we are seeing a disproportionate burden being placed upon females since the effects of STIs are more devastating in terms of long term effects for females than for males (CDC, 2005). For example, in women, untreated cases of chlamydial infection will lead to Pelvic Inflammatory Disease in 40 percent of the cases, infertility in 20 percent, debilitating pelvic pain in 18 percent, and life-threatening tubal pregnancies in 9 percent (Caron *et al*., 2004: 186; see also CDC, 2005). Gonorrhea can also lead to Pelvic Inflammatory Disease and also infertility if left untreated. In some cases it can spread to the blood and joints causing a possibly life-threatening condition in children born to infected mothers. Trichomoniasis is not necessarily associated with any long term negative effects though it does increase susceptibility to HIV infection and requires its share of attention specifically for this reason.

In the case of chlamydia, young women in particular are at a high risk for contracting the infection. In 2004, the rate of infection in females was 3.3 times higher than that for males, and in the overall population an increase of 5.9 percent was observed from 2003 to 2004 (CDC, 2005). In a study conducted by Gershman and Barrow in Colorado, it was found that women who tested positive for chlamydia were more likely to be younger than 25 years, of black or Hispanic race/ethnicity and have had multiple sex

partners (1996). In a study conducted in San Francisco high schools a prevalence rate of 3.9 percent was detected among females, with 1.5 percent among those less than 16 years of age (Kent *et al*., 2002:373). Of the infectious diseases, chlamydia persists with the highest reported prevalence rates in the United States (CDC, 2004).

Rates for the spread of gonorrhea in the United States are at their lowest since 1941; with a reported rate in 2004 of 113.5 cases per 100,000 persons (CDC, 2004). As was discussed previously; however, theses rates could be misleading as it is an infection that is significantly underreported. Worldwide, gonorrhea accounts for 62 million infected persons (WHO, 2001). The group affected most in the United States is African Americans (629.6 per 100,000 population), though their rates are on the decline. Rates of infection between the years of 2003 and 2004 increased by 2.1 percent for whites, 2.3 percent for Hispanics and 14.8 percent for American Indians (CDC, 2004). One of the new concerns with respect to gonorrhea is its increasing resistance to antibiotics. The CDC found that 6.8 percent of cases were demonstrating resistance to the traditional form of treatment – fluoroquinolones.

Trichomoniasis is the most common of the STIs worldwide and, according to the World Health Organization, the most common in the United States with 8 million infected persons (WHO, 2001). This by far surpasses the level of chlamydial infection, which is at approximately 3 million (CDC, 2005). Based on estimates obtained from an analysis conducted by Weinstock and colleagues, approximately 1.9 million of the new infections of trichomoniasis in 2000 occurred among those between the ages of 15 and 24 (2000: 8). Data on the true prevalence of trichomoniasis are limited, however, due to the fact that no national surveillance is maintained for this infection. This is largely due to

the fact that trichomiasis is not a reportable condition in most jurisdictions. Therefore, as researchers we are left to rely on prevalence studies, and accordingly, the risk that sampled populations may not be representative of the entire population (Weinstock *et al*., 2000: 6, CDC, 2005). Furthermore, those studies that do include this infection typically do not do so to ascertain prevalence rates. The data set being utilized for this report does not include information on trichomoniasis. This occurs, presumably, for the above mentioned reasons.

Trichomoniasis manifests itself as a form of vaginitis in women. Though the long term effects are not nearly as devastating as those of the above mentioned infections, they can include premature and low birth weights of offspring to women who are infected while pregnant. A wealth of data exists about the increased risk of HIV infection to a person who is infected with trichomoniasis. Data from studies conducted in Africa suggest that an increase in risk of infection of 2 to 3 times may exist for the transmission of the HIV virus (Sorvillo *et al*., 2001: 930). In the United States, researchers have observed higher incidences of infection among African American women. Sorvillo and colleagues state, "in each study that has presented information on race/ethnicity, the prevalence of trichomonas has been highest in African Americans (23%-51%), ranging from approximately 1.5 to 4 times greater than other racial/ethnic groups" (2001: 929).

Early onset of sexual activity has been demonstrated to strongly impact the likelihood of becoming infected with an STI at some point in the person's lifetime. Risk factors in the United States include a young age at first intercourse, drinking and drug use, high numbers of sex partners and race (Ericksen and Trocki, 1992: 843). With respect to the increased incidence of infection among African Americans, Ericksen's

study points to the early onset of sexual activity among women as the key risk factor for the spread among such groups (Ericksen and Trocki, 1992: 846). The authors identified inner-city subgroups as a high risk group and demonstrated that they were far more likely to engage in the trading of sex for drugs and in unprotected sex while under some sort of an illicit influence (Ericksen and Trocki, 1992: 844). Their data further show that, "women who were younger than sixteen when they had their first sexual intercourse are more than three times more likely to report STDs than women whose first sexual experience was at an older age" (Ericksen and Trocki, 1992: 849). These data indicate that the behavior of young minorities is putting them at an especially high risk for contracting STIs and efforts at prevention should be directed at these groups.

In a report published by the National Survey of Family Growth, it was shown that the percentage of never-married females and males between the ages of 15 and 19 who reported having had sexual intercourse was 46 percent (2002). Though this number has decreased in relation to previous estimates it is still substantial. Also, it brings to light the degree of sexual behavior of youths in the United States. When coupled with the finding that 25 percent of females and 18 percent of males reported to using no method of contraception at first intercourse, the potential for the spread of infection is even more apparent (NSFG, 2002:1). The findings regarding minorities and their sexual behavior further indicate that they are at an even higher likelihood of infection since they are less likely to use any form of contraception than their white counterparts (NSFG, 2002:2). Also, the number of teens who are participating in early sexual activity is increasing, and this finding alone is very alarming because it has been found to be one of the key risk

factors in the likelihood of reporting having an STI (Kalmuss *et al*., 2003: 87-93; Erickson and Trocki, 1992: 849).

Bacterial infections account for a majority of the reported infectious diseases in the United States. Furthermore, the highest rates of bacterial infection are among American youths. These particular infections are important to study for several reasons including the fact that if left untreated, chlamydia and gonorrhea can cause serious complications, all of which have been detailed above. Also, all three bacterial infections contribute to the spread of HIV, a growing concern among heterosexual populations. The bacterial infections are of particular importance with respect to young, minority populations in the United States because these are the groups most impacted and are exhibiting increasing rates of infection.

Sexually Transmitted Infections in China

The first chapter of this thesis introduced the finding that STIs had been virtually eliminated in China during the 1950's. Reports indicate that STIs were originally introduced in China by Portuguese traders sometime in the 1500's and they had managed to gain quite a foothold by the 1930's and 1940's (Cohen, 1996: S223). The high rates of infection during this time are most likely attributable to prostitution. An estimated 10 million Chinese were infected with sexually transmitted infections in 1950 (Cohen *et al*., 2000: 143). This problem was immediately addressed as an issue of the utmost importance with the instatement of Mao Zedong and his communist party objectives. His beliefs were that these infections signified a greater affliction with respect to the overall health of the Chinese people and the nation (Cohen, 1996: S224). Thus, in 1950 he

mounted a nationwide campaign with the help of the Central Research Institute of Dermatology and Venereology to eliminate VDs (as they were referred to then). This campaign involved four components. The first step involved the training of all health-related personnel. This part of the program educated practitioners in the recognition and treatment of STIs. A second element of the program featured an insistence on mass screenings in many parts of the country. As a third feature of the program, a massive propaganda campaign was implemented that identified the West and capitalism as the true enemy and vessel for the spread of infection. Mao Zedong was able to effectively redirect the nation's contempt toward the actual affliction rather than the infected person. Last, Mao directed a good portion of his efforts at the eradication of prostitution. He was able to accomplish this last goal by closing down brothels, arresting prostitutes and placing them in programs of reform. It was his intention that these women would transfer their loyalty to brothel owners over to the new regime. The women also received labor-related training and education and were not released until they became employed or participated in an arranged marriage (Cohen, 1996: S226). One of the most effective tenets of this program was that Mao made the treatment and its subsequent eradication of STIs an act of patriotism. According to an analysis conducted by Cohen and colleagues, STIs had all but vanished until the 1980's when China opened its doors to the West (1996: S226).

Currently, China's rate of infection is just as alarming as that of the United States even though the composition of the risk population differs. A newly found at-risk group is comprised of older, more educated Chinese men who then transmit the infections to their wives/steady partners, themselves comprising their own high risk group. It has been

reported that the "rate of increase in the number of infected persons [previously] had been about 30 percent per year, but this ... doubled by the year 2002" (Smith, 2005: 65). The literature concerning STIs and HIV/AIDS all seem to point to several reasons for the rapid spread of infection in China. These include China's open door policy and its subsequent introduction to Western culture, the rise of the commercial sex industry, and increasing numbers of young migrant workers, i.e., the floating migrants.

With regard to STI research conducted in China, one of the best and most well known analyses is by Parish and colleagues (2003). Their results indicate that the highest risk factor for contracting chlamydia is unprotected commercial sex. The authors have written that, "transmission remains concentrated in paths that lead from commercial sex worker to husband/steady partner to wife/steady partner" (Parish, 2003: 1271). The impacts of this research are profound because they point not only to a hidden epidemic of STIs that can lead to an increase in the spread of HIV/AIDS, but to a previously unidentified risk population that is especially prone to infection that consists of married men who are well-educated, travel often, and earn large incomes. This is counterintuitive to the notion that chlamydia is primarily an infection concentrated among young people, or a disease of the youth as is the situation in the United States.

In terms of actual rates of infection in China, we do not have a clear picture. The Chinese Centers for Disease Control do not publish their rates, so we must turn to individual prevalence studies and the estimates of the World Health Organization. However, China has implemented a program to control the spread of sexually transmitted infections organized by the Chinese Ministry of Health in conjunction with the National Center for AIDS Control and the National Center for STD and Leprosy Control. A

national system of STD surveillance was implemented in 1988 in response to the *Law of the People's Republic of China on the Prevention and Control of Infectious Diseases* and the *Management Regulation of STD Prevention and Control*. This law deemed syphilis, gonorrhea, AIDS, genital herpes, lymphogranuloma venereu, chancroid, genital warts and non-gonococcal urethritis/cervicitis as reportable infections (Chen *et al*., 2000: 140). A major obstacle to their prevention efforts is the significant amount of underreporting resulting from the fact that many are not treated in public settings (Chen *et al*., 2000: 140). Also, because the Chinese do not have access to reports on STIs in the private sector, they do not have the ability to give exact estimates of their prevalence. However, the study conducted by Chen and colleagues does allow for an analysis of trends with respect to the situation of STIs in China.

The above-mentioned program implemented a study conducted from 1989 to 1998 and uncovered the following. Overall, rates of infection increased 4.2 times for women and 3.78 times for men, and extramarital transmission was identified as a key component in the spread (Chen *et al*., 2000: 138). Chlamydia and trichomoniasis were not identified in their study, although the rates for gonorrhea were documented. Gonorrhea has shown a rise of 11.4 percent during the study period and accounts for the highest percentage of reported STIs (Chen *et al*., 2000: 141). The cases of infection are concentrated among older age groups as expected. However, this particular study attributes this to later onset of sexual activity among the Chinese. The World Health Organization reports that 18 million new cases of curable infections were detected within the East Asian region. Their estimates indicate that there are 5.3 million currently

infected with Chlamydia in this region, 3 million infected with gonorrhea and 10 million infected with trichomoniasis (WHO, 2001).

The decline of the socialist regime in China in the last two decades has been argued to have contributed substantially to the rise of commercial sex (Parrish, 2003: 1265). Current data and research indicate that the rise of the commercial sex industry is having a tremendous impact on the spread of STIs and HIV/AIDS. The number of Chinese female sex workers (FSWs) is estimated to have increased from 25,000 in 1985 to 420,000 in 1996, and some believe these estimates to be low (Tucker *et al*., 2005: 5). In fact, a study conducted by Cyranowski indicates that the number of prostitutes in China currently falls between 4 and 6 million (2005: 425). Also, slightly more than one-half of FSWs in China have admitted to having never used condoms during commercial sex encounters in the year of 2000 (Tucker *et al*., 2005: 6). A recent study conducted on female sex workers in China indicated that somewhere between 14 and 50 percent of them are infected with STIs (Xia and Yang, 2005: 144).

These numbers are staggering in terms of their potential for widespread infection. According to Parrish and his colleagues, the "absolute numbers of individuals with HIV infection are projected to surpass current numbers in the United States within two years and those within South Africa (currently the highest) within a decade" (Parrish *et al*., 2003: 1265).

Studies pertaining to HIV/AIDS and its prevalence indicate different progressions of the epidemic and these phases have been combined in an all-encompassing picture of it in China. Whereas foreign contacts can be originally singled out as the initial bench marker for the spread of infection, Thompson points to plasma donation as the first phase

of the epidemic (2005). This began in the mid-1980's and was facilitated by entrepreneurs who would pay poor peasants to donate plasma. Plasma is, "liquid portion of blood that provides critical proteins for blood clotting and immunity" (Thompson, 2005: 6). Thus the remaining blood was pooled and injected back into donors allowing for one infection to multiply rapidly and in the same way it did in the U.S. among hemophiliacs. Infections that were thought to be localized during this time frame had spread to 30 of the 31 Chinese provinces as of 2003.

Intravenous drug users are a second risk population and account for 44 percent of adults living with HIV/AIDS in China as of 2003. IDU's are increasingly a huge risk population because they often turn to commercial sex to support/facilitate their habit (Thompson, 2005:7). Furthermore, IDU's tend to be more sexually active than was previously estimated. This is indeed acting as a bridging population into the heterosexual population. In a study conducted by Xia and Yang they, "found that drug users were more likely to be involved in higher-risk sexual behaviors than those who do not use drugs. Most female drug users (52-98 percent) reported having engaged in commercial sex" (2005: 270). These numbers indicated that IDU's are significantly affecting the spread of HIV/AIDS. Thompson indicates that sexual transmission marks the third phase of the epidemic. This is synchronous with recent studies indicating the spread of HIV/AIDS into China's interior as it is being facilitated by commercial sex and young migrant workers. Current estimates indicate that the rate of infection among the heterosexual population has increased from 6 percent in 1997 to 11 percent in 2002 bringing out concerns that this phase of infection will surpass the others in severity (Thompson, 2005: 7).

Turning to STIs in general we see that women are increasingly susceptible when husbands and/or partners engage in male to male sex and/or commercial sex. Estimates regarding men who have sex with men are somewhat unclear, but the major concern is the prevalence of men who do not use condoms while engaging in risky sexual behaviors. Furthermore, female sex workers admit to rarely using condoms. One study found that, "Most female sex workers (FSWs) and individuals with STDs had concurrent sex partners, the authors found, and many continued having unprotected sex after noticing STD symptoms in themselves or their sexual partners" (Yang *et al*., 2005). Reports are beginning to show that the spread of STIs and HIV/AIDS is increasingly associated with the commercial sex industry. Smith has noted that "the fastest growing rate of new HIV infections is from sexual contact, much of which appears to be linked to the emergence of a thriving commercial sex industry in many parts of China" (Smith, 2005: 66; Yang *et al*., 2005). According to Smith, the current number of female sex workers ranges anywhere from four to six million (2005). These data become progressively salient when we take note of the fact that condom use amongst FSWs is further hindered because women who carry them can be arrested for prostitution as it serves as indicator of their behavior (Thompson, 2005:11). The research by Parrish and colleagues brings special attention to the fact that chlamydial infection increases the chances for the spread of HIV/AIDS and thus must be checked in order to prevent an epidemic of previously unforeseen consequences.

Current literature on the spread of STIs and HIV/AIDS cite temporary migration as another reason for the rapid increase in the spread of infection. Smith has noted the "increasing rates of mobility as one of the most important factors leading to the rapid

diffusion of HIV" (Smith, 2005: 67; see also Yang *et al*., 2005). China's economic reforms have led to a major increase in the mobility of temporary workers to the major cities of China. But this enormous migration has also resulted in a significant increase in the vulnerability and spread of STIs. The migrant population has been identified as a "bridging population" allowing for the spread of infection into the general population (Smith, 2005: 69). Yang, for instance, has undertaken an extensive review of studies conducted all over China and has reported that the floating migrants are the group with the highest STI prevalence rates (2005). Given the fact that floaters are usually young males whose wives or partners have remained in the rural areas (Poston and Duan, 2001), it is likely that the floaters have multiple sex partners and have participated in casual and/or commercial sex (see also Smith, 2005: 69).

As was noted in the introduction, the issue of surplus boys comes into play as they inevitably become migrant workers in response to their situation. Tucker's analysis of surplus men in China indicates that, "as a result of their limited economic resources, surplus men will migrate to other areas for job and/or brides" (2005: 542). Many studies point out that the characteristics of surplus men and migrant workers are quite similar. Thus, as migrant workers tend to participate in risky sexual behaviors, we can assume that this propensity will carry over into the population of surplus men.

An operational definition of surplus men describes them as, "young, poor, unmarried men" (Tucker *et al*., 2005: 542). Tucker and colleagues further demonstrate that this group is certainly at a higher risk for becoming migrants and may already fully comprise certain migrant groups (2005: 542). Their work argues that as female sex work flourishes, the surplus men will increasingly participate in unprotected commercial sex.

Even those who are relatively poor will be able to afford sexual services to some degree. These men will participate in high-risk behaviors when they are poor and unstable, exposing them to a host of infections. Eventually as they transition into a certain level of stability they will then transmit the infections acquired during the risk period to their steady sex partners (Tucker *et al*., 2005: 542), hence fulfilling their role as a bridging population. Tucker and his associates point out that it is important to study male bridging populations because such populations were discovered in Cambodia and sub-Saharan Africa and were instrumental in the spread of infection from a localized group into the general population (Tucker *et al*., 2005: 542). He argues that these bridging populations are not governed by typical social norms, and that their behaviors will be widespread among the group. Accordingly, as more and more surplus men begin to engage in sexually risky behaviors, we can expect that these trends will be characteristic of the entire bridging population. Thus, we can begin to perceive the potential impacts for the spread of infection that a surplus of over 20 million men can have on the general population in China.

The spread of STIs and HIV/AIDS in China is an issue requiring a great deal of attention. "The data also reveal a growing problem with STDs in women, with increasing attribution of STD transmission to extramarital sex…In China, it seems more likely that women are actually experiencing a dramatic increase in STDs" (Cohen *et al.*, 2000: 144). Parrish and his colleagues have uncovered the fact that women are in fact at higher risk of contracting an STI from their husbands who are engaging in unprotected sex with commercial sex workers. The research results on chlamydia, gonorrhea, and trichomoniasis that will be reported in this thesis go beyond most analyses of STIs in that

it entails the enabling of comparison between the self-reported answers regarding contracting STIs and urine-based evidence. This comparison will suggest that the hidden epidemic in China of STIs may well be more widespread than previously assumed.

It seems that China's open door policy has in fact opened up the country to a host of problems with regard to STIs and HIV/AIDS. Under Mao's regime, STIs had all but been eradicated because of the elimination of the commercial sex industry and the fact that it was an act of patriotism to report and/or to seek treatment for STIs (Cohen, 2000: 143). But according to Hershatter's book, *Dangerous Pleasures* (2000), some of the social forces favoring the spread of STIs include the cultural justification for personal wealth and the collection of consumer goods, increases in numbers of unhappy marriages that would lead to extramarital affairs, the younger ages for first and continuing sexual activity, the increased availability of pornography, particularly through the Internet, and sexual messages in the mass media (see also Cohen, 2000: 144). We have already pointed to the work of Parish and his associates who uncovered the fact that STIs are being spread to the wives and/or steady partners by older, educated men earning high incomes.

The literature reviewed for this thesis indicates that the United States and China are both experiencing significant problems with respect to the spread of sexually transmitted infections. American youths and minorities have been identified as a growing at-risk population; and older, more educated men and women in China are increasingly susceptible to infection as the commercial sex industry grows. China is facing an even larger dilemma as the number of surplus boys continues to grow. This was illustrated by the research that identified surplus boys as a population characterized

by risky sexual behavior. These surplus boys are also expected to act as a bridging population for the spread of infection into the mainstream. China is increasingly adapting the norms associated with Western culture, and it is argued that these beliefs and practices will also increase the likelihood of infection. The bacterial infections are often present with no symptoms and all serve to increase the chances of infection with HIV/AIDS. These problems are further compounded by the stigma associated with being infected with an STI in both cultures. The following chapters describe the research question of whether young minority group members are more heavily impacted by sexually transmitted infections as well as whether a hidden epidemic exists among older, more educated Chinese individuals. Also, each independent variable and its hypotheses are described.

CHAPTER III

METHODS

This chapter will detail the methods employed to analyze the rates of infection in the United States and China, and describe the data used to do so. Available data for the United States include self-reported responses for several of the identified STIs and will focus specifically on gonorrhea and chlamydia (two of the three bacterial infections). A variable for STI has also been constructed that will allow for an analysis of all the STIs reported on in the NSFG data set. This variable includes those respondents who reported 'yes' to at least one of the following infections: chlamydia, gonorrhea, syphilis, herpes or genital warts. The National Survey of Family Growth contains statistics for Americans between the ages of 15 and 44. Several variables of interest have been identified for the United States and these include the early onset of sexual activity, substance use, and race, among others. The China data set we will use contains two kinds of data on thee three bacterial STIs, namely, self-administered responses about whether the person has contracted each of the STIs in the past year, and chemical tests of a sample of the respondent's urine indicating whether the person is presently infected with one or more of the STIs. Logistic regression has been identified as the proper method of analysis for a binary dependent variable (i.e. likelihood of contracting an STI) and is described in full detail. This is followed by descriptive tables containing the characteristics of the respondents in both data sets.

Data on the United States

One component of the proposed thesis involves analyzing the data from the 2002 National Survey of Family Growth (Cycle 6) (NSFG) for the United States. This is an extensive data set with information regarding sexual behavior and many other relevant topics. The interviewing, data processing, and data file production for Cycle 6 of the National Survey of Family Growth (NSFG), 2002, were conducted by the University of Michigan's Institute for Social Research (ISR), under a contract with the National Center for Health Statistics (NCHS) (NSFG, 2002). The 2002 cycle of the NSFG was funded and planned by the U.S. Department of Health and Human Services in conjunction with nine other agencies including the CDC's National Center for Health Statistics. Cycle 6 of the NSFG was based on an area probability sample and is representative of the general population aged 15-44. Interviews pertaining to the NSFG, Cycle 6, were conducted from January 2002 to March 2003 by the Survey Research Center of the University of Michigan. They were in-person interviews that lasted approximately 60-80 minutes and involved 7643 women and 4928 men between the ages of 15 and 44. The NSFG data set contains information for a total of 12,571 males and females.

The data set was restricted for several reasons. First, only those that reported to being sexually active in some regard (i.e. vaginal, anal, or oral sex) were included in the sample. Also, if data was missing for any of the variables used, the observation was dropped. A final sample size of 10,455 was used for analytic purposes and included 6529 women aged 15-44 and 3926 males aged 15-45.

All interviews were confidential and conducted on a voluntary basis. An overall response rate of 79% was observed (CDC 2002). The data are additionally enhanced because the portion of the questionnaire related to sexuality, substance use, pregnancy information, and income was conducted by audiotape as opposed to by the interviewer. The respondents were given the computer and headphones so that they could answer the questions privately and instructed on how to answer questions on their own. They had the option of reading the questions on-screen or listening to them via the headphones provided. They were then instructed on how to "lock away" their responses once they were finished and assured that no one else, including the interviewer, could view the responses. This should allow for an increase in reporting in the affirmative to questions that are sensitive or involve some sort of stigmatization. Also, this portion of the survey is not available for public use. A group of researchers at Texas A&M University, myself included, were granted express permission by the agents of the NSFG to use the sexuality portion for research relating to sexuality.

The ages of the respondents range from 15-44; however for the purposes of this thesis the age cohorts will be broken down into respondents aged 15-19, owing to the interest in STI risk for teenagers and on individuals aged 20-44 for the purposes of comparison with the Chinese. For females, information includes demographic data, pregnancy history, contraceptive use data, marital and cohabitation practices, fecundity data, birth expectations, infertility and sexual behavior data. The information on males includes demographic data, marriage and cohabitation practices, information on sexual partners, infertility data and birth expectations, among others.

For the U.S. teenagers the analysis will focus on persons aged 15-19, who are minority group members, and who have reported sexual activity. The variables analyzed will be the same as those analyzed for the adults and include whether or not early onset of sexual activity occurred, alcohol and drug usage (see Table 3.1). For the group aged 20-44 the focus will mainly be on education level, number of sexual partners, age at first incidence of sexual activity and minority status so as to be able to identify similar patters across both populations (United States and China) (see Table 3.2). For the purposes of this thesis, the data set is restricted to information on those respondents who reported to having some sort of intercourse. Several variables were combined in order to identify these respondents. The following questions from the NSFG were combined in order to create one variable for whether or not the U.S. respondents have had sex (for the females/males): "Has a male ever put his penis in your vagina?/have you ever put your penis in a female's vagina?", "Has a male ever put his mouth on your vagina?/Has a female ever put her mouth on your penis?", or "Has a male ever put his penis in your rectum or butt?/Have you ever put your penis in a female's rectum or butt?" The combination of these three questions should be sufficient to include those respondents who are at risk for contracting an STI.

TABLE 3.1: Frequency Distribution of Independent Variables (US Teens: Males/Females; N=1144)					
US Data (NSFG)	Raw #	%	Raw #	%	Row Totals
Age Group	Males		Females		
15	47	8.48	49	8.31	96
16	83	14.98	78	13.22	161
17	96	17.33	114	19.32	210
18	165	29.78	161	27.29	326
19	163	29.42	188	31.86	351
Total	554		590		**1144**
Education Level					
9th grade or less	65	11.73	68	11.53	133
10th grade	87	15.7	82	13.9	169
11th grade	107	19.31	107	18.14	214
12th grade	155	27.98	186	31.53	341
1 yr college	108	19.49	95	16.1	203
2 yrs college	30	5.42	48	8.14	78
3 yrs college	2	0.36	4	0.68	6
Total	**554**		**590**		**1144**
Minority status					
Minority	286	51.62	273	46.27	559
Non-minority	268	48.38	317	53.73	585
Total	**554**		**590**		**1144**
Early 1st intercourse					
Yes	309	55.78	322	54.58	631
No	245	44.22	268	45.42	513
Total	**554**		**590**		**1144**
# sex partners					
1	149	26.9	224	37.97	373
2	86	15.52	100	16.95	186
3 to 10	257	46.39	231	39.15	488
11 to 20	38	6.86	24	4.07	62
20+	24	4.33	11	1.86	35
Total	**554**		**590**		**1144**
Alcohol cons./yr					
never	112	20.22	127	21.53	239
Once or twice	87	15.7	155	26.27	242
Several	89	16.06	114	19.32	203
1/month	80	14.44	100	16.95	180
1/week	158	28.52	81	13.73	239
1/day	28	5.05	13	2.2	41
Total	**554**		**590**		**1144**
Drug usage					
never	250	45.13	345	58.47	595
Once or twice	84	15.16	90	15.25	174
Several	52	9.39	59	10	111
1/month	30	5.42	26	4.41	56
1/week	43	7.76	35	5.93	78
1/day	95	17.15	35	5.93	130
Total	**554**		**590**		**1144**

TABLE 3.2: Frequency Distribution of Independent Variables (US Adults: Males/Females; N=9311)					
US Data (NSFG)	Raw #	%	Raw #	%	Row Totals
Age Group	Males		Females		
20-29	1413	41.9	2374	39.97	3787
30-39	1199	35.56	2447	41.2	3646
40+	760	22.54	1118	18.82	1878
Total	**3372**		**5939**		**9311**
Education Level					
9th grade or less	269	7.98	480	8.08	749
10th grade	136	4.03	223	3.75	359
11th grade	174	5.16	319	5.37	493
12th grade	875	25.95	1245	20.96	2120
1 yr college	347	10.29	740	12.46	1087
2 yrs college	462	13.7	797	13.42	1259
3 yrs college	244	7.24	438	7.37	682
4 yrs college	445	13.2	897	15.1	1342
5 yrs college	155	4.6	308	5.19	463
6 yrs college	106	3.14	247	4.16	353
7 yrs/grad	159	4.72	245	4.13	404
Total	**3372**		**5939**		**9311**
Minority status					
Minority	1594	47.27	2631	44.3	4225
Non-minority	1778	52.73	3308	55.7	5086
Total	**3372**		**5939**		**9311**
Early 1st intercourse					
Yes	1209	34.85	1589	26.76	2798
No	2163	64.15	4350	73.24	6513
Total	**3372**		**5939**		**9311**
# sex partners					
1	300	8.9	1209	20.36	1509
2	246	7.3	662	11.15	908
3 to 10	1531	45.4	3075	51.78	4606
11 to 20	592	17.56	578	9.73	1170
20+	703	20.85	415	6.99	1118
Total	**3372**		**5939**		**9311**
Alcohol cons./yr					
never	468	13.88	1402	23.61	1870
Once or twice	435	12.9	1208	20.34	1643
Several	393	11.65	1005	16.92	1398
1/month	525	15.57	897	15.1	1422
1/week	1190	35.29	1177	19.82	2367
1/day	361	10.71	250	4.21	611
Total	**3372**		**5939**		**9311**
Drug usage					
never	2359	69.96	5007	84.31	7366
Once or twice	306	9.07	401	6.75	707
Several	181	5.37	192	3.23	373
1/month	113	3.35	93	1.57	206
1/week	166	4.92	114	1.92	280
1/day	247	7.33	132	2.22	379
Total	**3372**		**5939**		**9311**

Data on the Chinese

The data to be analyzed are from the Chinese Health and Family Life Survey (CHFLS) conducted by the University of Chicago/NORC, Renmin University, Beijing Union Medical College and University of North Carolina funded by the National Institute of Health (NIH). It is a nationally representative sample of the Chinese ages 20-64 with the exclusion of Tibet and Hong Kong. The population sample was drawn according to the 1990 national population census and public health reports of STD infection rates in different provinces and cities. Certain populations were over-sampled due to the higher rates of STDs in certain regions (Parish, 2003). 5000 individuals were initially sampled and 3813 completed the interview. Also available in these data are urine results for 3,426 participants.

The CHFLS data were also restricted to those respondents who reported to being sexually active. These respondents were captured by including positive responses by unmarried participants to a question asking for their total number of sex partners other than their current primary partner. Married individuals were asked, "Before you were married for the first time, how many people have you had sex with?" Those that were not captured by either of the previous two questions were asked, "How many people did you have sex with in the last 12 months?" The respondents who reported to having a sex partner were included as part of the sample. Those respondents who reported no to any form of sex were dropped from the sample, and any missing observations were dropped. It is important to note however, that the response of zero sex partners is to be expected. This can be explained by the fact that those who were married at the time of the survey would have reported zero to the question inquiring about partners before marriage. Other

observations will be zero due to the fact that some respondents reported zero sex partners in the last twelve months. Also excluded were those respondents who did not agree to provide a urine sample. The final sample size included 3,168 participants, 1565 of which were males and 1603 of which were females.

Table 3.3 describes the characteristics of the Chinese sample population. We have access to many of their demographic characteristics and have shown the data pertaining to their age, education, region of residence and whether or not they are urban or rural. Among the non-demographic characteristics listed are the variables pertaining to their risk level for contracting an STI. These include time spent away from home and number of sex partners.

In the CHFLS 60 interview sites were used to encompass participants from all 31 Chinese provinces. The interviews were conducted by mid to late career social workers and researchers in their forties and fifties. They were specifically trained to conduct the interviews and were of the same sex as the respondents in the field. Much the same as the sensitive portion of the US interview was conducted, when the section of the questionnaire pertaining to sexual behavior/sexuality and STIs came up the interviewers turned the computer screens to face the participants so that they could enter the data privately. This should increase the number and quality of responses given related to sexual practices/behavior and risk level for contracting and STI. The data set is rich in demographic information and contains full descriptions of sexual history and behavior. The empirical phase of the research will focus mainly on items regarding sexual history and will use these self-reported responses to compare against the results obtained through urine-based analyses.

TABLE 3.3: Frequency Distribution of Independent Variables (Chinese Adults: Males/Females; N=3168)						
Chinese Data		Raw #	%	Raw #	%	Row Totals
		Male		Female		Total
Age Group						
20-29		265	16.93	276	17.22	541
30-39		521	33.29	559	34.87	1080
40-49		461	29.46	467	29.13	928
50-59		240	15.34	226	14.10	466
60+		78	4.98	75	4.68	153
Total		**1565**		**1603**		**3168**
Education Level						
none		42	2.68	112	6.99	154
primary		220	14.06	288	17.97	508
lower middle		609	38.91	604	37.68	1213
upper middle		453	28.95	434	27.07	887
jr college		150	9.58	121	7.55	271
college/univ		91	5.81	44	2.74	135
Total		**1565**		**1603**		**3168**
Region						
Non-coastal		938	59.94	921	57.45	1859
Coastal		627	40.06	682	42.55	1309
Total		**1565**		**1603**		**3168**
Urban Locale						
Rural		338	21.6	345	21.52	683
Urban		1227	78.40	1258	78.48	2485
Total		**1565**		**1603**		**3168**
Away from Home						
Less than 1 week		1207	77.12	1521	94.88	2728
More than 1 week		358	22.88	82	5.12	440
Total		**1565**		**1603**		**3168**
# Sex partners						
0		1001	63.96	1378	85.96	2379
1		222	14.19	154	9.61	376
2 or more		342	21.85	71	4.43	413
Total		**1565**		**1603**		**3168**
Paid for sex						
Yes		136	8.69	3	.19	139
No		1429	91.31	1600	99.81	3029
Total		**1565**		**1603**		**3168**

Findings – Summary Statistics

Table 3.1 shows the findings for United States teenagers (ages 15-19). The total sample size is 1144 and contains information for 554 males and 590 females. The table is broken down by each of the independent variables of: age, education level, minority status, early onset of sexual activity, number of sexual partners, amount of alcohol consumption in one year, and amount of drug usage in one year. The data signify that the majority of teens who participated in the survey are age 18 or 19. This group comprises 59.2 percent of the males and 59.15 percent of the females in the teen population. The majority of those sampled have completed the 12^{th} grade. The minority status variable is somewhat evenly distributed, with 51.62 percent of the males and 46.27 percent of the females indicating they are minorities. Both sexes indicated early onset of sexual activity with a higher frequency (55.78 percent of males and 54.58 percent o f females). An overwhelming majority reported 3-10 sex partners. Among the males 46.39 percent and among the females 39.15 percent reported a number in this range. Alcohol consumption varied by sex. The response reported with the highest frequency for the males was once per week at a rate of 28.52 percent. The response reported with the highest frequency for the females was once or twice in a year at a rate of 26.27 percent. Finally, the majority of respondents in both sexes reported never using drugs in a year with a rate of 45.13 for males and 58.47 for females.

Table 3.2 represents the findings for the U.S. Adult population. The total sample size is 9311 and contains information on 3372 males and 5939 females. Among the adults, the age categories are fairly evenly dispersed in the age categories of 20 to 29 and 30 to 39. The smallest percentage of respondents fell into the 40+ age range, with 22.54

percent of the males and 18.82 percent of the females. The most commonly reported education level was that of 12th grade, or a high school education. Among the males and females respectively, 25.95 percent and 20.96 reported this level of education. The majority of the respondents of both sexes were non-minorities, at a rate of 52.73 percent for the males and 55.7 percent of the females. Unlike the teenagers, a majority of the adult respondents reported to not having an early onset of sexual activity. The female and male rates were 64.15 percent and 73.24 percent, respectively. The adults reported 3 to 10 sex partners most frequently, with 45.4 percent of the males and 51.78 percent of the females falling into this category. The male and female responses varied dramatically in response to alcohol consumption at rates of 35.29 percent in the once per week category for the males and 23.61 percent in the never category for the females (in both cases, these were the highest reported frequencies). Finally, the responses in terms of drug usage did not vary by gender. The majority of respondents reported never using drugs at a rate of 69.96 percent of the males and 84.31 percent of the females.

Table 3.3 represents the findings associated with the Chinese sample population. A sample size of 3168 was analyzed, 1565 of which were male and 1603 were female. The majority of the respondents were in the 30 to 39 age category and comprised 33.29 and 34.87 percent of the males and females respectively. Lower to upper middle was the education category selected with the most frequency and comprised 67.86 and 64.75 percent of the males and females, respectively. The majority of respondents of both sexes did not live in a coastal region. A very large proportion of the sample reported being urban (78.40 percent of the males and 78.48 percent of the females). Also, a large percentage of the sample reported being away from home less than one week per year,

with 77.12 percent of the males and 94.88 percent of the females indicating this response. A majority of the respondents indicated 0 sex partners (this question refers to either number before marriage or in the last year). 63.96 percent of the males and 85.96 percent of the females responded in this manner. Last, respondents of both sexes indicated non-participation in commercial sex with rates of 91.31 and 99.81 percent for the males and females respectively.

Modeling Binary Outcomes

In the case of each of the dependent variables (uresult – urine results, bac – reported having a bacterial infection in the last year, STI – reported having an STI ever) the outcome will be binary. In other words, the dependent variable allows only two options as a result. The negative result is typically signified by a zero and a positive result is signified by a one. Accordingly, a positive urine result is coded as a one and a negative result is coded as a zero. This is the same in the case of the self-reported responses for the Americans and the Chinese. Logistic regressions are employed in order to examine the probability of the specified event occurring. For example, what are the odds that a person will have a positive result for any bacterial infection in their urine when one takes into account the effects of several independent variables? For the purposes of this thesis it is necessary to utilize logistic regression as it allows a model to be constructed in which the results are within the bounds of one and zero (Long and Freese, 2003: 113). The following equation demonstrates how to transform the probability into the odds which indicates how often something happens relative to how often it does not (Long and Freese, 2003: 113).

$$\Omega(x) = \frac{\Pr(y=1 \mid x)}{\Pr(y=0 \mid x)} = \frac{\Pr(y=1 \mid x)}{1 - \Pr(y=1 \mid x)}$$

The binary model is useful for this analysis as it allows for the modeling of a person's propensity for having an STI. This being said, it is important to remember that logistic regression allows for the estimation of a latent variable. This notion of a latent variable is that there is an underlying propensity for contracting an STI, in this case (Long and Freese, 2003: 110). Accordingly, some observations may be closer to the observed state than others, and the latent variable model allows for an estimation of this. Furthermore, logistic regression allows one to model any number of coefficients in order to assess their impacts on the outcome (Long and Freese, 2003: 113).

Summary – Methods

The tables and findings detailed above have provided a clear picture as to the nature and type of respondents that were captured in each survey. They indicate that both samples are representative of their respective populations, and as such should lead to reliable information on the nature and sexual behaviors of each. The following analyses will investigate the relationships between the dependent and independent variables and accordingly shed light on the risk level for STIs within each previously identified sub-population.

The United States data set is rich in information on this topic featuring questions such as: "How many male sexual partners have you had?" This type of information coupled with minority status and age should be sufficient to determine risk-levels for STI transmission. It is expected that the results of the empirical analysis will support the notion that young minorities are highly impacted as previous data has suggested. It is

also expected that high levels of substance use should increase the likelihood of contracting an STI for all groups, as previous research suggests. The Chinese data set contains similar items and asks questions regarding sexual history, number of partners, etc. We expect to find a higher risk of contracting an infection for those that are in older age groups and are more educated. It is also expected that females will be at a higher risk of infection due to the behavior or their spouses/steady partners. The self-reported responses coupled with urine-based results for chlamydia, gonorrhea and trichomoniasis for the Chinese should supply enough information to determine the at-risk groups in China and their characteristics. The next chapter will describe the variables used in the analyses and will present the tabular results obtained.

CHAPTER IV

DESCRIPTION

This chapter describes the variables to be used, presents the hypotheses to be tested, and shows tabular results for each group (American teens, American adults and Chinese adults). An operationalization section is included that lists each dependent and independent variable and how it was used and/or created. The hypotheses section details each expected relationship between the independent and dependent variables. Finally, tabular results are presented for each of the previously identified groups. They will demonstrate the observed relationships between the variables; this is followed by a brief discussion of their contents.

Operationalization of Variables for the United States

The U.S. data will be analyzed according to the dependent variable for likelihood of contracting an STI. It is measured in four ways. The first is the variable 'chlam1', a binary dependent variable, with a value of one representing a positive response to the question, "In the last 12 months, have you been told by a doctor or other medical care provider that you had chlamydia?" The second dependent variable is 'gon1', a binary dependent variable, with a value of one representing a positive response to the question, "In the last 12 months, have you been told by a doctor or other medical care provider that you had gonorrhea?" The third dependent variable is 'bac'. This variable was constructed by combing the affirmative answers to questions about having either gonorrhea or chlamydia (or both) in the last twelve months. Last, a variable was created to include an affirmative response to any one of the STIs mentioned on the NSFG

questionnaire with a variable name 'STI'. These infections are gonorrhea, chlamydia, herpes, genital warts and syphilis. The information provided for the bacterial infections was gathered for the last 12 months; syphilis, herpes and genital warts responses were based on lifetime reporting. As noted, these four variables are dummy variables, coded one for yes and zero for no.

Several independent variables have been identified as being strongly correlated to the incidence of STI transmission in the United States population. These variables are described in detail in the following paragraph. Two sets of tabular results for the U.S. adults and teens are presented. The description of the variables is the same with the exception of the age variable. For the U.S. teens, age is broken down into single years, i.e. 15 through 19.

The variables are operationalized as follows. "Newage" is a categorical variable for age groups 20-29, 30-39, and 40+. "Age" for the U.S. teens is a bounded interval variable ranging from 15 to 19. "Higrade" is an interval variable representing education in years. It ranges from a minimum value of 9 years, representing a 9^{th} grade education or less, up to a maximum value of 19 years, representing 7 or more years of college and/or graduate school. "Minority" is a dichotomous variable for minority status, with a value of one given to those who are minorities and zeros to those who are not. "Early" is a dichotomous variable representing early onset of sexual activity. Respondents who reported to first sexual intercourse before the age of 16 were given a value of one, and those that reported an age of 16 years or more were given a value of zero. "Sexpart" is an interval variable representing the number of reported number of sex partners including one (numerical value of 1), two (numerical value of 2), three to ten (numerical value of

7), eleven to twenty (numerical value of 15), and 20 or more (numerical value 20). "Alcohol" is an interval variable representing the number of times the respondent had any type of alcoholic beverage in the last twelve months. The categories include never (value of zero), once or twice (value of 2), several times (value of 6), once per month (value of 12), once per week (value of 52), and once per day (value of 365). "Drug" is an interval variable for reported drug use in the last twelve months. This variable combines the responses from questions regarding marijuana, cocaine, crack, and non-prescription injectable drug use into one all-inclusive variable. Its categories are the same numerical values as that of the alcohol variable. Each of these variables corresponds to the variables listed in Tables 4.1 and 4.2.

These dependent and independent variables should provide a clear picture as to the prevalence of STIs in United States for the adult and teen aged population, and the characteristics associated with STI prevalence. They will also adequately detail the most at-risk groups within the population. The next section describes the variables used to analyze the data for the Chinese sample.

TABLE 4.1: Frequency Distribution of Dependent and Independent Variables (US Teens: Males/Females; N=1144)								
Independent variables	Chlamydia		Gonorrhea		Bacterial Infection		Any STI ever	
	Males N=554	Females N=590	Males N=554	Females N=590	Males N=554	Females N=590	Males N=554	Females N=590
Age								
15	0	3	0	1	0	3	0	4
16	0	2	0	2	0	3	1	4
17	3	4	0	2	3	5	4	7
18	2	6	0	4	2	6	4	11
19	2	4	2	1	3	5	4	16
Education								
≤ 9th grade	1	6	0	4	1	7	1	10
10th grade	1	5	0	2	1	5	2	7
11th grade	2	3	0	1	2	4	4	5
12th grade	0	3	0	2	0	4	2	12
1 yr college	3	2	1	1	3	2	3	6
2 yrs college	0	0	1	0	1	0	1	1
3 yrs college	0	0	0	0	0	0	0	1
Minority status								
minority	5	13	1	8	5	16	7	26
non-minority	2	6	1	2	3	6	6	16
Early onset sex								
< 16 yrs	5	16	1	9	5	19	9	34
≥ 16 yrs	2	3	1	1	3	3	4	8
# sex partners								
1	0	1	0	1	0	1	0	2
2	1	3	0	2	1	3	3	5
3 to 10	5	11	2	7	6	14	8	26
11 to 20	0	2	0	0	0	2	1	5
20 or more	1	2	0	0	1	2	1	4
Alcohol use/year								
never	1	4	1	3	2	5	3	8
once or twice	1	7	0	1	1	7	2	10
several	2	4	1	4	2	5	2	12
once/month	1	2	0	1	1	3	3	5
once/week	2	1	0	1	2	1	1	6
once/day	0	1	0	0	0	1	0	1
Drug use/year								
never	2	7	1	3	3	8	5	16
once or twice	2	4	0	2	2	4	4	5
several	0	0	0	1	0	1	0	5
once/month	0	1	0	0	0	1	0	4
once/week	0	2	0	0	0	2	0	5
once/day	3	5	1	4	3	6	4	7
Totals	**7**	**19**	**2**	**10**	**8**	**22**	**13**	**42**

TABLE 4.2: Frequency Distribution of Dependent and Independent Variables (US Adults: Male/Female; N=9311)

Independent variables	Chlamydia		Gonorrhea		Bacterial Infection		Any STI ever	
	Men n=3926	Women n=5887	Men n=3926	Women n=5887	Men n=3926	Women n=5887	Men n=3926	Women n=5887
Age								
20-29	24	36	15	12	31	43	69	222
30-39	8	13	10	8	11	17	100	341
40+	3	3	4	1	5	3	80	143
Education								
≤ 9th grade	3	8	3	5	4	9	14	50
10th grade	2	5	3	1	4	5	12	26
11th grade	1	1	1	2	2	3	10	31
12th grade	9	10	8	7	13	15	68	123
1 yr college	6	8	3	2	7	8	32	102
2 yr college	5	8	5	1	5	9	24	112
3 yr college	4	7	3	3	5	9	18	60
4 yr college	3	3	1	0	4	3	44	133
5 yr college	1	2	0	0	1	2	16	35
6 yr college	1	0	2	0	2	0	11	33
7 yr college	0	0	0	0	0	0	13	43
Minority Status								
minority	23	39	20	16	33	47	116	245
non-minority	12	13	9	5	14	16	133	461
Early Onset Sex								
< 16 yrs	18	30	17	9	25	32	109	257
≥ 16 yrs	17	22	12	12	22	31	140	449
# Sex Partners								
1	4	3	4	0	5	3	14	25
2	0	5	0	1	0	6	6	27
3 to 10	15	25	9	15	20	33	79	369
11 to 20	7	12	5	2	8	13	63	153
20 or more	9	7	11	3	14	8	87	132
Alcohol use/year								
never	9	10	6	4	10	14	37	89
once or twice	3	8	3	4	5	10	27	119
several	2	10	4	5	4	12	24	132
once/month	4	12	4	5	5	14	35	118
once/week	11	8	5	1	14	8	83	192
once/day	6	4	7	2	9	5	43	56
Drug Use/year								
never	13	35	11	11	17	41	131	511
once or twice	6	8	3	3	8	8	29	75
several	2	4	4	1	4	4	16	39
once/month	1	1	1	2	1	3	12	22
once/week	6	2	4	0	7	2	21	26
once/day	7	2	6	4	10	5	40	33
Total	**35**	**52**	**29**	**21**	**47**	**63**	**249**	**706**

Operationalization of Variables for China

One dependent variable, the likelihood of contracting an STI, will be modeled according to the following three queries: 1) whether or not the respondent reports having contracted an STI in the lifetime, variable name 'STI'; 2) whether the person reports having had a bacterial STI in the last twelve months (includes all three bacterial infections), variable name 'bac1'; and 3) whether the respondent's urine indicates that an STI is currently present, variable name 'uresult'. These are dummy variables, coded 1 if yes. The variable representing urine results contains the results of all three bacterial STIs. This is mainly due to data limitations given that the number of respondents who tested positive for any one of the three is relatively small; combining the answers allows for better analysis.

The Chinese analysis includes several independent variables of interest listed in Table 4.3. The variables are operationalized as follows: "Agegrp" is a categorical variable for age including ages 20-29, 30-39, 40-49, 50-59 and 60+; "Educ" is an interval variable for education including no school (value of 0 years), primary (value of 5 years), low middle (value of 7 years), upper middle (value of 11 years), junior college (value of 13 years) and university or more (actual value 16 years); "Coastal" is a dichotomous variable representing region of residence with one being equal to residence in a coastal location and 0 equal to other; "Urban" is a dichotomous variable for urban residence with one being equal to urban; "Lefthome" is a dichotomous variable representing whether or not a person spends more than one week away from home (0=less than one week away and 1=more than week away from home); "Sexpart" is a categorical variable representing number of reported number of sex partners including none (numerical value 0), one

(numerical value 1), or two or more (numerical value 2); last "Paidsex" is a dichotomous variable representing whether or not the respondent has ever paid for sex (1=yes and 0=no). These variables correspond to the variables listed in Table 4.3.

The dependent and independent variables for the United States and China have been created to be as similar to one another as possible. For example, the dependent variable 'bac' in the United States has a directly corresponding variable in the Chinese data set, 'bac1'. This variable represents those who reported having chlamydia or gonorrhea in the last twelve months in the U.S., and those respondents who reported chlamydia, gonorrhea and/or trichomoniasis in the last twelve months for the Chinese. The variables representing STI rates for both countries are also very similar (they include those who reported positive responses to any of the identified STIs in their lifetime). Certain independent variables have been included or not included from the data sets for the different countries due to the differing impacts they have on STI transmission risk level. For example, the literature reports that minority status has a very strong impact on the likelihood of infection in the United States for teens and adults, but it has very little or no impact on likelihood of infection for the Chinese. The following explains the expected relationships for each of the variables in accordance with previous findings and literature.

TABLE 4.3: Frequency Distribution of Dependent and Independent Variables (Chinese Adults: Male/Female; N=3168)						
Independent variables	**Urine Results (no.)**		**Bacterial infection in last year**		**STI ever**	
	Men n=1565	Women n=1603	Men n=1565	Women n=1603	Men n=1565	Women n=1603
Age						
20-29	11	19	9	19	12	2
30-39	22	44	9	41	11	6
40-49	17	20	5	18	7	0
50-59	1	6	4	4	4	2
60+	0	0	1	0	0	0
Education level						
No school	2	2	0	0	1	0
Primary	5	14	2	10	1	0
Low mid	17	41	12	35	13	2
Upper mid	19	28	12	26	15	3
Jr. college	3	3	1	10	4	4
Univ/Grad	5	1	1	1	0	1
Region						
Coastal	22	48	13	45	16	5
Other	29	41	15	37	18	5
Location of Residence						
Urban	44	77	23	73	27	10
Rural	7	12	5	9	7	0
Time Spent Away from Home						
$\leq$ 1 week	38	85	18	72	21	7
$\geq$ 1 week	13	4	10	10	13	3
# Sex partners in last year						
0	23	72	8	66	4	8
1	6	13	2	8	1	0
2 or more	22	4	18	8	29	2
Commercial Sex						
yes	14	0	12	0	20	0
no	37	89	16	82	14	10
Totals	**51**	**89**	**28**	**82**	**34**	**10**

Hypotheses, General and Specific

Several key variables have been identified as being strongly associated with the likelihood of contracting an STI in the United States. Some of the strongest associations have been discovered for minority group members in the younger age groups (i.e. 20-24), as well as among teenagers due to their increased participation in "risky behaviors". Thus, it is expected that a negative association will be detected between age and likelihood of infection. In other words, as age increases, the risk level should decrease. This is based on the finding that nearly half of the new infections contracted annually are affecting those younger than 25 (Boonstra, 2004: 1; see also Weinstock *et al*., 2004: 6). Furthermore, Americans aged 15-24 constitute the fastest growing group of those infected with chlamydia. It has also been found that minorities are at a significantly greater risk of contracting an STI. Thus, it is expected that a positive association will be observed between being a minority group member and the likelihood for contracting an STI. Education should have an inverse relationship with STI transmission risk level. So, we would expect that with each increase in year of education, there should be a lower incidence of STIs. This owes to previous research indicating that those with less education are more likely to be infected with an STI because of their restricted access to healthcare and/or resources pertaining to sexual health.

Many studies have successfully demonstrated the positive relationship between the early onset of sexual activity and the likelihood for contracting an STI. Accordingly, we expect to find those who participated in sexual activity prior to age 16 to have a higher STI risk level than those who were not early participators. The number of one's sex partners has also been identified as a major contributor to the likelihood that one will

contract an STI. Thus as this number increases, it is expected that the risk level will increase significantly. Finally, substance use has been directly linked to the risk of contracting an STI. The variables representing drug and alcohol use should both exhibit the same relationship with STI risk level. That is, as alcohol and/or drug use increases, so too should the likelihood of contracting an STI.

In the case of China, previous research points to industrialization as a vital component to the spread of STIs; thus it is expected that persons residing in coastal regions and urbanized areas will be more likely to have an STI. Coastal areas tend to be modernized and are centers for economic activity. Also, these are the locations where female sex workers (FSWs) tend to concentrate. As was discussed in the literature review, concentrations of FSWs along with modernization have both been shown to be associated with the prevalence of STIs. The same relationship between being an urban dweller and likelihood of infection should also be observed due to the impacts of modernization being more widespread, as well as the fact that the commercial sex industry is more rampant in urban locales. Further reasoning for the positive relationship between urban dwelling and increased likelihood of infection is evidenced by the concentration of intravenous drug users (IDUs) in urban areas. Also, it has been shown that participation in commercial sex is directly linked to the increased likelihood of contracting an STI. Multiple studies have demonstrated the direct correlation between these variables (see Parish *et al*., 2003; Yang *et al*., 2005; Smith, 2005). We thus expect to observe a positive relationship between the likelihood of infection and consumption of commercial sex.

In addition, the effects of age, education level, the amount of time spent away from home, and the number of sex partners will be analyzed for the Chinese. The following associations are expected with respect to the above listed independent variables. It is expected that as age increases the likelihood of contracting an STI will increase. This is mainly based on the work conducted by Parish and colleagues, which indicates that higher rates of infection are concentrated among those in the 30-39-age category. Parish found that women in this age group are being infected via the behavior of their husbands/steady partners. These trends are different within the United States, as rates of infection generally tend to lessen with age. But in China we expect to find the positive relationship that Parish and colleagues have observed. Education should have an inverse relationship with the likelihood of contracting an STI; the more education one has, the lower the rate of infection. Generally, those with higher amounts of education are less susceptible as they tend to have access to more information and resources regarding treatment and prevention of STIs. The more time spent away from home, the more likely one should be to contract an STI. This is based on the logic that as one travels more often, he/she is more likely to engage in commercial sex and/or risky sexual behavior. Finally, the number of sex partners one has had should be positively associated with the likelihood of infection. Previous research points to exceptionally strong ties between high numbers of sex partners and STI rates. This is true in both sample populations. The following tables show in tabular form the observed relationships between the independent and dependent variables for the United States and China.

Table 4.1 shows the findings for the United States teens, i.e. persons between the ages of 15 and 19. The total sample size for the teen population is 1,144; 554 are male

and 590 are female. Each independent variable has been cross tabulated with the four dependent variables of: 1) whether the respondent reported having chlamydia in the last twelve months, 2) whether the respondent reported having gonorrhea in the last twelve months, 3) the combined responses for either bacterial infection, and 4) whether the respondent has ever had any of the identified STIs. The numbers shown are the raw data and represent the number of respondents who answered in the affirmative to any one of the above questions pertaining to sexually transmitted infections.

Table 4.1 displays how disproportionately affected females are than males. It was postulated in previous research that this could be due to a higher incidence of testing among females. But in each and every category, the female frequencies are higher by almost 3 times, sometimes more. Part of this could be accounted for by the previous explanation. However, it seems unlikely that this would account for the entire gender gap. For teens, higher frequencies of STI infection were detected among minority group members and those who reported an early onset of sexual activity with regard to every measure of infection (i.e., chlamydia, gonorrhea, both, or any STI). This confirms the results of prior studies that point to these variables as strong predictors of STI incidence. The majority of those who reported some kind of infection also reported a number of sex partners in the range of 3 to 10. This contradicts the finding that increased incidence will be detected as number of sex partners increases. However, this range could still be considered moderate, and the high levels of infection found in this group could be attributable to underreporting with regard to number of sex partners. Alcohol and drug use do not seem to have as great an impact as was expected, but the absolute numbers of those reporting infection were small and fairly widely dispersed among the categories.

So, we may not have a clear picture of the true impacts these variables have on STI incidence level. We will be able to appraise more adequately these two variables when we estimate the logistic regression equations.

Table 4.2 presents the findings for the US adult population. It too is separated into four categories: 1) whether the respondent reported to having Chlamydia in the last twelve months, 2) whether the respondent reported to having gonorrhea in the last twelve months, 3) the combined responses for either bacterial infection, and 4) whether the respondent has ever had any of the identified STIs. The numbers are presented in raw format and represent the exact number of respondents who reported having any of the identified infections. The results are further separated by gender.

In the U.S. adult population, females are much more strongly impacted than men (with the exception of gonorrhea). If we look at the results for any STI ever, almost 3 times more women reported to some type of infection than men. The highest number of women reporting infection was in the 30-39 age categories. This is contrary to the findings of prior studies, which indicate that risk level decreases as age increases. Also, interestingly, a large proportion of the women who indicated having some type of infection were those with a college degree. Thus, two separate risk groups were found with the education variable; one for those with a high school education and one for those with a college degree. Minority status generated a higher incidence of infection with respect to the bacterial infections, but this was not observed with respect to the variable for any STI. Also, because most of the adult population did not indicate an early onset of sexual activity, this variable did not seem to have as much impact on them. As was observed with the teens, the majority of infections tended to be found among those who

reported 3 to 10 sex partners. In terms of alcohol consumption, the highest frequencies of infection were found among those that reported to drinking once per week. Finally, the highest rates of infection were reported among those who reported never using drugs in all cases.

Table 4.3 presents demographic characteristics as well as the responses to the survey questions regarding sexual history of the Chinese. It is broken down into three categories including, namely, whether or not the respondents' urine indicated the presence of an STI, whether or not they responded yes to having had an STI in the last year, and whether they indicated having ever had an STI. The results indicate that within the urine results for those who tested positive almost half of the men and women fall into the 30-39 age range. Additionally, nearly 3/4 of men and more than 3/4 of women fall into the lower to upper middle education range. The majority of women who tested positive are located in the Coastal regions, and 86.27 percent of men and 86.52 percent of women are urban residents. It was also observed that 74.51 percent of men and 95.51 percent of women report having been away from home for less than week out of the year.

The variable measuring the influence of number of sex partners proved to have some very interesting findings associated with it. For example, among the men that tested positive, 45.10 % reported to zero sex partners. However, 43.14% of them reported to two or more. Among the women that tested positive, the majority (80.90%) reported to zero sex partners. These findings support the notion that women are indeed being heavily affected by the behavior of their partners. It is necessary to clarify that 0 sex partners does not mean 0 sex partners ever, but none before marriage or none in the past 12 months.

Thus, these results confirm that the majority of cases are occurring among older age groups. The higher incidences of infection among women in the coastal regions may be explained by the concentration of prostitutes located there. These data further suggest that those with less education and who live in urban areas are more susceptible to infection as was expected. However, the results show that, contrary to what has been found previously the majority of cases of infection are among those who reported not having traveled for more than one week. The majority of both sexes who tested positive indicated not having had any sex partners before marriage or in the last year. However, among the men, a number only slightly less than the majority indicated having two or more sex partners. Also, the variable for commercial sex impacted the males only; none of the females who tested positive or reported any infection also reported to participating in commercial sex. The strongest correlation was observed for the 'STI' variable, with a majority of those men indicating participation in commercial sex.

The cross-tabulations described and modeled above begin to show us the dynamics of the incidence and prevalence of STI infection in the United States and China. In the following chapter (5), logit equations will be estimated, using the above independent variables to predict the log odds of having contracted an STI. These regressions will allow for a complete analysis of the impacts of the independent variables on the dependent variables. Various logistic regression diagnostics will also be introduced to make sure the logit regression assumptions are being met and that there are not serious outliers. The initial analysis will provide the answer to a key research question: Do minorities who are sexually active at an early age in fact have a higher incidence of STI? Also, are Chinese women at a higher risk for contracting an STI?

CHAPTER V

RESULTS

Chapter V presents results of logistic regressions performed for each of the three data sets. It was previously determined that logistic regression is the most appropriate form of analysis for a binary dependent variable because it allows for the estimation of a probability (value between one and zero). The results of the regressions are described in detail and are followed by tables depicting the results for each sample set. Table 5.1 contains the results for the U.S. teens, and each model presents the regression results for each dependent variable (four are presented). Table 5.2 contains the results of the logistic regressions for U.S. adults, presented in the same format as the teens. Finally, Table 5.3 presents the results of the logistic regressions for the Chinese adults. It is modeled according to the three dependent variables described in the previous chapter.

The following tables show the actual results of the logistic regression performed for each of the dependent variables. The U.S. teens and adults were modeled in four ways, and the Chinese adults were modeled according to three variations of the dependent variable, likelihood of contracting an STI. The results were presented in two formats; the logits and odds ratios. Logits are the coefficients generated during the regression and are defined as the natural logarithms of the odds. The odds ratio is the likelihood of a given event occurring. In this case we modeled the odds of, or probability that a person will be infected with an STI.

Table 5.1: Logistic Regression Results (U.S. Teens: Male/Female; N=1144)				
	Model 1 (Chlamydia)	Model 2 (Gonorrhea)	Model 3 (Chlam./Gon.)	Model 4 (Any STI)
	Logits Odds Ratios	Logits Odds Ratios	Logits Odds Ratios	Logits Odds Ratios
Socio-demographic Characteristics				
Gender	-1.47*** .23	-1.85** .16	-1.46*** .23	-1.58*** .21
Education Level	-.35** .71	.002 1.00	-.28** .75	-.10 .91
Minority Status	.81* 2.25	1.07* 2.92	.86** 2.37	.43* 1.54
Early Onset Sexual Activity	.23 1.25	1.07 2.92	.29 1.33	.50* 1.65
# Sex Partners	.11*** 1.11	-.02 .98	.10*** 1.11	.12*** 1.12
Alcohol Consumption	-.001 .99	-.03 .97	-.002 .10	-.001 .99
Drug Usage	.004*** 1.00	.01*** 1.01	.003*** 1.004	.002** 1.002
Constant	-.91	-5.56*	-1.48	-2.72**
Pearson Chi-Squared	36.50***	25.80***	39.58***	54.00***
Pseudo R-Squared	.15	.19	.14	.12
Log Likelihood	-105.84	-53.73	-119.05	-193.58
N	1144	1144	1144	1144
Degrees of Freedom	7	7	7	7

significant at .1 (*)
significant at .05 (**)
significant at .001 (***)

Table 5.2: Logistic Regression Results (U.S. Adults: Male/Female; N=9311)				
	Model 1 (Chlamydia)	Model 2 (Gonorrhea)	Model 3 (Chlam/Gon.)	Model 4 (Any STI)
	Logits Odds Ratios	Logits Odds Ratios	Logits Odds Ratios	Logits Odds Ratios
Socio-demographic Characteristics				
Gender	-.2 .82	.46* 1.59	-.12 .89	-1.05*** .35
Age	-.86*** .42	-.40** .67	-.80*** .45	.23*** 1.25
Education Level	-.06* .94	-.15** .86	-.08** .92	.09*** 1.09
Minority Status	.98*** 2.65	.97*** 2.64	1.06*** 2.89	-.17** .85
Early Onset Sexual Activity	.55** 1.74	.20 1.22	.34* 1.41	.17** 1.19
# Sex Partners	.05** 1.05	.05** 1.05	.05*** 1.05	.10*** 1.11
Alcohol Consumption	.002* 1.00	.002* 1.002	.002** 1.002	.00** 1.00
Drug Usage	.001 1.00	.003*** 1.003	.002** 1.002	.002*** 1.002
Constant	-2.92***	-3.72***	-2.65***	-4.8***
Pearson Chi-Squared	80.99***	56.99***	105.41***	554.70***
Pseudo R-Squared	.08	.09	.09	.09
Log Likelihood	-452.65	-282.72	-544.87	-2801.67
N	9311	9311	9311	9311
Degrees of Freedom	8	8	8	8

significant at .1 (*)
significant at .05 (**)
significant at .001 (***)

Table 5.3: Logistic Regression Results (Chinese Adults: Male/Female; N=3168)			
	Model 1 (Urine Result) Logits Odd Ratios	Model 2 (Bacterial Inf.) Logits Odd Ratios	Model 3 (Any STI) Logits Odd Ratios
Socio-demographic Characteristics			
Age	-.41*** .66	-.39*** .68	-.11 .90
Education Level	-.04 .96	.00 1.00	.07 1.07
Region of Residence	.17 1.19	.28* 1.32	-.03 .97
Urban/Rural	.67** 1.96	.56* 1.76	-.21 .81
Time Spent Away from Home	-.44* .64	.03 1.03	.25 1.28
# of Sex Partners	.05 1.05	.10 1.10	1.02*** 2.76
Commercial Sex	.77** 2.17	.62* 1.86	1.59*** 4.92
Constant	-2.44***	-6.36***	-5.30***
Pearson Chi-squared	40.40***	15.23**	58.24***
Pseudo R2	.04	.08	.12
Log Likelihood	-553.35	-83.35	-210.52
N	3168	3424	3424
Degrees of Freedom	7	6	6

significant at .1 (*)
significant at .05 (**)
significant at .001 (***)

The results for the U.S. teens (Table 5.1) indicate that many of the previously hypothesized relationships are, in fact evident among this sample. Model 1 indicates the results of the responses to the question pertaining to whether or not the respondent had chlamydia in the past year. Model 2 indicates the results of the same question in reference to gonorrhea. Model 3 displays the results of both bacterial infections combined. Last, Model 4 displays the results for whether the respondent reported to any of the identified STIs (chlamydia, gonorrhea, syphilis, genital warts, and herpes).

Gender is significant for U.S. teens. The results for all four models indicate that a teenager is almost 80 percent less likely to be infected with an STI if they are male in all cases, other things equal. This finding is consistent with previous studies, which indicated that females are at a greater risk of contracting an STI (the U.S. Centers for Disease Control and Prevention indicate that females are indeed adversely impacted by STIs as their infection rates tend to be higher than males on average). Education is significant in the case of Model 1 (chlamydia) and Model 3(chlamydia/gonorrhea); the results indicate that with each extra year of education the chances of chlamydial infection decrease by 29.5 percent, all else equal. Furthermore, the likelihood of infection with either bacterial infection decreases by 25 percent with each extra year of education, all else equal. This confirms the hypothesis that increases in education decrease the likelihood of STI infection. Minority status is significant in all four cases. The models indicate that minorities are the highest risk for contracting gonorrhea, or they are almost twice as likely to contract gonorrhea than non-minorities. Previous research uncovered the finding that minorities are disproportionately affected by STIs. In fact, the Centers for Disease Control and Prevention reported that even though the rates for gonorrhea are

decreasing with respect to the previous year's estimates, blacks in particular are the most impacted group (2004).

The variables taken from the portion of the NSFG survey related to risky behaviors are described below. These include questions related to sexual behavior and substance usage. Early onset of sexual activity performed as expected although it was only significant in Model 4. The results show that those teens who participate in early sexual activity are 65 percent more likely to be infected with an STI, other things equal. Also, it was previously hypothesized that a high number of sex partners will be strongly correlated with incidence of infection. This is the case in three out of four of the models (gonorrhea – Model 3 is excluded). However, the likelihood of infection is not quite as high as we would have expected. The strongest correlation for number of sex partners was found for the reporting of any of the identified STIs, 'STI'. Model 4 displays an increase of 12.3 percent likelihood of contracting an STI with each increase in category of number of sex partners, all else equal. Alcohol consumption does not seem to have any impacts on likelihood of infection according to these results. Last, drug usage was found to have a significant impact on STI risk level; however the impacts were fairly small. The largest impact was observed for gonorrhea (Model 3), with an increased risk of .7 percent with each increase in category of drug usage, all else equal.

The results for the U.S. adults are displayed in Table 5.2. Each of the models corresponds to those in Table 5.1, i.e. Model 1 represents findings on chlamydia, and so forth. Gender is significant in Model 4; we see that females are 65 percent more likely to report to an STI, other things equal. In the same model, age is significant and an increase of 25 percent for the likelihood of reporting an STI is observed with each increase in

category of age, all else equal. Though this is contrary to the hypothesis, it is perhaps attributable to the large numbers of females who reported having any STI in the 30 to 39 age range. The highest level of significance for education level is observed among those in Model 4. Here we see that with each increase in years of education the likelihood of contracting an STI is increased by 9.5 percent, all else equal. Again, this is contrary to the hypothesis. But, it was observed in this sample that a large number of women reported to having a college education and one of the identified STIs. So, it is possible that this finding is explained by the fact that large numbers of women with college educations are reporting having an STI. Unlike the teens, we observe a negative relationship between minority status and incidence of infection with respect to Model 4. However, in terms of the bacterial infections (Models 1-3), minorities are almost twice as likely to be infected, all else equal. Thus, we find support for the hypothesis that minorities are more likely to be infected with an STI.

Early onset of sexual activity does tend to have the suspected relationship with incidence of STI infection. The strongest correlation was observed in Model 1. Here we see an increase of 73.6 percent likelihood of contracting chlamydia with early sexual activity, other things equal. The consumption of alcohol displays a small yet significant impact on the likelihood of contracting an STI in all four cases, with an increase of approximately .2 percent with each increase in category of alcohol consumption, all else equal. Finally, drug usage has minimal, yet significant impacts with regard to three out of four of the models (Model 1 is excluded). The greatest impact is observed in Model 3 and indicates that with each increase in category of drug usage a person is .3 percent more likely to contract gonorrhea, all else equal.

Table 5.3 reports the results from the logistic regressions for the Chinese sample population. Model 1 presents regression data for urine results; Model 2, for whether or not the respondent reported having a bacterial infection in the last year and Model 3 indicates whether or not the respondent reported ever having had an STI. Model 1 indicates that other things being equal, the odds of having an STI show up in urine are decreased by 34% with each increase in age category; being an urban resident increases the odds of having an STI show up in urine by 95.9%; those who spent more than one week away from home are 35.6% less likely to have positive urine result; and consumption of commercial sex increases the odds by 116.6%, other things equal. Region of residence, education level and number of sex partners are not significant.

Model 2 represents the findings associated with self-reported responses to whether or not the respondent had a bacterial infection in the last year. The variables for education, time spent away from home and numbers of sex partners are not significant. Time spent away from home. Region of residence is positively associated with the incidence of bacterial infections as is being an urban resident. In other words, the odds of reporting to having a bacterial infection in the last year are increased by 32.4% for coastal residents and by 75.5% for urban residents, all else equal. The odds of reporting to a bacterial infection in the last year are decreased by 32.2% with each increase in age category, other things equal. Finally, consumption of commercial sex increases the odds by 85.6%, all else equal.

Model 3 represents the findings associated with self-reported responses to whether or not the respondent had an STI ever. The variables age, education, region of residence, and urban/rural, and time spent away from home are not significant. However,

number of sex partners and consumption of commercial sex are positively associated with the incidence of STIs. In other words, the odds of reporting to any STI during the lifetime are increased by 176% (almost two times) with each increase in number of reported sex partners and by almost 4 times if the respondent reports to having paid for sex, all else equal.

The regression results indicate that in the majority of cases, the hypotheses were supported. In the United States population, gender, age, education, minority status, early onset of sexual activity, and number of sex partners all performed as expected (with the few exceptions noted above). The impacts of the variables measuring the alcohol consumption and substance usage were too minimal to analyze. The Chinese data also provided confirmation for many of the previously mentioned hypotheses. The next chapter will discuss the relationships that were discovered in more depth as well as the direction future research should take.

CHAPTER VI

SUMMARY AND FUTURE IMPLICATIONS

Previous research has shown that the independent variables used in this analysis have an impact on the spread of STIs, although with differing impacts. These impacts were described at length in the previous chapters. The variables used generally performed as expected. The following paragraphs will discuss the expected relationships for each of the independent variables and offer possible explanations as to the causes for alternate results. Also, future research in the area of sexually transmitted infections is critically needed, and this need as well as suggestions for future directions will be addressed.

The research conducted in this thesis for the United States populations indicated the clear risk of STI transmission for minorities between the ages of 15 and 19. Further risk factors include "risky behavior" defined by substance use and/or abuse. The models for the United States focused on both teens and adults, so that these particular risk groups could be analyzed. It was expected that age, education, and male sex should all have inverse relationships with the dependent variable, the likelihood of contracting an STI. Furthermore, a positive relationship with the dependent variable was expected between minority status, early onset of sexual activity, high numbers of sex partners, and substance use.

With the respect to U.S. teens, these relationships were mostly confirmed. In terms of chlamydia, significant relationships in the correct direction were observed for the variables representing gender, education, minority status, number of sex partners, and drug usage. If we think back to the previous arguments and findings related to chlamydia

in the U.S., we can add support to the finding that female minorities in particular are being adversely impacted by this infection. The findings for gonorrhea were not quite as definitive. This is perhaps due to such a small percentage of reported infections (the sample size is sufficient to make conclusions from). However, significant relationships were still observed for gender, minority status and drug usage. When the bacterial infections were combined into a single dependent variable, the strength of the relationships increased; and significant relationships were observed for gender, education, minority status, number of sex partners and drug usage. Finally, for all of the combined STIs, gender, minority status, early onset of sexual activity, number of sex partners and drug usage were all found to have significant relationships with the dependent variable. Only here did we find support for the original hypothesis that early sexual activity contributes to the likelihood of contracting an STI.

The U.S. adults had the same risk factors as the teens, although the results were quite different from those observed among the U.S. teens. The chlamydia results indicated significant relationships for age, education, minority status, early onset of sexual activity, number of sex partners, and alcohol consumption. And, these relationships were in the directions expected. Among the adults, alcohol consumption was a risk factor for contracting chlamydia that was not observed among the teens. The gonorrhea results were as expected; the only relationship that was not confirmed was that of early onset of sexual activity. When the two bacterial infections were combined, the only variable that did not have a significant impact was gender. This seems to be the case due to the higher levels of men who reported to infection with gonorrhea, thus negating the effects of the negative impacts on females. Finally, some very interesting findings

were discovered with respect to the U.S. adults and the dependent variable for any STI (Model 4). Here we saw that males are indeed less likely to contract an STI, and that number of sex partners, early onset of sexual activity, and substance use all vary positively with the likelihood of infection. However, the remaining variables showed relationships opposite to what that predicted.

In this final model, increases in age are associated with an increase in risk of infection. As was stated in the preceding chapters, this is may be due to the large number of both men and women in the 30 to 39 age category who reported to having at least one of the STIs. Further explanation would seem to coincide with the large number of women and men reporting "other STIs" and having a college education. Upon further analysis, it seems as though the majority of these cases may be attributable to genital warts and herpes among respondents with a college education. Thus, an increase in education is actually associated with an increase in the likelihood of infection. Previous research has not identified this trend, and it is important to note. Also, a decreased likelihood was observed for minorities in this model. Again, this could be attributed to the majority of herpes and genital warts infections being detected among whites. These findings were certainly not expected, and previous research points in the opposite direction in terms of risk factors.

In light of the previous findings, future work on the rates and prevalence of STIs in the United States should be dually focused. First, young minorities are obviously at an increased risk for contracting the bacterial STIs, in particular. Previous research related to the relationship between gender and STI infection points to higher levels of infection for females. This thesis confirmed those findings. However, the issue of whether or not

the discrepancy is based on higher levels of testing among females is still unclear. Thus, future studies involving young adults should be aimed at this issue. In other words, the level of testing among groups should also be examined in order to determine if this is the case.

It is imperative that the situation of STI infection be addressed given that these infections are associated with a number of complications in their own right; they also contribute to the likelihood of infection with HIV/AIDS. Also, because early onset of sexual activity has been confirmed as a contributor to the likelihood of infection, it should be brought to the public's attention that young people who engage in early sex are at increased risk of contracting bacterial infections.

Second, this newfound group of college educated whites who are infected with viral infections (genital warts and herpes) should be addressed. This is not a group for whom prevention strategies have been focused, because they are rarely seen as an at-risk group. This is a mistaken notion. Also, any infection creates an increased risk of infection for HIV/AIDS, and these viral infections are incurable. These groups need to be analyzed with more vigor, and further studies should have a special focus on them.

For future work in the United States, it would be advantageous if the questions related to sexually transmitted infections were more focused. It would be helpful to have access to the responses for all eight of the CDC-identified sexually transmitted infections. Also, urine results, like those obtained in China, would certainly add to the validity of these survey data. Hopefully, it would also serve to lessen the confusion surrounding the question of whether males are truly less impacted or are simply tested with less frequency. The trends of infection in the U.S. vary greatly with respect to the kind of

infection (viral or bacterial). Accordingly, in future analyses these infections would need to be analyzed and compared. Finally, data on trichomoniasis need to be gathered. This is an infection not nationally reported on but is still posing health risks. Survey work should be done that includes this bacterial infection, and health care providers should be instructed that this is in fact a sexually transmitted infection and should be treated as such.

In light of the analyses conducted, it has become apparent that there is still much to be done in terms of research regarding STIs in the United States. Equipped with this information, it is clear that for the United States, a dual focus must be applied. What this means specifically is that, there are two risk groups that must be studied. Previous research has focused on young members of minority groups. Research efforts should continue to focus on this group and should include information on trichomoniasis as well as chlamydia and gonorrhea. The findings related to trichomoniasis are limited in number and need to be expanded.

If given the opportunity to do another analysis, a separate/new study including the results on trichomoniasis should be conducted. Also, a survey focusing on young members of the U.S. population would be especially helpful given that some of the previous analyses were limited because a smaller group of teens versus adults were interviewed in the National Survey of Family Growth. The results showed that U.S. teens are impacted differently than U.S. adults. Thus, the variables that impacted the teens differently (minority group membership and early onset of sexual activity) would need to have special focus.

It also seems to be necessary to include more of a discussion on the part of the interviewers with respect to sexual activity. Though it has not been shown, I suspect that underreporting in terms of the number of one's sexual partners exists in the National Survey of Family Growth. The U.S. Centers for Disease Control and Prevention indicate that the American reluctance to address sexuality has indeed proven to be a barrier to the successful prevention and treatment of sexually transmitted infections (2004). No measures exist within this survey to be able to detect this, though previous research on the effects of stigma indicates that individuals are likely not to disclose in terms of reporting on sexuality. Thus, it is likely that underreporting exists within this instrument as well. It would be preferable that the portion of the survey related to sexual behavior be prefaced with more information than just the fact that the respondent's answers will remain confidential. This information should include statements such as, "It is imperative that you answer the following questions with as much accuracy as possible. Your answers will be confidential and will not be associated with you as an individual. Only certain members of the research team will have access to this particular section, and you will not be judged in any way for the manner in which you respond. We understand that the questions are sensitive, but the responses you give will be very helpful for research." This is merely a rough template that could be used, but it would likely be helpful in assuring the respondents that honest answers will not affect them in a negative manner.

The idea of stigma was discussed in previous chapters and obviously has an impact on the way people view STIs and sexual behavior in general. Thus, a discussion

of the nature of STIs may also need to be included in the interviewer's discussion so as to quiet the respondent's fears in this regard.

Findings associated with the Chinese were as expected, for the most part. It was originally hypothesized that there would be a lower risk associated with an increase in age, education would be inversely related to risk-level, those in coastal areas would be more susceptible, a greater number of sex partners would increase risk, being away from home more than one week per year would increase risk-level and living in an urban location would be positively associated with the risk of contracting an STI. The results were pretty much consistent with these expectations.

In terms of the urine results, the associations were stronger than those for the self-reported responses. For example, time spent away from home was significant in terms of urine results and was negatively associated with an increase in risk-level in the models; whereas no significance was detected in either of the models based on self-reporting. The only variable that was not significant based on urine results, but was significant based on self-reporting, was number of sex partners. In Model 3, we see that a person is almost two times more likely to report having any STI as their reported number of sex partners increases, all else equal. We did not see as strong an association as was expected for time spent away from home. But, the discrepancies here may be based on commercial sex rather than the amount of travel, especially in light of the fact that 86 percent of the male respondents reporting being away from home less than one week per year and the observed 117 percent greater likelihood of testing positive to any of the three bacterial infections if an individual was a consumer of commercial sex.

The urine results clearly show that people are either under-reporting or are unaware of the fact that they are currently infected with an STI. If China is indeed suffering from a hidden epidemic, then it is imperative that future research include urine-based reporting. It is also important to find out how many of these inconsistencies are attributable to omissions or ignorance of STI symptoms. If omissions are more common, than it is certainly necessary to better educate the groups so that the stigma associated with infection can be lessened. If the discrepancies are based on the fact that people are unaware of what exactly an STI is then once again, it is imperative that education be disseminated in terms of diagnosis and treatment.

Future work in terms of China should be focused on these discrepancies and should include questions designed to uncover facts pertaining to STIs in particular. Further analyses on STIs in China should definitely include urine results to be able to compare against the self-reported responses. If China does not have the strict regulations as in the U.S. does with regard to blood testing (i.e. explicit consent for HIV testing and notification of results), then blood samples should also be included in future samples. This is particularly important in light of the HIV/AIDS crisis, which seems to be developing at a rapid pace in China. The fact that many of the respondents reported to not having traveled more than one week in the past year is also very interesting. If the spread of STIs is not in fact attributable to travel, then further analyses need to be conducted in terms of the consumption of commercial sex. Also, it may be necessary to employ even more secure means of collecting the information pertaining to the number of sex partners in particular. A clear picture of the number of sexual partners is attainable

from the current data, but a more distinct measure needs to be developed that will be able to ascertain the numbers regardless of marital status.

It also seems that it would be helpful to analyze both the United States and China in terms of a multi-level model. This type of analysis would allow us to see the effects on the occurrence of infection of both individual characteristics, as well as at the next level of geography, say, the county or province. This would certainly give a clearer picture as to the risk level for contracting an STI with respect to urban residence. The same could be done with respect to the United States and China. We could look at the effects of the individual independent variables and the county independent variables. The use of multi-level modeling would allow us to ascertain the impacts that contexts have on STI risk. Thus, if teenaged minority group members in urban settings are more likely to engage in risky behavior we would be able to explore the effects. The investigation of the different levels might indeed lead to differing conclusions for the analyses.

STI incidence is a major concern in the U.S. and China. Cohen has noted that research has shown that, "rates of unprotected sexual activity, STIs, pregnancy and child-bearing continue to be substantially higher among U.S. adolescents than among young people in comparable industrialized countries" (2000: 87). U.S. teens are very much at risk of contracting a bacterial STI. Furthermore, adults in the United States are equally at risk as the findings in this thesis have illustrated. In terms of China, an epidemic of unsurpassed proportions is projected for HIV/AIDS. With the staggering increases in the number of surplus boys and the explosion of commercial sex work, STIs have become an issue that cannot be disregarded. We cannot afford to ignore this problem and must develop a strategy to decrease their levels.

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VITA

Name:	Ginny Elizabeth Garcia
Address:	Department of Sociology, Mail Stop 4351, Texas A&M University, College Station, TX 77843-4351
Email Address:	ginny_garcia3@yahoo.com
Education:	B.S., Sociology, Texas A&M University, 2002 M.S., Sociology, Texas A&M University, 2006