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The Association between Literacy and HIV-related Knowledge for Adults in Afghanistan and Pakistan

Gregory J. Joseph
Georgia State University

THE ASSOCIATION BETWEEN LITERACY AND HIV-RELATED KNOWLEDGE FOR ADULTS IN AFGHANISTAN AND PAKISTAN

By

GREGORY JOSEPH
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Author: Gregory Joseph

Address: 1326 Gilford Place, Conyers, Georgia 30094

Committee Chair: Dr. Richard Rothenberg, MD, MPH, FACP

Committee Member: Dr. Monica Swahn, Ph.D, MPH

College: Georgia State University

School of Public Health

P.O. Box 3995

Atlanta, Georgia 30302-3995

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Gregory Joseph

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APPROVAL PAGE

The Association between Literacy and HIV-Related Knowledge for Adults in Afghanistan and Pakistan

By

Gregory Joseph

Approved:

Dr. Richard Rothenberg

_____

Committee Chair

Dr. Monica Swahn

_____

Committee Member

January 20, 2018

_____

Date

ABSTRACT

INTRODUCTION: HIV/AIDS knowledge is a major factor in the prevention of further HIV/AIDS spread. South Asia has some of the worst literacy rates in the world, with Afghanistan and Pakistan having the lowest rates in the region. There is very limited data on the association between literacy rates and HIV knowledge in Afghanistan and Pakistan. Both countries have recorded low prevalence of HIV, but have been categorized as high-risk countries for epidemic due to the active intravenous drug use and low education in the countries.

AIM: The purpose of this study is to identify associations between literacy and HIV knowledge and also to compare HIV knowledge between Afghanistan and Pakistan.

METHOD: The study used secondary data from the Demographic and Health Surveys (DHS) that collect nationally representative data on Pakistan (2012-2013) and Afghanistan (2015). Sample sizes of the study populations were 40,221 people from Afghanistan and 16,654 people from Pakistan. Variables were created in order to evaluate HIV knowledge in the Afghanistan and Pakistan population. SAS 9.3 was used to run binary logistic regression for associations between literacy and HIV-related knowledge in Afghanistan and Pakistan. Logistic regression was also used to analyze the association of country (Afghanistan and Pakistan) and HIV-related knowledge. Socio-demographic factors i.e. residence, age, marital status, education, and wealth index were controlled for in the analysis.

RESULTS: In both Afghanistan and Pakistan, there was a significant association between literacy and HIV-related knowledge. In both countries, literacy had a positive association with the specific variables chosen to signify accurate HIV knowledge. After controlling for socio-demographic factors, people who were illiterate had lower chances of having accurate comprehensive preliminary HIV knowledge (Afghanistan OR .820, Pakistan OR .642), comprehensive HIV transmission knowledge (Pakistan OR .756), comprehensive HIV prevention knowledge (Afghanistan OR .829, Pakistan OR .676), MTCT knowledge (Afghanistan OR .696, Pakistan OR .588), and accurate overall HIV knowledge (Afghanistan OR .835, Pakistan OR .701). The Pakistan population was more likely to have accurate knowledge of HIV/AIDS than the population in Afghanistan (Preliminary HIV Knowledge OR 2.426, HIV Prevention Knowledge OR 1.233, HIV Transmission Knowledge OR 2.322, MTCT Knowledge OR 2.468, and Overall HIV Knowledge OR 2.275).

DISCUSSION: The results of this study continue previous research about associations between literacy and health information, while showing its impact on Afghanistan and Pakistan.

CONCLUSION: The study illustrates that more attention on education is needed in order to effectively prevent HIV spread. Afghanistan and Pakistan exhibit a high risk for HIV epidemics due to their high illiterate population, high intravenous drug use, and low knowledge of HIV. Further research should be conducted in order to implement interventions that could proactively prohibit an epidemic.

KEY WORDS: HIV/AIDS, Literacy, Health Literacy, Pakistan, Afghanistan, Epidemic, HIV Knowledge.

CHAPTER 1
INTRODUCTION

1a. Background

The HIV/AIDS epidemic has proven difficult to contain, claiming the lives of over 1 million people in 2016. As of the end of 2016, an estimated 37 million people were living with HIV with 1.8 million being newly infected. Even though the number of people who get infected by HIV continues to decline year after year, this disease still remains one of the greatest global public health threats of this decade (World Health Organization, 2017).

Pendse, Gupta, Tu, and Sarkar (2016) claim that while Sub-Saharan African has the highest burden of HIV infections, South Asia also is in need of attention given that over 3 million people live with the disease in this region (Pendse, Gupta, Tu & Sarkar, 2016). What is interesting about this region is that there are countries that have relatively few people living with HIV and also countries with many people living with HIV. For example, India has the highest number of people living with HIV and AIDS outside of Africa, while many other countries like Nepal have significantly few HIV infected people (Rodrigo & Rajapakse, 2009). While sexual contact is the primary mode of HIV transmission in Africa, intravenous drug use is the primary mode of HIV transmission in South Asia and drives several health concerns within the countries due to the availability of injectable substances (Todd, et al., 2011).

Afghanistan is particularly vulnerable to the HIV epidemic given the fact that it is the primary source of opioids across the world. Opioids, which include heroin, are culturally used throughout the country and South Asian region, which is problematic given that it is primarily used intravenously. That gives opioid use a high potential for HIV transmission (Beyrer, 2011).

Afghanistan has historically had a low HIV prevalence within the country, but given the availability of opioids in the country, remains a high risk country for HIV epidemics (Rehman et al, 2007). Pakistan, which is Afghanistan's neighbor, poses the same type of problems, with a low HIV prevalence rate yet a high risk of epidemics due to a multitude of factors (Raees et al., 2013). Both countries also have a very challenging, complicated history that influences their current status and susceptibility to HIV/AIDS epidemics (Durani & Khan, 2009).

1b. Purpose of Study

An improvement of health literacy could be a significantly influential factor in lowering a population's susceptibility to an HIV epidemic. Low literacy has been associated with multiple adverse health effects. These health effects that literacy influence include knowledge about health care, hospitalization, and some chronic diseases (DeWalt et al., 2004). The purpose of this study is to examine the association between literacy and accurate knowledge of HIV/AIDS in Pakistan and Afghanistan. Both countries have intertwined history, similar geography, comparable susceptibility to injectable substances (i.e. opioids), religions, and social views, so it will be interesting to see how the rates compare between the two countries. Multiple variables will be controlled for in this study in order to avoid potential extraneous variables.

The results of this research will contribute to current and past literature on health literacy and the many factors that contribute to increasing it. It also contributes to the literature by focusing on underrepresented populations like the Afghan and Pakistani people, and whether or not their literacy contribute to the health literacy in their respective countries. Health literacy for the purposes of this study will focus on the accurate knowledge of HIV/AIDS. The results of this study could lead to more effective interventions with intention of targeting underrepresented populations with low literacy rates in order to lower their risks of HIV transmission.

1c. Research Questions

Is there an association between literacy rates and accurate knowledge of HIV/AIDS in Afghan women and men in DHS 2015?

Is there an association between literacy rates and accurate knowledge of HIV/AIDS in Pakistani women and men in DHS 2012-2013?

Is there a difference in accurate knowledge of HIV/AIDS between Pakistan and Afghanistan?

1d. Hypothesis

This study theorizes that there is a positive correlation between literacy rates and accurate knowledge of HIV/AIDS in Afghanistan and Pakistan populations. Theoretically, the people who have better literacy, in both countries, should have more accurate knowledge of HIV/AIDS than people with low literacy. Low literacy has been shown to be associated with poorer use of health care, outcomes, cost, and disparities in health outcomes among persons of all ages (Berkman et al., 2011), which gives scientific precedent for this current hypothesis.

CHAPTER 2

LITERATURE REVIEW

The following chapter is dedicated to presenting scientific literature on HIV, the countries in question, and the variables used for the study. The literature will support the inclusion of these variables in the study.

2a. HIV/AIDS

According to the Department of Health and Human Services (2017), human immunodeficiency virus (HIV) is a virus that spreads through certain bodily fluids and attacks the CD4 cells (i.e. T cells). The CD4 cells are specifically designed to help the immune system fight off infections, so individuals that have HIV over extended periods of time will experience significant negative effects on their immune systems, which will make it harder and harder for their bodies to combat foreign diseases and infections. Acquired Immunodeficiency Syndrome (AIDS) is the most severe phase of HIV infections, where people have such badly damaged immune systems that they experience an increased number of severe illnesses. HIV infection is currently incurable, but there are plenty of antiviral medication that can have substantial impact on a person's life expectancy. (Department of Health and Human Services, 2017).

The history of HIV/AIDS is still debated to this day, but many scientists believe that the original source of HIV was a type of chimpanzee in Central Africa. The chimpanzees are believed to have been a host for a version of immunodeficiency virus, which was called simian immunodeficiency virus (SIV), which was likely transmitted to humans and mutated into HIV (Sharp & Hahn, 2011). Scientists believe that the disease was transmitted from the chimps when humans would hunt them and ingest their meat for food, coming in contact with their infected blood and contracting the disease. Through tracing, scientists have theorized that the

transmission of immunodeficiency disease from simians to humans go as far back as the late 19th century, and over the decades the virus has spread across African and into other parts of the world (Center for Disease Control, 2017).

According to the Center for Disease Control (2017), HIV/AIDS is transmitted primarily through certain body fluids, specifically, blood, semen, pre-seminal fluid, rectal fluids, and breast milk. These fluids must come in contact with a mucous membrane, damaged tissue, or be injected directly into the bloodstream from a needle or syringe for transmission to occur. Another common way HIV/AIDS is transmitted is through the sharing of contaminated needles and syringes that are primarily used for drugs given that contaminated blood may still be present on the needle when it is reinjected into the bloodstream. Sexual contact is the primary mode of transmission, though, which is why HIV is categorized as a sexually transmitted disease (STD). (Center for Disease Control, 2017)

The Center for Disease Control also claims that there are many myths about HIV/AIDS transmission that need to be addressed as well. HIV is a virus that cannot survive long outside of the human body, such as on surfaces, and cannot reproduce outside a human host, which makes its modes of transmission very specific. For instance, HIV is not transmitted through saliva, sweat, or tears, so it is safe to share food and drinks with an infected individual and even partake in more invasive actions like closed-mouth kissing. Vectors like insects or pets cannot transmit HIV through biting. It is also impossible to get HIV by sitting on a toilet seat. There have been some cases of people getting infected with HIV through sharing food or deep open mouth kissing, but scientists have claimed that these cases are because infected blood was transferred (either through the food, or through deep cuts inside the mouth). It is also theoretically possible to get HIV infection from tattoos if the needle isn't sanitized and is contaminated with infected

blood, but there haven't been many cases reported to this day of that type of transmission. (Center for Disease Control, 2017).

Besides constant unprotected sexual contact and intravenous drug use, there are other factors that increase an individual's risk for HIV. Scientists have shown that there is a co-morbid relationship between HIV and other sexually transmitted diseases. Having an STD like chlamydia, gonorrhea, syphilis, or herpes can make an individual more likely to contract HIV. Having an STD changes the cells lining the vagina, penis, rectum, or mouth in a way that makes it easier for HIV to enter the body (New York Department of Health, 2013).

In some extremely rare cases, it is possible to contract two types of HIV infections. HIV superinfection is when an individual contracts two separate strains of the virus. The effects of having multiple strains of HIV is different for each individual. For instance, if an individual contracts a different strain of HIV while being treated for a strain, that individual might get sicker because the new strain is resistant to the type of treatment being prescribed. (Center for Disease Control, 2017).

2b. War/Conflict and HIV Spread

In times of war and conflict, there is increased potential for the spread of pathogens and viruses like HIV. Paxton (2014) claims that war negatively affects many factors that influence the suppression of infectious diseases. In times of war, physical and organization infrastructure is disrupted, which is problematic given that most of these infrastructures contribute through either direct or indirect means to the general human health of a specific region. For instance, a major conflict could lead to damage in water purification and reclamation systems, waste disposal, food production, and a whole host of systems that help suppress the spread of pathogens and viruses.

But war has an impact on human traffic as well, which is important given that HIV is spread primarily from human to human (Paxton, 2014).

Paxton (2014) also claims that in times of war, there are usually migrations of people from one place to another, either willingly or through displacement given the harsh conditions of the conflict. These refugees tend to be more susceptible to disease like HIV/AIDS due to the fact that refugees have lowered immunity to the new diseased environments that they now inhabit (Paxton, 2014). Refugees are also subject to behavioral changes due to the interruption of social networks and economic vulnerability. These changes in behaviors could increase the risk for transmission of HIV depending on the current environment that the refugees inhabit. If refugees are placed in environments with high HIV prevalence and potential drug use, the risk for HIV transmission is much higher (UNAIDS, 2003). While being displaced due to a war can lead to higher risk of HIV transmission, war can have a more direct impact on HIV spread.

During times of great conflict, the interaction between the civilians and military personnel can lead to increases in HIV spread. During conflict, rape and other forms of sexual violence are often used as weapons of war by combatants, and even after the conflict is settled, forced sex perpetrated by combatants still continues (McGinn et al., 2001). The military has long been associated with high STD rates and transmission due to a perpetuated culture of risk-taking. Soldiers that are already immersed in a culture of risk-taking and in an equally stressful environment of war are more prone to indulge in risky sexual behavior and drug use. During times of war, the military tends to take advantage of female commercial sex workers for sexual contact, and in more extreme cases, civilians. This intermingling of the military and civilians causes huge spikes in HIV prevalence (Thomsen et al., 2011).

2c. Health Literacy

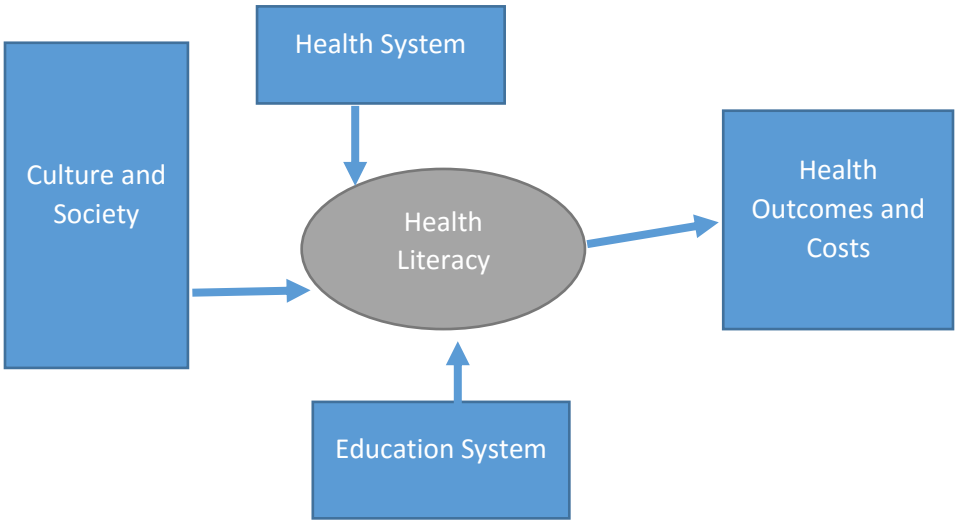
The term health literacy is still relatively new, given that the first time it was used was in 1974 (Hernandez, 2014). Over the years, there have been quite a few definitions for health literacy. The most common definition that people and health organizations use for health literacy is "the degree to which individuals have the capacity to obtain, process, and understand basic health information and services needed to make appropriate health decisions." (Jiang et al, 2017, pg.1). The Center for Disease Control states that people who require health information need good health literacy in order to find the correct information and services, communicate their needs and preferences and respond to information and services, process the meaning and usefulness of the information and services. It also allows them to understand the choices, consequences and context of the information and services. (Center for Disease Control, 2017)

The Center for Disease Control also makes the claim that while having good literacy and numerical skills do not necessarily equate to having good health literacy. Even people who read well and are good with numbers face issues with health literacy when they are unfamiliar with medical terms or how their bodies work and have to interpret statistics and evaluate risks and benefits that affect their health and safety, or are diagnosed with a serious illness and are scared and confused. Issues with health literacy when individuals have health conditions that require complicated self-care and when they are voting on an issue affecting the community's health and relying on unfamiliar technical information (Center for Disease Control, 2016). All of these factors illustrate the dangers of misconstruing literary and numeracy as health literacy.

There can sometimes be an impactful disconnect between healthcare workers and the general public, which could lead to lower health literacy among the general population. When health materials are too complicated and use technical language that is too advanced for the general population, then the messages do not come across clearly and people do not understand.

(Center for Disease Control, 2016). There are multiple frameworks that show how certain factors influence health literacy, which in turn affects the health outcomes of the general public. Figure 2.1 illustrates a recreation of a model that places the responsibility on the societal, educational, and health institutions to make sure the general public is properly prepped to deal with the daily dangers of health issues (Nielsen-Bohlman, 2004).

Figure 2.1 Framework of Institutional Influence on Health Literacy



Nielsen-Bohlman. (2004). Recreation of Institutional Framework for Health Literacy. Licensed under Institute of Medicine Committee on Health Literacy

According to Nielsen-Bohlman (2004), in one of his frameworks, the education system consists of the K-12 system, adult education programs and higher education. The health system consists of all people performing health-related activities, including working in hospitals, clinics, physician offices, home healthcare public health agencies, accreditation groups, regulatory agencies and insurers. The culture and society system consists of socioeconomic status, race, ethnicity, along with influences from mass media. All of these components are factors that influence health literacy and need to be considered when creating interventions in order to improve it (Nielsen-Bohlman, 2004). For the purposes of this study, health literacy is going to be referred to as having accurate knowledge of HIV.

2d. Literacy and Health Literacy

Literacy and health literacy have a very strong relationship. Just like health literacy, there are multiple ways to define literacy. There are simple definitions for literacy like "the ability to read and write at a specified age" (Central Intelligence Agency, 2016) and more complex definitions. For instance, The Center for Disease Control defines literacy as understanding, evaluating, using, and engaging with written text to participate in the society, to achieve one's goals, and to develop one's knowledge and potential (Center for Disease Control, 2016). There are over 758 million illiterate adults in the world and more than three-fourths of them are found in South Asia and Sub-Saharan Africa (Central Intelligence Agency, 2016).

Table 2.1 Literacy Rates in South Asia by Country

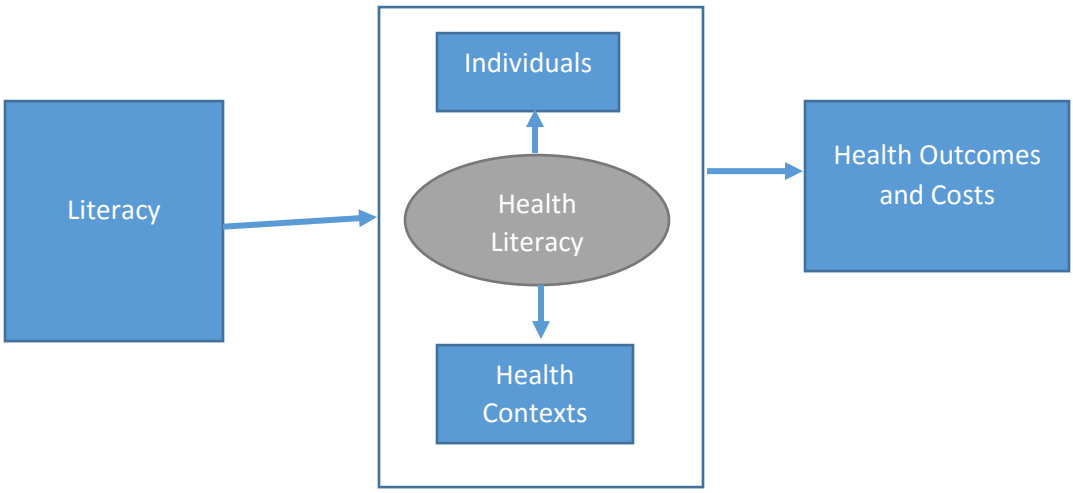
Country	**Literacy Rates**		
	Total Pop.	Male	Female
Afghanistan	38.2%	52%	24.2%
Pakistan	57.9%	69.5%	45.8%
India	71.2%	81.3%	60.6%
Bangladesh	72.8%	75.6%	69.9%
Nepal	63.9%	76.4%	53.1%
Sri Lanka	92.6%	93.6%	91.7%
Maldives	99.3%	99.8%	98.8%
Bhutan	64.9%	73.1%	55%

CIA World Factbook.(2016) South Asia Literacy Rates by Country. Licensed by the Central Intelligence Agency.

Table 2.1 illustrates the literacy rates of all the countries that encompass South Asia. From data, there are huge differences in rates from country to country. Afghanistan and Pakistan make have the lowest literacy rates in the region and also have the biggest disparity of literacy rates between men and women. (Central Intelligence Agency, 2016). This is problematic considering the research on the association of literacy and health outcomes. Berkman and colleagues (2001) claim that there is a strong link between limited literacy and adverse health-related variables. People with lower literacy rates are reported to have lower health literacy,

which as a result affects their health outcomes in terms of disease prevalence, healthcare access and even mortality rates (Berkman et al., 2011). The relationships between literacy, health literacy and health outcomes is illustrated in Figure 2.2.

Figure 2.2 Framework of Literacy Influence on Health Literacy



Nielsen-Bohlman. (2004). Recreation of Individual Framework for Health Literacy. Licensed under Institute of Medicine Committee on Health Literacy

Figure 2.2 illustrates an iteration of one of Nielson Bolman's (2004) models highlighting literacy as the main component that drives health literacy, which with added health context (i.e. health system, social problems, etc.) along with other contributions of the individual (socioeconomic status, race, etc.), influences the health outcomes and costs (Nielsen-Bohlman, 2004).

Literacy and health literacy are interrelated, and in order to have good health literacy, an individual needs to have the basic ability to read, write, and understand language. Afghanistan and Pakistan have some of the lowest literacy rates not just in the region of Southern Asia, but in the entire world, so it is of interest to see how this affects their health literacy when it comes to accurate knowledge about HIV/AIDS.

2e. The Violent History of Afghanistan and Pakistan

According to Kuara (2017), the relations between Afghanistan and Pakistan have been unstable since the emergence of Pakistan in 1947. The strife between the two countries stems from the border, called the Durand Line, which has led to multiple conflicts that has spurred mass displacement of people. Back in the 19th century, Afghanistan was subjected to a major loss of territory during the power struggle between the British and Russian empires. During this time, Russia was slowly but steadily spreading its Empire, moving closer and closer to the borderline of British India. Because of this, British India sent a diplomat by the name of Sir Mortimer Durand to negotiate an agreement to create a border between Afghanistan and British India. The "Durand Line", ended up dividing the Pashun tribal lands into two, with half becoming part of British India and the other half remained a part of Afghanistan. This along with the fact that Afghanistan lost the province that deprived it its historic access to the Arabian Sea, left the country in disarray (Kuara, 2017).

When the British left India, Afghanistan called for a renegotiation of the borders, claiming that the country was coerced by British influence (Durani & Khan, 2009). Afghanistan's efforts were unsuccessful, and the country of Pakistan emerged in the territory not long after. A decades long conflict began between the two countries over territory along the Durand Line. Pakistan wanted Afghanistan to recognize the legitimacy of the border, with the idea that they legally inherited it from British India. Afghanistan wanted the territory it lost back when the Durand Line was established due to the fact they lost access to the Arabian Sea and some of their cultural tribes. The relationship between the two countries got even worse during the Cold War between the United States and the Soviet Union, when Pakistan sided with the United States and Afghanistan sided with the Soviets (Kuara, 2017).

Kuara (2017) claims that the Cold War gave Pakistan more legitimacy in Afghan international affairs when it sided the United States. During the war, Pakistan used funding from the United States in order to train Pashtun tribes and Afghan refugees in order to fight for the United States-Pakistan agenda. The methods used by Pakistan during this time had a detrimental consequence though, as it showed that they could manipulate Afghan internal affairs for their own agendas. The fall of the Najibullah regime came not long after, which, after the chaos that followed, would set the stage for the rise of the Taliban in 1996 (Kuara, 2017). The Taliban is a nuisance for both countries to this day, even after the invasion of the United States in 2001. Currently, the relationship between the two countries is still strained, with periodic conflicts occurring every few years (Durani & Khan, 2009). These conflicts have caused mass migrations of people from one country to the other. Over the last few decades, over six million Afghans were displaced to other neighboring countries during the violent conflicts, particularly to Pakistan and Iran, which is problematic given that these mass migrations of people could potentially lead to outbreaks of HIV (Todd et al, 2007).

2f. Afghanistan and HIV

According to Rodrigo & Rajapakse (2009), data on HIV in Afghanistan is very sparse, but the HIV prevalence of the country is estimated to be below 0.5%. While this prevalence is very low, the country remains at high risk given a multitude of factors (Rodrigo & Rajapakse, 2009). According to Beyrer (2011), one of the greatest risk factors for HIV spread within the country is its connection to intravenous drug use. To this day, Afghanistan remains the primary source of opium and cannabis production across the world. Ever since the early 2000s, Afghanistan remained the top exporter of opioids, shipping product all across the globe. This

ever-expanding industry of drug cultivation has led to some pretty drastic negative health effects among the people in the region (Beyrer, 2011).

According to Beyrer (2011), for some time now, researchers have said that the HIV epidemics have reached their peaks in major areas, and the spread was starting to slow. Beyrer then stated that researchers started to notice that the only areas where there were concerns of expanding epidemics of HIV spread were in the vast Eastern Europe and Central Asian regions. These regions include Iran, Afghanistan, Pakistan, and the Muslim majority regions in Western China. The most common thread for all of the epidemics in these regions of the world was opioid injection use. Heroin, which is a product created from opioids, has been proven to be a principle driving force for HIV spread all across the Eurasian region (Beyrer, 2011).

Todd and colleagues (2012) claim that Afghanistan faces a major problem in terms of HIV spread due to the fact that opioids are so ingrained in the culture that use is quite common among the population. Approximately 8% of 15-to-64 year old adults use some form of intoxicant and with an estimated opium use prevalence (2.3-2.9%), Afghanistan places among the top ten countries with the highest opiate consumption globally. And these numbers keep increasing as well because from 2005 to 2009, there was an increase by 140% of heroin use among Afghan adults (Todd et al., 2012). Hall and Degenhardt (2014) say that is sometimes difficult to narrow down an approximate prevalence rate of opioid use in the Afghan population given that they are widely dispersed and mobile (Hall & Degenhardt, 2014). The risk for HIV spread will continue to increase as the amount of drug use increases within this country (Todd et al., 2012). The risk doesn't rely in the fact that they are injected per se, but the fact that injectable drugs increase the potential for infected needle sharing (Beyrer, 2011). According to Todd and colleagues (2011), a national drug use survey taken in 2009 showed "87% of IDUs reported

lifetime needle sharing and that 60% reported their syringes had been used by between 2 and 5 people prior to their personal use" (Todd et al., 2011, pg. 2).

Beyond that, research has shown that there is a positive relationship between substance abuse and risky sexual behavior (Leigh & Stall, 1993). For instance, Beyrer (2011) claims that people who partake in intravenous substance abuse have a higher risk of having drug using partners, multiple partners, selling or trading sex for drugs, more frequent unprotected sex, and sex in prisons and other detention centers (Beyrer, 2011). Afghanistan's relationship with heroin and other opioids is dangerous in terms of the potential spread for HIV among its populous and all of the neighboring countries that are also influenced by it.

2g. Pakistan and HIV

Like Afghanistan, Pakistan has a relatively low prevalence of HIV among the populous, but it is also a high-risk country. According to Haque and colleagues (2004), the first case of AIDS in Pakistan was reported in 1987, and the number has increased to around 100,000 cases since then (Haque et al., 2004). Raees and colleagues (2013) state that that the current HIV prevalence of Pakistan rounds up to about 0.1%. The HIV infections are concentrated in specific high risk groups like intravenous drug users, men who have sex with men, and commercial sex workers (Raees et al., 2013). Afghanistan and Pakistan are interconnected not just by their history, but also in terms of their public health issues. Pakistan is likely experiencing indirect effects of HIV transmission from its volatile neighbor.

Strathdee and colleagues (2003) claims that Pakistan, due to its proximity to Afghanistan, the largest heroin producer in the world, became a major conduit for opioids. The availability of opioids within the country has led to an emergence of a local consumption market. The

researchers also make the claim that the Afghanistan War has had indirect effects on the Pakistan population in terms of drug use. With the dangerous conditions of war, it was reported that more people started to engage in intravenous drug use in order to cope with the stress (Strathdee et al., 2003).

Emmanuel and colleagues (2009) state that the primary mode of transmission of HIV in Pakistan is through needle sharing for intravenous drug use. The researchers state that in a study with a sample of 4,039 intravenous drug users that were randomly collected from 12 cities across Pakistan, there was an HIV prevalence rate of 15.8% among that sample. The research shows more alarming results, claiming that the intravenous drug use among the country continues to increase (Emmanuel et al., 2009). Haque and colleagues (2004) claims that recent estimates state that there are about half a million drug users reside in Pakistan, and of those users, 180,000 are intravenous drug users (Haque et al., 2004). The amount of drug users in the country poses a higher risk of additional risky behaviors that could increase transmission of HIV.

Intravenous drug use has been linked to increased risky sexual behavior amongst the Pakistan population. Haque and colleagues (2004) conducted a study to examine the sexual behaviors of Pakistani drug users, and found that men in three Pakistan cities have reported low condom use and HIV/AIDS awareness. Also, of the sample of 608 drug users, nearly half of them have reported paying for sex, and nearly one-third have reported paying for having sex with males and females. These findings, if generalized, can lead to terrifying results. Half of the Pakistan population is married, so if the findings are true, these infected drug users can potentially transmit HIV to their spouses through unprotected sexual contact (Haque et al., 2004).

2h. Education

Multiple studies have been conducted to show how education is a very fundamental factor in HIV knowledge (Bazargan et al., 2000; Noden, Gomes & Ferriera, 2010; Tavoosi et al., 2004). Vandermoortele and Delamonic (2000) claim that there is a strong inverse correlation between education level and HIV burden. The researchers illustrate that people with lower education level are more likely to have little to no knowledge about HIV/AIDS. After examining over 30 countries, Vandermoortele and Delamonic (2000) found that pattern was universal amongst all countries, supporting that knowledge of various aspects of HIV/AIDS increases as education level increases. (Vandermoortele & Delamonic, 2000). Kirby, Obasi, and Laris (2006) conducted a systematic review of HIV programs in schools that educate students about the virus, its modes of transmission and how to prevent it, and found that schools are a very effective environment to lower risky behavior and HIV spread due to its ability to increase students' knowledge on HIV/AIDS (Kirby, Obasi & Laris, 2006).

2i. Wealth

Researchers have found that socioeconomic status is a contributing factor to a person's level of HIV/AIDS knowledge that (Glick & Sahn, 2007; Peltzer et al., 2009). It is known that people with higher wealth tend to be more knowledgeable about HIV/AIDS due to the fact that they have easier access to resources and higher education (Gillespie, Kadiyala & Greener, 2007). Individuals with a higher wealth index are also more inclined to ingest mass media, which allows them to have access to public health information about HIV/AIDS through multiple sources like television, radio, newspaper, etc. (Oljira, Berhane & Worku, 2013). Inversely, individuals in poverty tend to have less knowledge about HIV/AIDS due to lack of proper programs in schools, low general education levels, and less access to mass media (Kalichman et al., 2006). Wealth is a

powerful factor that influences multiple facets of a person's life, including knowledge about HIV/AIDS.

2j. Residence

For years, there have been massive disparities between urban and rural populations in terms of health. Individuals who live in rural areas tend to have less access to health professionals and less HIV prevention programs than people who reside in urban areas (Heckman et al., 1998). Studies have illustrated that because of a lower amount of public health professionals and resources, people who reside in rural areas have less knowledge about HIV/AIDS than people who live in urban areas (Sambisa & Stokes, 2006). Because urban environments tend to have higher prevalence of HIV/AIDS due to increased risk behaviors, there are more programs to educate the inhabitants about the virus and ways to prevent, giving populations in urban communities an increased knowledge base about the disease in order to suppress any spread of HIV (Crosby et al., 2002).

2k. Summary

Afghanistan and Pakistan has had a long, complicated history that has paved the way for both countries to have high risk of HIV transmission within their populations. The conflicts between the two countries has led to the displacement of large amounts of people that, through their migration, could potentially carry HIV across the border to the other country. Also, given that Afghanistan is the leading producer and consumers of opioids, there is even more risk of HIV transmission given that there is a high number of people who use intravenous drugs and even share needles. This prefaced with the fact that drug use is correlated with risky sexual behavior means that these countries could be faced with major epidemics of HIV if the right

precautions aren't taken. Research has shown that there may be an association between literacy rates and health literacy.

The main questions that this study will address are:

Is there an association between literacy rates and accurate knowledge of HIV/AIDS in Afghan men and women?

Is there an association between literacy rates and accurate knowledge of HIV/AIDS in Pakistani men and women?

Are there significant differences in HIV/AIDS knowledge between Pakistan and Afghanistan?

CHAPTER 3
METHODS

3a. Data Source

The data from this study are based on the Demographic Health Survey (DHS) Program. The DHS Program collects and disseminates nationally representative data on fertility, family planning, maternal and child health, gender, HIV/AIDS, malaria, and nutrition. The program is funded through the United States Agency for International Development (USAID). The DHS program started in 1984, and since then, has provided technical assistance to over 300 surveys in over 90 countries. Their mission is to advance global understanding of health and population trends in developing countries. For the purposes of this study, Demographic Health Surveys were collected for Pakistan and Afghanistan. The Afghanistan data was collected in 2015 and the Pakistan data was collected in 2012-2013.

3b. Participants

Analyses are based on individuals that are aged 15-49 in Afghanistan (N= 40,221) and Pakistan (N= 16,654). 13,520 Pakistani women and 3,134 Pakistani men were surveyed for the study. 29,461 Afghan women and 10,760 Afghan men were surveyed for the study. All individuals that were above the age of 49 were excluded from the study.

3c. Variables of Interest

Literacy

The independent variable of this study is the literacy of the individuals. Every participant of the DHS Program were required to take a literacy assessment in order to evaluate their ability to read and understand written language. The variable was coded as a categorical variable in the

study, with 3 groups used to accurately gauge the participant's literacy after they are told to read a sentence provided by the interviewer. The groups were:

1 – Cannot read at all

2 – Able to read only parts of sentence

3 – Able to read whole sentence

Accurate HIV/AIDS Knowledge

The dependent variable of this study is individuals' accurate knowledge of HIV/AIDS. There are multiple questions in the survey pertaining to HIV knowledge that spans from general knowledge about the condition to modes of transmission. The items in the survey were:

General Preliminary Knowledge of HIV/AIDS

1. Ever heard of an STI?
2. Have you ever heard of AIDS?
3. Can a healthy looking person have AIDS?

Knowledge of HIV Prevention Methods

4. Can you reduce the risk of getting HIV by always using a condom during sex?
5. Can you reduce the risk of getting HIV by having sex with 1 partner only who has no other partners?

Knowledge of HIV Transmission

6. Can HIV get transmitted by mosquito bites?
7. Can you get HIV by sharing food with a person who has AIDS?

8. Can you get HIV by witchcraft or supernatural means?

Knowledge of Mother to Child Transmission (MTCT)

9. Can HIV get transmitted during pregnancy?
10. Can HIV be transmitted during delivery?
11. Can HIV be transmitted by breastfeeding?

MTCT Prevention Knowledge

12. Are there drugs that can prevent transmission

All of the individuals' answers were inputted as numerical variables, which were then coded into categorical variable with groups "yes", "no", and "do not know". The "do not know" category was recoded as "missing" for the purposes of this study.

A new variable will be created for each of these segments in order to assess the accuracy of the answers the respondents give for the questions. The new variable will be a yes/no categorical variable that will show whether or not the individual has accurately answered all of the questions. For the HIV Prevention section, a variable will be created called "Comprehensive HIV Prevention Knowledge" and the respondents would need to accurately answer all of the questions (Score 2) in that category in order to be coded as having accurate HIV prevention knowledge. So for the study, the new variables will be:

1. Comprehensive Preliminary HIV Knowledge

(Has heard about STIs + Has heard about AIDS + Agrees that a healthy looking person can have HIV)

2. Comprehensive HIV Prevention Knowledge

(Agrees that HIV can be prevented by consistent condom use + Agrees that HIV can be prevented by having only one, uninfected partner)

3. Comprehensive HIV Transmission Knowledge

(Agrees that HIV cannot be transmitted through mosquito bites + Agrees that HIV cannot be spread through sharing food + Agrees that HIV cannot be spread through witchcraft/supernatural means)

4. Comprehensive MTCT Knowledge

(Agrees that HIV can be transmitted of child through pregnancy+ Agrees that HIV can be transmitted to child through delivery + Agrees that HIV can be transmitted to child through breastfeeding)

A final variable will be created that compiles individuals with accurate responses from items from a variety of segments to create:

5. Completely Accurate HIV Knowledge

(Heard of STI + Heard of AIDS + Knows a Healthy Person can have HIV + Agrees that condoms prevent HIV + Agrees that having sex with one, uninfected partner prevents HIV + Disagrees that HIV is spread by mosquitoes + Disagrees that HIV is spread by sharing food)

The following covariates were included in the study. These covariates were selected based on literature review and their availability in the DHS data sets.

AGE: All the individuals' in the study were asked about their age, and their answers were coded as a categorical variable that categorized the ages of the respondents into 5-year groups with 7 categories. For the purposes of this study, the age variable was recoded to have 4 categories.

1 – (15-19)

2 – (20-29)

3 – (30-39)

4 – (40-49)

EDUCATION: Individuals' were asked whether or not they attended school, and their answer (yes/no) were coded into a categorical variable that illustrates the respondents' level of school completion. The variable has 4 categories:

1 – No education

2 – Primary education

3 – Secondary education

4 – Higher education

WEALTH INDEX: The wealth index is a composite score of the individuals' living standards within the study. It calculates a continuous score from the amount of resources available to the individuals (ownership of assets [televisions, bicycles, etc.], access to sanitation and clean water, internet access), which is then grouped into a categorical variable with 5 categories that signify the quartile of wealth an individual has:

1 – Lowest

2 – Second

3 – Middle

4 – Fourth

5 – Highest

MARITAL STATUS: The individuals' were asked about their relationship status and those answers were coded as a categorical variable with 6 levels, but for the purposes of the study, the variable was recoded with 3 levels:

1 – Never in Union

2 – Married/Living with Partner

3– Widowed/Divorced/Separated

RESIDENCE: Individuals' were asked about where they lived, and their responses were coded as a categorical variable with 2 levels:

1 – Urban

2 – Rural

3d. Statistical Method

The study used Statistical Analysis Software (SAS) version 9.3 in order to manage and analyze the DHS data. For the descriptive statistics, frequency procedures were used in order to provide descriptive characteristics of all independent and dependent variables in the study. Chi-square tests were conducted with a p-value of 0.05 in order to compare each of the variables between the countries Afghanistan and Pakistan.

Binary logistic regression will be used for univariate and multivariate analysis to analyze the association between literacy rates and specific variables for HIV related knowledge. Odds ratios with 95% confidence intervals will be provided to illustrate whether or not the association between literacy and HIV knowledge is statistically significant. All relationships will be

compared between Afghanistan and Pakistan in order to examine any significant differences between the countries.

CHAPTER 4

RESULTS

4a. Socio-demographic Characteristics

Table 4.1 describes the socio-demographic characteristics of the individuals in the study. The study was composed of 56,875 individuals, with 40,221 from Afghanistan and 16,653 from Pakistan. After conducting chi-square tests, it is concluded that the distributions of gender, age, residence, education, wealth index, and literacy were significantly different between Afghanistan and Pakistan (p-value <.0001). In terms of gender, there is a large percentage of women in both countries' samples (Afghanistan (73.2%; Pakistan 81.2%). The majority of the population in both countries is over 30 (Pakistan 63.5%, Afghanistan 54.8%) and lives in rural areas (Afghanistan 76.7%; Pakistan 53.8%). Both countries have large uneducated populations, but Afghanistan's population is alarmingly undereducated. In comparison to Pakistan, who has population in which 50.7% have never been in school, Afghanistan has a population in which over three fourths (approx. 76.7%) have never attended school. Only 3.19% of Afghanistan's population attended higher education, which is lower than Pakistan's 14.60%. Over ¾ of Afghanistan's population (approx. 76.8%) is unable to read, whereas a little over half of Pakistan's population (approx. 51.1%) is unable to read. In terms of wealth, Afghanistan has a nearly even distribution, with a majority of the people falling within the second and middle bracket (23% and 21.8% respectively). A majority of Pakistan's population has a higher wealth index, with the majority (24.1%) being in the highest level. Both Afghanistan and Pakistan have populations in which the majority are married/in a serious relationship (97.8% and 96.4%).

Table 4.1 Socio-demographic characteristics of people aged 15-49 between Afghanistan (2015) and Pakistan (2012-2013)

	Afghanistan	Pakistan	
	N (%)	N (%)	p-value
Gender			
Male	10760 (26.75)	3134 (18.82)	<.0001*
Female	29461 (73.24)	13520 (81.18)	
Total	40221 (100)	16654 (100)	
Age			
15-19	1987 (4.94)	596 (3.58)	<.0001*
20-29	16187 (40.25)	5483 (32.92)	
30-39	12652 (31.46)	5945 (35.70)	
40-49	9395 (23.36)	4630 (27.80)	
Total	40221 (100)	16654 (100)	
Residence			
Urban	9358 (23.27)	7861 (47.20)	<.0001*
Rural	30863 (76.73)	8793 (53.80)	
Total	40221 (100)	16654 (100)	
Education			
No Education	30717 (76.73)	8451 (50.74)	<.0001*
Primary	3719 (9.25)	2361 (14.18)	
Secondary	4503 (11.20)	3410 (20.48)	
Higher	1282 (3.19)	2432 (14.60)	
Total	40221 (100)	16654 (100)	
Wealth Index			
Lowest	7612 (18.93)	3063 (18.39)	<.0001*
Second	9238 (22.97)	3156 (18.95)	
Middle	8776 (21.82)	3129 (18.79)	
Fourth	8640 (21.48)	3290 (19.76)	
Highest	5955 (14.81)	4016 (24.11)	
Total	40221 (100)	16654 (100)	
Marital Status			
Never in Union	0 (0.00)	0 (0.00)	<.0001*
Married/Living with Partner	39348 (97.83)	16057 (96.42)	
Divorced/Widowed /Separated	873 (2.17)	597 (3.58)	
Total	40221 (100)	16654 (100)	
Literacy			
Cannot Read At All	30812 (76.75)	8504 (51.12)	<.0001*
Able to Read only parts of a sentence	2512 (6.26)	983 (5.90)	
Able to read whole sentence	6822 (16.99)	7148 (42.97)	
Total	40461 (100)	16634 (100)	

**p-value<.05*

4b. HIV-related Knowledge

Table 4.2 illustrates the demographic characteristics of HIV-related knowledge in Afghanistan and Pakistan. All of the variables except 'always use a condom', 'MTCT through breastfeeding', 'Drugs to avoid MTCT during pregnancy' are significantly different between Afghanistan and Pakistan. All the characteristics in this table are from correct responses to the survey questions. In terms of preliminary knowledge about HIV, Pakistan has population that is significantly more knowledgeable about HIV than Afghanistan. Only 34.3% of Afghanistan's population has heard of an STI, while 53.1% of Pakistan's population has heard of an STI. When asked if they heard of AIDS, 29.7% of Afghanistan's population and 48.7% of Pakistan's population agreed. Of the people who have heard of AIDS and STIs, 64.8% of Afghanistan's population agreed that a healthy person can have HIV, which is still significantly lower than Pakistan's population, in which 80.5% know that a healthy person can have HIV. In Afghanistan, only 13.2% of the entire population answered all three questions correctly. In Pakistan, 32.4% of the population answered all the questions correctly. The rest of the questions were given to the people who have heard of AIDS.

Of the people who have heard of AIDS in the Pakistan and Afghanistan populations, 85.0% of Afghans agreed that having sexual contact with only one faithful, uninfected partner. While this is definitely a high percentage, it still fall behinds the Pakistani population, in which 91.2% knows limited sexual contact prevents HIV. In terms of knowing that consistent condom use prevents HIV, there isn't a significant difference (p-value = .3777) in the percentage of people who agree about the preventive method of condom use (Afghanistan 78.4%; Pakistan 77.7%). In terms of the individuals in both populations that answered both HIV prevention questions accurately, 14.2% of Afghanistan's population got both questions right, while 24.1%

of Pakistan's population answered both questions accurately, further showing that the Pakistan population are more knowledgeable about HIV than Afghanistan.

Pakistan's population is more knowledgeable about the subject of HIV transmission methods than Afghanistan. Over seventy percent (approx. 71.3%) of Pakistan's population knew that HIV cannot be transmitted by mosquito bite, while only 51.6% of Afghanistan's population did. Over sixty percent (approx. 65.2%) of Pakistan's population knew that HIV cannot be transmitted by sharing food, while only 51.2% of Afghanistan's population did. Even in terms of knowing witchcraft/supernatural means cannot transmit HIV, 90.9% of the Pakistan population agreed while only 85.01% of the Afghanistan population did. While it was quite rare for individuals to answer all three of the questions correctly, Pakistan still leads Afghanistan in terms of comprehensive HIV transmission knowledge (18.0% and 5.8% respectively).

In terms of Mother to Child Transmission (MTCT) knowledge, Pakistan leads Afghanistan in almost every question. When asked if HIV can be transmitted to a child through pregnancy, 84.7% of Pakistan's population agreed, while only 74.4% of Afghanistan's population agreed. When asked if HIV can be transmitted to a child during delivery, 82.1% of Pakistan's population agreed, while only 65.4% of Afghanistan's population did. There was no significant difference (p-value = .2409) between the populations of Afghanistan and Pakistan in terms of knowing that HIV can be transmitted to kids through breastfeeding (76.5% and 75.7% respectively). Pakistan clearly has more knowledge on MTCT than Afghanistan, especially given that 19.15% of Pakistan's population answered all three MTCT questions right when only 4.9% of Afghanistan population answered all MTCT accurately.

There was not a significant difference (p-value = .9946) between the populations' of Afghanistan and Pakistan in terms of knowledge of prevention methods for MTCT of HIV

(64.7% for both). In terms of the individuals that have accurate overall HIV knowledge (Heard of STI + Heard of AIDS + Knows a Healthy Person can have HIV + Agrees that condoms prevent HIV + Agrees that having sex with one, uninfected partner prevents HIV + Disagrees that HIV is spread by mosquitoes + Disagrees that HIV is spread by sharing food), both countries have populations with low overall HIV knowledge. Over nine percent (approx. 9.3%) of Pakistan's population has accurate overall HIV knowledge while only 2.4% of Afghanistan's population has accurate overall HIV knowledge. This illustrates that Pakistan's population has higher overall HIV knowledge than Afghanistan.

Table 4.2 Demographic characteristics of HIV-related knowledge among people aged 15-49 in Afghanistan (2015) and Pakistan (2012-2013)

	Afghanistan	Pakistan	
	N (%)	N (%)	p-value
Preliminary HIV Knowledge			
Heard of an STI	13728 (34.30)	8814 (53.09)	<.0001*
Heard of AIDS	11930 (29.72)	8100 (48.68)	<.0001*
A healthy looking person can have HIV	5297 (64.79)	5395 (80.47)	<.0001*
Comprehensive Preliminary HIV Knowledge (Score 3)[a]	5297 (13.17)	5395 (32.39)	<.0001*
HIV Prevention Methods			
One faithful, uninfected partner	8358 (85.01)	6419 (91.24)	<.0001*
Always use a condom	7099 (78.36)	4488 (77.74)	.3777
Comprehensive HIV Prevention Knowledge (Score 2)[b]	5934 (14.76)	4017 (24.12)	<.0001*
HIV Transmission Knowledge			
Can get HIV by mosquito bites	4583 (51.56)	4647 (71.32)	<.0001*
Can get HIV by sharing food	4807 (51.23)	4452 (65.24)	<.0001*
Can get HIV by witchcraft or supernatural means	7354 (85.01)	6243 (90.89)	<.0001*
Comprehensive HIV Transmission Knowledge (Score 3)[c]	2315 (5.76)	3005 (18.04)	<.0001*
HIV MTCT Knowledge			

MTCT during pregnancy	6997 (74.44)	5487 (84.70)	<.0001*
MTCT during delivery	2967 (65.40)	3658 (82.11)	<.0001*
MTCT through breastfeeding	7027 (76.53)	4776 (75.71)	.2409
Comprehensive MTCT Knowledge (Score 3)[b]	1963 (4.88)	3189 (19.15)	<.0001*
MTCT Prevention Knowledge			
Drugs to avoid MTCT during pregnancy	3928 (64.69)	2573 (64.70)	.9946
Overall HIV Knowledge			
Completely Accurate Knowledge of HIV (Score 7)[e]	951 (2.36)	1545 (9.28)	<.0001*

[a] Has heard about STIs + Has heard about AIDS + Agrees that a healthy looking person can have HIV ;[b] Agrees that HIV can be prevented by consistent condom use + Agrees that HIV can be prevented by having only one, uninfected partner ;[c] Agrees that HIV cannot be transmitted through mosquito bites + Agrees that HIV cannot be spread through sharing food + Agrees that HIV cannot be spread through witchcraft/supernatural means; [d] Agrees that HIV can be transmitted of child through pregnancy+ Agrees that HIV can be transmitted to child through delivery + Agrees that HIV can be transmitted to child through breastfeeding; [e]Heard of STI + Heard of AIDS + Knows a Healthy Person can have HIV + Agrees that condoms prevent HIV + Agrees that having sex with one, uninfected partner prevents HIV + Disagrees that HIV is spread by mosquitoes + Disagrees that HIV is spread by sharing food; p-value<.05; MTCT: Mother to Child Transmission; HIV: Human Immunodeficiency Virus*

4c. Logistic Regression Analysis

Univariate Association between Literacy Rates and Accurate HIV-Related Knowledge

Table 4.3 illustrates the univariate analysis of association between literacy and selected variables relating to HIV-related knowledge in Afghanistan and Pakistan.

In Afghanistan, there was statistically significant associations between literacy and every selected HIV-related variable. People who were illiterate were less likely to be have accurate comprehensive preliminary HIV knowledge (OR .389; p-value <.0001), less likely to have accurate comprehensive HIV prevention knowledge (OR .360; p-value <.0001), less likely to have accurate comprehensive HIV transmission knowledge (OR .442; p-value <.0001), less likely to have accurate MTCT knowledge (OR .612; p-value <.0001), and less likely to have accurate overall HIV knowledge (OR .379; p-value <.0001).

In Pakistan, there was also significant associations between literacy and all selected HIV-related knowledge variables. The people who were illiterate were less likely to be have accurate

comprehensive preliminary HIV knowledge (OR .306; p-value <.0001), less likely to have accurate comprehensive HIV prevention knowledge (OR .310; p-value <.0001), less likely to have accurate comprehensive HIV transmission knowledge (OR .276; p-value <.0001), less likely to have accurate MTCT knowledge (OR .435; p-value <.0001), less likely to have accurate overall HIV knowledge (OR .241; p-value <.0001).

Table 4.3 Univariate analysis of associations between literacy and selected variables relating to HIV knowledge in Afghanistan (2015) and Pakistan (2012-2013)

	Afghanistan			Pakistan		
	OR	p-value	95% CI	OR	p-value	95% CI
Comprehensive Preliminary HIV Knowledge (Score 3)	.389	<.0001*	(.377-.402)	.306	<.0001*	(.293-.318)
Comprehensive HIV Prevention Knowledge (Score 2)	.360	<.0001*	(.349-.371)	.310	<.0001*	(.296-.325)
Comprehensive HIV Transmission Knowledge (Score 3)	.442	<.0001*	(.423-.463)	.276	<.0001*	(.260-.292)
Comprehensive MTCT Knowledge (Score 3)	.612	<.0001*	(.582-.643)	.435	<.0001*	(.416-.455)
Overall Knowledge of HIV (Score 7)	.379	<.0001*	(.354-.406)	.241	<.0001*	(.220-.265)

**p-value<.05; MTCT: Mother to Child Transmission; HIV: Human Immunodeficiency Virus*

Multivariate Association between Literacy and HIV-Related Knowledge

Table 4.4 illustrates the multivariate analysis of association between literacy and selected variables relating to HIV-related knowledge in Afghanistan and Pakistan after controlling for socio-demographic factors like education, marital status, age, gender, residence, and wealth).

In Afghanistan, there was statistically significant associations between literacy and four HIV-related variable after controlling for sociodemographic factors. People who were illiterate were less likely to be have accurate comprehensive preliminary HIV knowledge (OR .820; p-value <.0001), less likely to have accurate comprehensive HIV prevention knowledge (OR .829; p-value <.0001), less likely to have accurate MTCT knowledge (OR .696; p-value <.0001), less likely to have accurate overall HIV knowledge (OR .835; p-value .0329). There was not a significant association between literacy and HIV transmission (p-value .2102).

In Pakistan, there was also significant associations between literacy and almost all HIV-related knowledge variables after controlling for socio-demographic factors. The people who were illiterate were less likely to be have accurate comprehensive preliminary HIV knowledge (OR .642; p-value <.0001), less likely to have accurate comprehensive HIV prevention knowledge (OR .676; p-value <.0001), less likely to have accurate comprehensive HIV transmission knowledge (OR .756; p-value <.0001), less likely to have accurate MTCT knowledge (OR .588; p-value <.0001), less likely to have accurate overall HIV knowledge (OR .701; p-value <.0001).

Table 4.4 Multivariate analysis of associations between literacy and selected variables relating to HIV knowledge controlled for sociodemographic factors (Age, ethnicity, residence, marital status, education, wealth, gender)

	Afghanistan			Pakistan		
	OR	p-value	95% CI	OR	p-value	95% CI

Comprehensive Preliminary HIV Knowledge (Score 3)	.820	<.0001*	(.758-.888)	.641	<.0001*	(.598-.690)
Comprehensive HIV Prevention Knowledge (Score 2)	.829	<.0001*	(.768-.895)	.676	<.0001*	(.624-.732)
Comprehensive HIV Transmission Knowledge (Score 3)	.930	.2102	(.831-1.042)	.756	<.0001*	(.688-.831)
Comprehensive MTCT Knowledge (Score 3)	.696	<.0001*	(.606-.800)	.588	<.0001*	(.542-.639)
Overall Knowledge of HIV (Score 7)	.835	.0329*	(.707-.985)	.701	<.0001*	(.612-.802)

**p-value<.05; MTCT: Mother to Child Transmission; HIV: Human Immunodeficiency Virus*

Univariate Analysis of the Association between Countries and HIV-Related Knowledge

Table 4.5 illustrates the univariate analysis of the association between countries (Pakistan and Afghanistan) and selected variables for HIV-related knowledge. There was a significant association between countries and all of the selected variables for HIV knowledge (p-value < .05). Compared to Afghanistan, people in Pakistan who were illiterate were less likely to have accurate comprehensive preliminary HIV knowledge (OR 3.159; p-value <.0001), accurate comprehensive HIV prevention knowledge (OR 1.836; p-value <.0001), accurate comprehensive HIV transmission knowledge (OR 3.605; p-value <.0001), accurate comprehensive MTCT knowledge (OR 4.616; p-value <.0001), and accurate overall HIV knowledge (OR 4.223; p-value <.0001).

Table 4.5 Univariate analysis of associations between countries and selected variables for HIV-related knowledge

	Pakistan			Afghanistan
	OR	p-value	95% CI	
Comprehensive Preliminary HIV Knowledge (Score 3)	3.159	<.0001*	(3.025-3.300)	Reference
Comprehensive HIV Prevention Knowledge (Score 2)	1.836	<.0001*	(1.756-1.921)	Reference
Comprehensive HIV Transmission Knowledge (Score 3)	3.605	<.0001*	(3.403-3.819)	Reference
Comprehensive MTCT Knowledge (Score 3)	4.616	<.0001*	(4.349-4.899)	Reference
Overall Knowledge of HIV (Score 7)	4.223	<.0001*	(3.886-4.588)	Reference

**p-value<.05; MTCT: Mother to Child Transmission; HIV: Human Immunodeficiency Virus*

Multivariate Analysis of the Association between Countries and HIV-Related Knowledge

Table 4.6 illustrates the univariate analysis of the association between countries (Pakistan and Afghanistan) and selected variables for HIV-related knowledge after controlling for socio-demographic factors like education, residence, gender, age, wealth, and marital status. There was a significant association between countries and all of the selected variables for HIV knowledge (p-value < .05). Compared to Afghanistan, people in Pakistan were more likely to have accurate comprehensive preliminary HIV knowledge (OR 2.426; p-value <.0001), accurate comprehensive HIV prevention knowledge (OR 1.233; p-value <.0001), accurate comprehensive HIV transmission knowledge (OR 2.322; p-value <.0001), accurate comprehensive MTCT

knowledge (OR 2.467; p-value <.0001), and accurate overall HIV knowledge (OR 4.223; p-value <.0001).

Table 4.6 Multivariate analysis on associations between country and selected variables for HIV-related knowledge controlled for sociodemographic factors (Age, residence, marital status, education, wealth, gender)

	Pakistan			Afghanistan
	OR	p-value	95% CI	
Comprehensive Preliminary HIV Knowledge (Score 3)	2.426	<.0001*	(2.294-2.566)	Reference
Comprehensive HIV Prevention Knowledge (Score 2)	1.233	<.0001*	(1.162-1.307)	Reference
Comprehensive HIV Transmission Knowledge (Score 3)	2.322	<.0001*	(2.162-2.493)	Reference
Comprehensive MTCT Knowledge (Score 3)	2.468	<.0001*	(2.294-2.654)	Reference
Overall Knowledge of HIV (Score 7)	2.275	<.0001*	(2.058-2.513)	Reference

**p-value<.05; MTCT: Mother to Child Transmission; HIV: Human Immunodeficiency Virus*

CHAPTER 5
DISCUSSION

5a. HIV-Related Knowledge

Even though the incidence of HIV worldwide is gradually decreasing, the disease still remains one of the most dangerous risks for people in developing countries (World Health Organization, 2016). Medicine has advanced to the point where people infected with HIV can potentially live similar lives to healthy individuals, but there is still no cure for the disease at this current time. Because of this, the best way to fight the spread of this specific disease is through preventing transmission. Adequate knowledge of HIV is required in order for the population to use appropriate measures in order to prevent the spread of HIV. Education remains an important factor in providing the fundamentals for individuals to learn about diseases like HIV and understand its burdens (Zimmerman, Woolf, Haley, 2015). Studies have been conducted in multiple countries in Sub-Saharan Africa regarding HIV-related knowledge (Kalichman & Simbayi, 2003; Nachega et al. 2005; Fay et al., 2011; Delobelle et al., 2009) , but there are very few studies conducted in countries within the Southern Asian region.

In terms of the research question of whether there was an association between literacy and HIV-related knowledge, this study found significant associations between literacy rates and the majority of the selected variables of HIV-related knowledge in both Afghanistan and Pakistan. For both countries, people who were illiterate had less odds of having accurate knowledge of HIV/AIDS. The results of this study run in tandem with the mountain of research of the association between literacy and health knowledge (Gazmararian et al., 2003; Lindau et al., 2002; Pandit et al., 2009; Berkman et al., 2004). This study illustrates the fundamental need for education in order to prevent disease spread. Most of the population in both Afghanistan and

Pakistan were illiterate and have not had any schooling. The factors of education and literacy have a direct effect on individuals' knowledge of diseases like HIV. Most of the population in both Afghanistan and Pakistan, when asked about AIDS, have not even heard of the disease. This is problematic given the high amount of risk both countries have for HIV outbreaks due to the amount of intravenous drug use in the countries (Ruiseñor-Escudero, 2014; Bokhari, 2007). Adequate education programs are needed to teach individuals in these countries the proper literacy skills in order effectively navigate through these risky environments and prevent further transmission of HIV.

In terms of the second research question of whether there was a significant difference in HIV-related knowledge between Afghanistan and Pakistan, the study found that there is a significant difference between countries (Afghanistan and Pakistan) and HIV-related knowledge. The study found that the Pakistan population has significantly higher prevalence of accurate HIV-related knowledge than the Afghanistan population. These results are likely due to the amount of attention one country gives to HIV versus the other. Pakistan has been developing initiatives to combat the spread of HIV for over a decade, with contribution from both private and public sectors in the country (Khan & Hyder, 2001). Pakistan's focus on HIV over the years have made the populous more aware of the disease and made them more educated on the subject than people in Afghanistan, who has had limited engagement with the HIV in terms of programs and initiatives. Also, from the study, Pakistan also illustrates a higher percentage of its population that has been educated than Afghanistan's, making its populace more equipped with necessary skills like adequate literacy to understand health issues like HIV.

Both Afghanistan and Pakistan need more attention in terms of research given the high-risk status they have due to intravenous drug users. While both countries currently have low

prevalence for HIV, it is suspected that the actual number of people with HIV is much higher than reported due to the fact that many people do not report having HIV/AIDS with NGOs. This can be because of fear of being persecuted in their communities due to stigma or because they legitimately aren't aware they have the disease (Yousaf et al., 2011).

5b. Strengths and Limitations

The DHS program uses nationally representative datasets for all of the countries targeted in the program. Because of this, the study can generalize the samples used in the Afghanistan and Pakistan datasets to the entire population. That being said, there were a lot of variables within the datasets with missing values, which could potentially skewed the results. There was also a significant difference in the number of individuals in the Afghanistan dataset and the Pakistan dataset, which could it harder to compare the countries. Also, because most of the variables in this study were self-reported, there is a potential for response bias.

5c. Future Directions

Highlighting the differences between Afghanistan and Pakistan is important because it illustrates the gaping problems that need to be addressed in both countries in order to protect their populations from HIV transmission. Further research can be conducted on their education systems to explain why most of the populations are illiterate. Further research can also be conducted on the massive disparities between men and women in these countries. Of the 758 million illiterate people in the world, almost two-thirds are women (Central Intelligence Agency, 2014). Other disparities could also be explored among Afghanistan and Pakistan like in ethnicity, residence, and wealth in order to fully understand the HIV problem in these understudied countries.

5d. Conclusion

Afghanistan and Pakistan are countries that remain high-risk countries due to their relationship with opioids and intravenous drug use. Given limited available information on the countries, no one knows for sure the HIV prevalence, but currently it is assumed to be low in both countries. Literacy is an important factor that needs to be addressed in order to further combat the spread of HIV. Its relationship to HIV-related knowledge illustrates how further steps should be taken in order to ensure that populations in both Afghanistan and Pakistan are well educated with the skills necessary to navigate the health issue of HIV.

REFERENCES

Baker, D. W. (2006). The Meaning and the Measure of Health Literacy. *Journal of General Internal Medicine, 21*(8), 878–883. http://doi.org/10.1111/j.1525-1497.2006.00540.x

Bazargan, M., Kelly, E. M., Stein, J. A., Husaini, B. A., & Bazargan, S. H. (2000). Correlates of HIV Risk-taking Behaviors among African-American College Students: The Effect of HIV Knowledge, Motivation, and Behavioral Skills. *Journal of the National Medical Association, 92*(8), 391.

Berkman, N. D., DeWalt, D. A., Pignone, M. P., Sheridan, S. L., Lohr, K. N., Lux, L., ... & Bonito, A. J. (2004). Literacy and Health Outcomes. *Evidence Report/Technology Assessment*, 87, 1-8.

Berkman, N.D., Sheridan, S.L., Donahue, K.E., Halpern, D.J. & Crotty, K. (2011) Low Health Literacy and Health Outcomes: An Updated Systematic Review. *Ann Intern Med.*; 155:97–107. doi: 10.7326/0003-4819-155-2-201107190-00005

Beyrer, C. (2011). The Golden Crescent and HIV/AIDS in Central Asia: Deadly Interactions. *Global Public Health, 6*(5), 570-576. doi:10.1080/17441692.2011.572080

Crosby, R. A., Yarber, W. L., Diclemente, R. J., Wingood, G. M., & Meyerson, B. (2002). HIV-Associated Histories, Perceptions, and Practices Among Low-Income African American Women: Does Rural Residence Matter? *American Journal of Public Health, 92*(4), 655-659. doi:10.2105/ajph.92.4.655

Delobelle, P., Rawlinson, J. L., Ntuli, S., Malatsi, I., Decock, R., & Depoorter, A. M. (2009). HIV/AIDS Knowledge, Attitudes, Practices and Perceptions of Rural Nurses in South Africa. *Journal of Advanced Nursing, 65*(5), 1061-1073.

DeWalt, D. A., Berkman, N. D., Sheridan, S., Lohr, K. N., & Pignone, M. P. (2004). Literacy and Health Outcomes: A Systematic Review of the Literature. *Journal of General Internal Medicine*, *19*(12), 1228–1239. http://doi.org/10.1111/j.1525-1497.2004.40153.x

Bokhari, A., Nizamani, N. M., Jackson, D. J., Rehan, N. E., Rahman, M., Muzaffar, R., ... & Pisani, E. (2007). HIV Risk in Karachi and Lahore, Pakistan: An Emerging Epidemic in Injecting and Commercial Sex Networks. *International Journal of STD & AIDS, 18*(7), 486-492.

Durani, M.U. & Khan, A. (2009). Pakistan-Afghan Relations: Historic Mirror. *The Dialogue, 4*(1), 25-64.

Emmanuel, F., Archibald, C., Razaque, A., & Sandstrom, P. (2009). Factors Associated With an Explosive HIV Epidemic Among Injecting Drug Users in Sargodha, Pakistan. *JAIDS Journal of Acquired Immune Deficiency Syndromes, 51*(1), 85-90. doi:10.1097/qai.0b013e31819906f3

Fay, H., Baral, S. D., Trapence, G., Motimedi, F., Umar, E., Iipinge, S., ... & Beyrer, C. (2011). Stigma, Health Care Access, and HIV Knowledge among Men Who Have Sex with Men in Malawi, Namibia, and Botswana. *AIDS and Behavior, 15*(6), 1088-1097.

Gazmararian, J. A., Williams, M. V., Peel, J., & Baker, D. W. (2003). Health Literacy and Knowledge of Chronic Disease. *Patient Education and Counseling, 51*(3), 267-275.

Gillespie, S., Kadiyala, S., & Greener, R. (2007). Is Poverty or Wealth Driving HIV Transmission? *Aids, 21*(Suppl 7). doi:10.1097/01.aids.0000300531.74730.72

Glick, P., & Sahn, D. E. (2007). Changes in HIV/AIDS Knowledge and Testing Behavior in Africa: How Much and for Whom?. *Journal of Population Economics, 20*(2), 383-422.

Hall, W. D., & Degenhardt, L. (2014). Afghanistan has a Sizeable Problem with Opioid Use. *The Lancet Global Health, 2*(10). doi:10.1016/s2214-109x(14)70299-2

Haque, N., Zafar, T., Brahmbhatt, H., Imam, G., Hassan, S. U., & Strathdee, S. A. (2004). High-risk Sexual Behaviours among Drug Users in Pakistan: Implications for Prevention of STDs and HIV/AIDS. *International Journal of STD & AIDS, 15*(9), 601-607. doi:10.1258/0956462041724172

Heckman, T. G., Somlai, A. M., Peters, J., Walker, J., Otto-Salaj, L., Galdabini, C. A., & Kelly, J. A. (1998). Barriers to Care among Persons Living with HIV/AIDS in Urban and Rural Areas. *AIDS Care, 10*(3), 365-375.

Hernandez, L. M. (2013). Health literacy: Improving Health, Health Systems, and Health Policy around the World: Workshop Summary. Washington, D.C.: National Academies Press. Retrieved November 23, 2017, from https://www.ncbi.nlm.nih.gov/books/NBK202445/.

HIV. (2017, July). Retrieved November 21, 2017, from http://www.who.int/hiv/en/

HIV / AIDS. (2016, August 2). Retrieved December 19, 2017, from http://www.who.int/immunization/topics/hiv/en/index1.html

HIV/AIDS and Conflict. (2003, August). Retrieved November 23, 2017, from http://data.unaids.org/topics/security/fs_conflict_en.pdf?preview=true

HIV Transmission. (2017, June 06). Retrieved November 22, 2017, from https://www.cdc.gov/hiv/basics/transmission.html

Jiang, Y., Sereika, S. M., Lingler, J. H., Tamres, L. K., & Erlen, J. A. (2017). Health Literacy and its Correlates in Informal Caregivers of Adults with Memory Loss. *Geriatric Nursing*, 1-7. doi:10.1016/j.gerinurse.2017.10.008

Kalichman, S. C., & Simbayi, L. C. (2003). HIV Testing Attitudes, AIDS Stigma, and Voluntary HIV Counselling and Testing in a Black Township in Cape Town, South Africa. *Sexually transmitted infections, 79*(6), 442-447.

Kalichman, S. C., Simbayi, L. C., Kagee, A., Toefy, Y., Jooste, S., Cain, D., & Cherry, C. (2006). Associations of Poverty, Substance Use, and HIV Transmission Risk Behaviors in Three South African Communities. *Social science & medicine, 62*(7), 1641-1649.

Kirby, D., Obasi, A., & Laris, B. A. (2006). The Effectiveness of Sex Education and HIV Education Interventions in Schools in Developing Countries. *Technical Report Series-World Health Organization*, 938, 103.

Kuara, V. (2017, July 27). The Durand Line: A British Legacy Plaguing Afghan-Pakistani Relations. Retrieved November 24, 2017, from http://www.mei.edu/content/article/durand-line-british-legacy-plaguing-afghan-pakistani-relations

Leigh, B. C., & Stall, R. (1993). Substance Use and Risky Sexual Behavior for Exposure to HIV: Issues in Methodology, Interpretation, and Prevention. *The American Psychologist, 48*(10), 1035–1045.

Lindau, S. T., Tomori, C., Lyons, T., Langseth, L., Bennett, C. L., & Garcia, P. (2002). The Association of Health Literacy with Cervical Cancer Prevention Knowledge and Health Behaviors in a Multiethnic Cohort of Women. *American Journal of Obstetrics and Gynecology, 186*(5), 938-943.

Literacy. (2016, September). Retrieved November 24, 2017, from https://www.cia.gov/library/publications/the-world-factbook/fields/2103.html

McGinn, T., Purdin, S. J., Krause, S., & Jones, R. K. (2001). Forced Migration and Transmission of HIV and Other Sexually Transmitted Infections: Policy and Programmatic Responses. HIV InSite Knowledge Base Chapter. Retrieved November 23, 2017, from http://hivinsite.ucsf.edu/InSite?page=kb-08-01-08

Nachega, J. B., Lehman, D. A., Hlatshwayo, D., Mothopeng, R., Chaisson, R. E., & Karstaedt, A. S. (2005). HIV/AIDS and Antiretroviral Treatment Knowledge, Attitudes, Beliefs, and Practices in HIV-infected Adults in Soweto, South Africa. *JAIDS Journal of Acquired Immune Deficiency Syndromes*, *38*(2), 196-201.

Nielsen-Bohlman, L. (2004). Health literacy: a prescription to end confusion (A. M. Panzer & D. A. Kindig, Eds.). Washington, DC: National Academies Press.

Noden, B. H., Gomes, A., & Ferreira, A. (2010). Influence of Religious Affiliation and Education on HIV Knowledge and HIV-related Sexual Behaviors among Unmarried Youth in Rural Central Mozambique. *AIDS care, 22*(10), 1285-1294.

Oljira, L., Berhane, Y., & Worku, A. (2013). Assessment of Comprehensive HIV/AIDS Knowledge Level among In-school Adolescents in Eastern Ethiopia. *Journal of the International AIDS Society, 16*(1), 17349. http://doi.org/10.7448/IAS.16.1.17349

Pandit, A. U., Tang, J. W., Bailey, S. C., Davis, T. C., Bocchini, M. V., Persell, S. D., ... & Wolf, M. S. (2009). Education, Literacy, and Health: Mediating Effects on Hypertension Knowledge and Control. *Patient Education and Counseling, 75*(3), 381-385.

Paxton, N. A. (2014). Political Processes and the Spread of HIV. *SSRN Electronic Journal*, 1-31. doi:10.2139/ssrn.2416896

Peltzer, K., Matseke, G., Mzolo, T., & Majaja, M. (2009). Determinants of Knowledge of HIV Status in South Africa: Results from a Population-based HIV Survey. *BMC public health, 9*(1), 174.

Pendse, R., Gupta, S., Yu, D., & Sarkar, S. (2016). HIV/AIDS in the South-East Asia Region: Progress and Challenges. *Journal of Virus Eradication, 2*(Suppl 4), 1–6.

Raees, M.A., Abidi, S.H., Wajid, Ali., Muhammad, R.K. & Syed, Ali. (2013). HIV among Women and Children in Pakistan. *Science & Society, 21*(4), 213-214. Doi: http://dx.doi.org/10.1016/j.tim.2012.12.005

Rehman, S. U., Rasoul, M. Z., Wodak, A., Claeson, M., Friedman, J., & Sayed, G. D. (2007). Responding to HIV in Afghanistan. *The Lancet, 370*(9605), 2167-2169. doi:10.1016/s0140-6736(07)61911-4

Rodrigo, C., & Rajapakse, S. (2009). Current Status of HIV/AIDS in South Asia. *Journal of Global Infectious Diseases*, *1*(2), 93–101. http://doi.org/10.4103/0974-777X.56249

Ruiseñor-Escudero, H., Wirtz, A. L., Berry, M., Mfochive-Njindan, I., Paikan, F., Yousufi, H. A., ... & Vu, A. (2014). Risky Behavior and Correlates of HIV and Hepatitis C Virus

Infection among People Who Inject Drugs in Three Cities in Afghanistan. *Drug and Alcohol Dependence,* 143, 127-133.

Sambisa, W., & Stokes, C. S. (2006). Rural/urban Residence, Migration, HIV/AIDS, and Safe Sex Practices among Men in Zimbabwe. *Rural Sociology, 71*(2), 183-211

Sharp, P. M., & Hahn, B. H. (2011). Origins of HIV and the AIDS Pandemic. *Cold Spring Harbor Perspectives in Medicine:, 1*(1), a006841. http://doi.org/10.1101/cshperspect.a006841

Strathdee, S. A., Zafar, T., Brahmbhatt, H., Baksh, A., & Hassan, S. U. (2003). Rise in Needle Sharing among Injection Drug Users in Pakistan during the Afghanistan War. *Drug and Alcohol Dependence, 71*(1), 17-24. doi:10.1016/s0376-8716(03)00072-3

Tavoosi, A., Zaferani, A., Enzevaei, A., Tajik, P., & Ahmadinezhad, Z. (2004). Knowledge and Attitude towards HIV/AIDS among Iranian Students. *BMC public health, 4*(1), 17.

Todd, C. S., Abed, A. M., Strathdee, S. A., Scott, P. T., Botros, B. A., Safi, N., & Earhart, K. C. (2007). Association between Expatriation and HIV Awareness and Knowledge among Injecting Drug Users in Kabul, Afghanistan: A Cross-sectional Comparison of Former Refugees to those Remaining During Conflict. *Conflict and Health, 1*(1), 5. doi:10.1186/1752-1505-1-5

Todd, C. S., Abed, A. M. S., Strathdee, S. A., Scott, P. T., Botros, B. A., Safi, N., & Earhart, K. C. (2007). HIV, Hepatitis C, and Hepatitis B Infections and Associated Risk Behavior in Injection Drug Users, Kabul, Afghanistan. *Emerging Infectious Diseases, 13*(9), 1327–1331. http://doi.org/10.3201/eid1309.070036

Todd, C. S., Macdonald, D., Khoshnood, K., Mansoor, G. F., Eggerman, M., & Panter-Brick, C. (2012). Opiate Use, Treatment, and Harm Reduction in Afghanistan: Recent Changes and Future Directions. *International Journal of Drug Policy, 23*(5), 341-345. doi:10.1016/j.drugpo.2012.05.004

Todd, C. S., Nasir, A., Stanekzai, M., Fiekert, K., Rasuli, M., Vlahov, D., & Strathdee, S. A. (2011). Prevalence and Correlates of HIV, Syphilis, and Hepatitis B and C Infection and Harm Reduction Program Use among Male Injecting Drug Users in Kabul, Afghanistan: A Cross-sectional Assessment. *Harm Reduction Journal, 8*(1), 22. doi:10.1186/1477-7517-8-22

Thomsen, C. J., Stander, V. A., Mcwhorter, S. K., Rabenhorst, M. M., & Milner, J. S. (2011). Effects of Combat Deployment on Risky and Self-destructive Behavior among Active Duty Military Personnel. *Journal of Psychiatric Research, 45*(10), 1321-1331. doi:10.1016/j.jpsychires.2011.04.003

Understanding Health Literacy. (2016, December 19). Retrieved November 23, 2017, from https://www.cdc.gov/healthliteracy/learn/Understanding.html

Understanding Literacy. (2016, December 19). Retrieved November 24, 2017, from https://www.cdc.gov/healthliteracy/learn/UnderstandingLiteracy.html

Vandemoortele, J., & Delamonica, E. (2000). *The "Education Vaccine" Against HIV. Current Issues in Comparative Education, 3(*1), 1-8. Retrieved December 8, 2017.

What Are HIV and AIDS? (2017, September 26). Retrieved November 22, 2017, from https://www.hiv.gov/hiv-basics/overview/about-hiv-and-aids/what-are-hiv-and-aids

What is Health Literacy? (2016, December 13). Retrieved November 23, 2017, from https://www.cdc.gov/healthliteracy/learn/index.html

What is HIV? (2017, May 30). Retrieved November 23, 2017, from https://www.cdc.gov/hiv/basics/whatishiv.html

What You Need To Know About the Links Between HIV and STDs. (2013, October). Retrieved November 23, 2017, from https://www.health.ny.gov/diseases/aids/consumers/hiv_basics/stds_hiv.htm

Zimmerman, E. B., Woolf, S. H., & Haley, A. (2015). Understanding the Relationship between Education and Health. *Population Health: Behavioral and Social Science Insights*. Retrieved December 19, 2017, from https://www.ahrq.gov/professionals/education/curriculum-tools/population-health/zimmerman.html.