STARS

University of Central Florida
STARS

Electronic Theses and Dissertations, 2020-

2020

In Sickness or In Health: The Impact of Disease Burdens on the Likelihood of Violent Conflict

Devyn Escalanti
University of Central Florida

 Part of the Political Science Commons
Find similar works at: https://stars.library.ucf.edu/etd2020
University of Central Florida Libraries http://library.ucf.edu

This Masters Thesis (Open Access) is brought to you for free and open access by STARS. It has been accepted for inclusion in Electronic Theses and Dissertations, 2020- by an authorized administrator of STARS. For more information, please contact STARS@ucf.edu.

STARS Citation

Escalanti, Devyn, "In Sickness or In Health: The Impact of Disease Burdens on the Likelihood of Violent Conflict" (2020). *Electronic Theses and Dissertations, 2020-*. 209.
https://stars.library.ucf.edu/etd2020/209

IN SICKNESS OR IN HEALTH: THE IMPACT OF DISEASE BURDENS ON THE LIKELIHOOD OF VIOLENT CONFLICT

by

DEVYN ESCALANTI
B.A. University of Central Florida, 2018

A thesis submitted in partial fulfillment of the requirements
for the degree of Master's of Arts
in the School of Politics, Security, and International Affairs
in the College of Sciences
at the University of Central Florida
Orlando, Florida

Summer Term
2020

© 2020 Devyn Escalanti

ABSTRACT

This paper expands on the relationship between disease burdens and the onset of violent conflict in Sub-Saharan Africa from 1990-2012. Most studies have focused on conflict as a cause of HIV transmission, while some suggest that HIV infection rates, by substantially reducing life-expectancy, increase the onset of violence by lowering the opportunity cost of rebelling for HIV-positive individuals. This paper argues that to the degree that life expectancy is important to opportunity costs, it is more likely driven by other factors. First, I argue preventable diseases that are less connected to individual decision-making, and the presence of poor health infrastructure more generally, are more likely to both introduce grievances and lower the opportunity costs of rebellion. Second, I argue the HIV-onset link requires the questionable assumptions that HIV positive individuals know their status in sufficient numbers, are fit to fight after learning of their status, and "have nothing to live for." By introducing more direct and disaggregated measures from the Global Burden of Disease project, including years of life lost and disability-adjusted life years, I find that non-HIV health challenges are strongly associated with onset of violent conflict.

A mi familia en el cielo que me muestra el camino.

ACKNOWLEDGMENTS

I owe an enormous amount of gratitude to Jonathan Powell, Kenicia Wright, Thomas Dolan, Clayton Besaw, and Salah Ben Hammou for their time, their unwavering support, and their constructive feedback and encouragement.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF ACRONYMS

ART	Antiretroviral Therapy
AIDS	Acquired Immunodeficiency Syndrome
CACs	Conflict-Affected Countries
CAR	Central African Republic
DALYs	Disability Adjusted Life Years
DRC	Democratic Republic of Congo
GBD	Global Burden of Disease
HIV	Human Immunodeficiency Virus
IHME	Institute for Health Metrics Evaluation
OBS	Observations
UN	United Nations
RD	Relative Deprivation
SSA	Sub-Saharan Africa
WB	World Bank
WHO	World Health Organization
UNAIDS	United Nations Program on AIDS
UNICEF	United nations International Children's Emergency Fund
UNHCR	United Nations High Commissioner for Refugees
YLL	Years of Life Lost

CHAPTER ONE: INTRODUCTION

Countries in sub-Saharan African (SSA) have made moderate progress in public health over the past several decades. Since the 1970s, there have been improvements in the reduction of premature mortality for various diseases and conditions, in addition to increases in life expectancy. On average, SSA countries gained eleven years of life over the past 50 years (IHME 2013). According to the World Health Organization (WHO), SSA has reduced premature death and disability from various diseases and adverse health conditions. In particular, there have been notable drops in DALYs[1] for measles, tetanus, malaria, and HIV (IHME 2013). For example, between 1990 and 2012, the region experienced an 86% decline of health loss due to measles along with a 63% reduction in tetanus DALYs. The DALY burden from HIV reduced from 15.2% in 2005 to 8.1% in 2010 (GBD 2017). Despite regional reductions in burdens of certain conditions over time, SSA had noticeable increases in other areas of health that have reduced on a global scale. Over twenty years (1990-2010), SSA experienced spikes in maternal disorders (32%) and preterm birth complications (19%) (IHME 2013). Further, the region continues to surpass the rest of the world in premature death and mortality from neonatal complications, lower respiratory infections, diarrheal illnesses, and HIV (GBD 2017). Despite the surge in adverse birth-related conditions and the lack of progress in curbing the burden of relatively preventable conditions, the SSA public health concern that has garnered the most attention in political science research is HIV.

This is not without reason. The 1990s witnessed a multitude of civil wars, interstate wars, and insurgency warfare across the continent. Violent conflicts included the Taureg Rebellions

[1] DALYs are calculated as the sum of the Years of Life Lost (YLL) due to premature mortality in the population and the Years Lost due to Disability (YLD) for people living with a specific health condition. One DALY is considered a one-year loss of healthy life.

(1990-95), the Rwandan Civil War (1990-1994), the Sierra Leone Civil War (1991-2002), the Burundi Civil War (1993-95), the First (1996-97) and Second Congo (1998-2003) Wars, the South African intervention in Lesotho (1998-99), the Guinea Bissau Civil War (1998-99), and various insurgencies from the Allied Democratic Forces in Uganda. This list is not exhaustive. Throughout the 1990s, state-based battle-related deaths surged, and over the decade, millions of men, women, and children lost their lives amid the state-sanctioned, one-sided, and non-state violence (PRIO 2018).

The 1990s is also the decade when substantial information about HIV's impact became more evident to the scientific community. Data collected over time made is it evident that HIV has disproportionate and adverse effects within SSA relative to other regions. Eastern and Southern Africa are the most HIV afflicted regions in the world and are home to the largest populations of people living with HIV. In 2017, 68% of the world's HIV-positive populations lived in SSA. According to the Global Burden of Disease (GDB 2017), in 1998, HIV accounted for 10.9% of DALYs in SSA while the global average was 2.8%. In 2005, HIV accounted for 15.21% of DALYs in SSA, while the global average was 4.28%. Among the eight countries with the highest HIV prevalence rates, seven are in SSA: Namibia, Swaziland, Zimbabwe, South Africa, Botswana, Zambia, and Lesotho. Although the overall impact of HIV in SSA is significant, the burden of overwhelmingly affects individuals along gender lines. For example, four out of five new infections among adolescents (ages 15-19) are among girls and young women (ages 10-24) are twice as likely as their male peers to contract HIV at some point in their lifetime. Young women in Eastern and Southern Africa are likely to acquire HIV five to seven years earlier than their male peers, and for every three new infections among young men, there are seven new infections among women of the same age. Given the overlap in violent conflicts

of the 1990s and the uncovering of the regional impact of HIV in SSA, it is not surprising that the topic of HIV and implications for conflict, ranging from social unrest to civil war, have periodically surfaced in social science conversations. There exist two primary arguments.

The first perspective argues that although HIV can significantly reduce life expectancy, it is likely to have a limited social and political effect and is unlikely to lead to an outburst of violence or conflict (Caldwell 1997; De Waal 2006). The organization and coordination between local African civil society organizations, African governments, and various international and non-governmental institutions have been notably effective at managing HIV as so much to minimize political threats and outbreaks of violence (De Waal 2007, pg. 3). Despite escalating deaths and dire prospects from HIV in the 1990s, Caldwell[2] noted that up until 2006, there were no recorded cases of the African electorate using violence to demand or coerce government institutions into making HIV a top priority. Nor has there been any societal collapse or revolutionary transformations (De Waal 2007, pg. 2). Caldwell succinctly stated:

> "The additional death rate because of the epidemic, up to ten thousand annually in some countries, is of a similar magnitude to the experience of France during the First World War… Yet… Governments are not threatened by accusations of mishandling the epidemic. Not a single protest demonstration has occurred. Life goes on in a surprisingly normal way" (Caldwell 1997, pg. 180).

[2] John C. Caldwell (1928-2016) was a leading health care demographer in the areas of fertility and health transition. He researched in Africa, South Asia, and Southeast Asia and is most known for his "wealth flows" theory that relates demographic transition to changes in intergenerational transfers within families..

The second perspective argues that HIV-related conditions have the ability to cause social conflicts that undermine political stability (Fourie & Schönteich 2001; Garret 2005; Kustra 2017). The Central Intelligence Agency also tracked HIV's impact on security in SSA throughout the 1990s and suggested that HIV is "one of the variables that determine which states self-destruct" (Fourie & Schönteich 2001, pg. 30). In 2000, Kofi Annan, the UN Secretary-General and James Wolfensohn, the president of the World Bank, related the impact of HIV to the destruction of warfare in its ability to threaten political stability (Fourie & Schönteich 2001, pg. 30).

There are three dominant theories regarding HIV's negative impact on national security. The first argument cites the disease's ability to erode at economic security (Fourie & Schönteich 2001; Garrett 2005; Haacker 2002; Boutayeb 2009). In SSA, deaths from HIV impact adults in the most productive part of their lives, between the age of 25 and 40. Consequently, deaths from this age cohort affect both personal and family incomes, investment, and company profits (Garrett 2005; Haacker 2002; Boutayeb 2009). It is difficult to gauge the impact of HIV on the continent's economies on an aggregate level. However, there have not been any recorded cases of economic collapse directly attributable to HIV conditions. The second theory asserts that HIV could impact political security by claiming the lives of national leaders, government officials, and military leadership (Garrett 2005, pg. 59). Depriving states and localities of seasoned institutional management could aid in creating a political vacuum that supports the conditions for violence. Much like the first argument, there have been no recorded cases of HIV killing off government officials so quickly as to create a political vacuum leading to conflict.

The third theory asserts that HIV infection rates, by substantially reducing life-expectancy, increase the onset of conflict by lowering the opportunity cost of rebelling for HIV-positive

individuals because they “have nothing to live for” (Kustra 2017, pg. 3). The opportunity cost of conflict is the value of the decision foregone in order to participate in a movement. Death is an opportunity cost that varies with life expectancy, and a positive HIV diagnosis is considered an automatic death sentence. Shortened life expectancies make young, seropositive people more accepting of other risks, particularly armed conflict, helping to satisfy conditions for conflict. As will be explored, the argument is theoretically problematic because it makes questionable presumptions about how individuals react to a positive diagnosis and assumes that HIV-positive individuals know their status in sufficient numbers and are fit to fight after learning of their status.

The two broad, contrasting perspectives on the effect of HIV on violence leads to a crossroads in the discussion. Does HIV influence the likelihood of conflict in some capacity? It is unclear, as empirical investigations of the issue are sparse (see Kustra 2017). The theory that life expectancy impacts the opportunity cost of conflict warrants further attention because of its ability to incite conflict through a different process. Moving the conversation beyond HIV, is it possible that reduced life expectancy from non-HIV diseases affects the likelihood of violence? I posit that sustained non-HIV disease burdens are more likely to lower the opportunity costs of participating in acts of violence, thus increasing the likelihood of conflict. Using updated health indicator data from the Global Burden of Disease (GBD), I use two probit regressions along with and predictive margin plots to test my theory of disease conditions and violent conflict.

This paper begins with a systematic review of HIV and conflict literature, addressing the main points main in each HIV-conflict perspective. I begin with the relationship between soldiers, military organizations, and HIV. Following is a review of disease and risk-taking, the motivations for rebellion, and the opportunity costs associated with such a movement. In the

second section, I revisit the HIV-conflict model and offer empirical and theoretical arguments against the theory. In the third section, I posit that sustained burdens from illnesses unrelated to HIV may have a positive effect on the likelihood of violent conflict. In the fourth section, I test the disease-onset propositions using new health care metrics from the GBD through a series of probit regressions and predictive margin analyses. I have two main findings. The first is that HIV is unassociated with the onset of violent conflict. The second is that non-HIV related conditions are significantly associated with the onset of violent conflict. In the final section, I discuss this study's implications policy regarding public health and security in SSA and I address a couple avenues for future research.

CHAPTER TWO: LITERATURE REVIEW

To the degree that disease can impact prospects for violence, I argue that conditions less related to HIV and more related to preventable illnesses are more likely to be drivers of conflict. In order to build support for my argument against the HIV-conflict model, I address the literature on HIV's potential impact on national security. Specifically, I include literature on HIV conditions among soldiers and recruits, the impact of the disease on military organization, and the role of HIV transmission during acts of sexual violence perpetrated during conflict. Then, to build support for my theory of disease and conflict, I incorporate literature on disease and risk-taking, rebel recruitment, and the opportunity costs of decision-making.

Soldiers, Military Organization, and HIV

The nexus between the role of soldiers and the transmission of HIV during wartime is convoluted. Earlier literature overwhelmingly supported the idea that soldiers are frequent transmitters of the disease. However, the current impact of the disease on soldiers and the mechanisms making them more or less susceptible to infection varies in emphasis and remains unclear (Shell 1999; Elbe 2002; Hankins et al 2002; Ostergard 2002; Singer 2002; Tripodi & Patel 2002, 2004; Miles 2003; Garrett 2005; Sagala 2006, 2008; Iqbal & Zorn 2010; Whiteside et al 2006; McInnes & Rushton 2010). The narrative that initially garnered the most attention was that armed forces, insurgents, and soldiers are high-risk occupations for acquiring and transmitting HIV. It was commonly thought that such occupations tend to have higher prevalence rates relative to the general population (Singer 2002; Ba et al. 2008; Iqbal & Zorn 2010). There were several reasons for this rational.

A common association between high infection rates and soldiers are the commonplace sexual relationships with prostitutes and the commercial sex activity widely available in the proximity surrounding military camps (Sagala 2006). Military bases are ground zero for attracting other high-risk populations, including prostitutes and drug dealers, demographics more likely to be infected with HIV (Singer 2002). Proximity to sex workers, combined with risk-acceptant behaviors, such as lack of condom use, significantly increases infection rates among military members (Hankins et al 2005; Iqbal & Zorn 2010). Not only do soldiers tend to be of a sexually active age group, but they also have a greater opportunity for sexual relations, tend to be more risk-acceptant, and are often thought to "valorize violent behavior" (Elbe 2002; Singer 2002).

Further, increased mobility, occupational stresses, peer pressure, isolation from regular sexual partners and families, and a sense of personal invulnerability have been linked to the high levels of infection among soldiers (Tripoli & Patel 2002, 2004; Sagala 2006). The spread of HIV is not only linked to national armed forces, but international peacekeeping troops are acknowledged as prominent vectors for transmission amidst conflict (Ostergard 2002; Garrett 2005). The Department of Peacekeeping Operations and UNAIDS have recognized the health threats posed by peacekeeping operations concerning HIV (Tripodi & Patel 2004). Not only are peacekeepers susceptible to infection through complex emergencies and operations, but they also have higher risks of acquiring it through the sexual assault of HIV-positive individuals and consensual sex with prostitutes (Sagala 2008).

Another argument to the soldier-HIV relationship is presented by Whiteside et al (2006) who argue that HIV prevalence rates are low among new military recruits. Prospective recruits testing positive for HIV are routinely excluded from service (Whiteside et al 2006). Via informal

consultations and mass medical screenings, HIV-positive individuals are systematically weeded out and are declined enlistment into military roles. African military organizations and the United Nations began incorporating HIV education in peacekeeping and military training and mandatory pre-deployment medical screenings (Thomas et al 2014). A 2014 cross-sectional survey from 28 SSA countries regarding military-HIV policy found that HIV surveillance initiatives and structural prevention programs are routinely conducted (Thomas et al 2014). The majority of militaries surveyed (92.9%) reported having an official HIV program manager or designated disease oversight procedures of some capacity. Among respondents, 88% require mandatory recruit screenings of incoming personnel, and 71% conduct random, mandatory HIV testing on active personnel. The general consensus is that enlistment becomes restricted when an individual is found to be HIV positive during the recruiting process. Over 96% of the militaries surveyed do not recruit or enlist HIV positive individuals. However, there are no official reports regarding the forced or mandatory discharge of staff members found to be HIV positive after enrollment (Thomas et al 2014). Changes in recruitment patterns and increased screening methods are relatively recent. Therefore, issues relating to HIV incidences among soldiers was likely more a salient issue in the 1980s and 90s, as little was known about the disease at the time. However, this argument of low prevalence levels among new recruit does not address that idea that the recruits can be HIV-free upon registration but then become infected while on duty and become "super spreaders" while in service.

HIV can have a destabilizing effect on strategic military capacity. Organizational norms, recruiting, and training of general and specialized soldiers can be severely impacted by the loss of personnel who died of HIV complications (Ba et al 2008). It may also weaken national security directly through HIV transmission and indirectly through governments reallocating

funds away from military services into health care costs (Tripodi & Patel 2004). The virus can challenge military capabilities by increasing the probability of opportunistic, and potentially deadly, infections of soldiers who are HIV-positive (Ostergard 2002) and requiring militaries to continually acquire recruits to replace ill-fallen or dead soldiers (Elbe 2002).

Infantry troops are generally easier to replace, but HIV directly impacts leadership positions as it becomes more challenging to replace individuals of high ranks such as commanders or a top technical officers, creating gaps in leadership cadres (Singer 2002; Garrett 2005). Weakened military organization can have an impact of the calculus of rebels. If the HIV-conflict model proposed by Kustra were correct, the findings could be explained by healthy rebels deciding to fight against HIV-weakened state militaries. In the midst of a health crisis, rebels are more likely to calculate a higher chance of winning against state militaries. Fearon and Laitin (2003) posit that a financially and bureaucratically weak state is a significant risk factor for the initiation of violence. Weakened leadership networks and increased health related costs for the military weaken the state from a financial and bureaucratic perspective, which may help to further satisfy conditions for rebellion.

Sexual Violence and HIV

The systematic use of sexual violence is not a new mechanism of warfare (Elbe 2002). However, it is becoming increasingly organized for strategic and political purposes during violent conflict and has been formally recognized by the United Nations as a weapon of war (Singer 2002; Virginie et al 2010). The definition of sexual violence is broad and includes, but is not limited to mass rape, gang rape, sexual slavery, and forced marriages of women, children, and men. Initial reports published in the social sciences suggest there is a link between sexual violence in conflict

afflicted countries (CACs) and the proliferation of HIV. However, emerging epidemiological evidence is beginning to shift the understanding of the implications of rape on HIV infection and transmission during conflict.

The prevailing argument is that during bouts of conflict, the breakdown of social control encourages the use of sexual force as tactic of warfare and increases the potential of military to civilian HIV transmission (Iqbal & Zorn 2010). The 20th Activity Report of the African Commission on Human and Peoples' Rights made a landmark decision to consider the use of an infectious disease as a punishable weapon of warfare after publishing a report estimating that as many as 2,000 HIV-infected foreign soldiers committed sexual violence with the intent to transmit HIV to the victims in the South Kivu province in the DRC during the 1999 civil war (Singer 2002; Mills & Nachega 2006).

Similarly, a 2002 study on HIV in the military published an account of Rwandan soldiers taunting their victims after sexually assaulting them by stating, "We are not killing you. We are giving you something worse. You will die a slow death" (Singer 2002). Sexual violence and systemic rape have been perpetrated by the United Revolutionary Front against thousands of women during the Sierra Leone Civil War, yet, it remains unclear how many of these victims contracted HIV from the attacks (Singer 2002). Virgine et al (2010) use a risk equation model to evaluate the potential impact of mass rape on incidences of HIV among women and girls in Burundi, DRC, Sierra Leone, Rwanda, southern Sudan, Somalia, and Uganda. Data from the UNAIDS, WHO, and the US Census Bureau's International Data Base suggest that mass rape could cause five HIV infections per 100,000 females annually in the DRC, Sudan, Somalia and Sierra Leone, ten HIV infections in Burundi and Rwanda, and twenty HIV infections in Uganda.

Even in extreme conditions where mass rape is rampant, the impact of rape on increasing HIV prevalence is negligible.

Spiegel et al (2007) report an alternative perspective. The authors assert the widespread misconception about the role of rape on HIV during conflict is primarily based on an unpublished and unsubstantiated report based on 1,125 female rape survivors, of which 70% were estimated to have acquired the disease (Spiegel et al 2007). Using data from the Uppsala database assessing armed conflict and global literature containing original data for HIV prevalence rates, the authors conducted a systematic analysis on the change in HIV prevalence during conflict in seven African countries: DRC, Sudan, Uganda, Rwanda, Burundi, Somalia, and Sierra Leone. Data from these countries did not show an increase in HIV infection rates during periods of conflict and there is insufficient evidence to support the common claim that rape significantly increases HIV. Further, HIV prevalence in urban areas affected by conflict decreased at similar rate as areas unaffected by conflict in Burundi, Rwanda, and Uganda.

A more recent study by Anema et al (2008) further asserts that widespread rape in CACs do not have a significant impact on the population-level change in HIV prevalence. These findings are based on a model determining the potential effect of conflict-associated rape on HIV prevalence rates among women, ages 5-49, in seven CACs in SSA: Burundi, DRC, Liberia, Rwanda, Sierra Leone, Sudan, and Uganda. Situations in which 15% of the female population was raped, and HIV prevalence among assailants was eight times the country's prevalence among the general population, widespread rape increased total HIV rates of females by 0.023%.

Disease & Risk-Taking Behavior

A disease-onset model assumes that individuals are more likely to engage in risky behaviors (i.e., initiate or participate in violent conflict) when faced with a health condition that substantially reduces life expectancy. Earlier work on risk-taking considers risks from the perspective of life histories, asserting positive future conditions are positively correlated with increased risk-averse behaviors (Hill et al 1997). A small-scale questionnaire focusing on socially disapproved risk behaviors (drug use, unprotected sex, and physical violence) suggests a negative relationship between life expectancy and risk-taking actions (Hill et al 1997). The frequency of adverse risk-taking is higher for individuals with increased beliefs of future unpredictability and among those who perceived themselves to have shorter life spans. In a more recent study, Wang et al (2010) posit that risk-taking is more effective than risk avoidance when life expectancies are short or when future unpredictability is high. Subjective life expectancies impact an individuals' temporal framework in which they adjust their goals and deadlines in life. When life expectancies are perceived to be shorter, life deadlines become more imminent, thus making risks worth taking. Results from the 448 questionnaires regarding perceived riskiness among individuals ages 18 to 50 suggest that among the three dependent measures (likelihood of engaging in, perceived riskiness of, and attractiveness of the risky behaviors), perceived riskiness was affected by only one life-history variable: sex.

When considering how a disease can impact a group's decision to partake in violent conflict, it is essential to consider how health conditions and life expectancy affect risk-taking behavior. Studies on HIV-related risk tend to focus on behaviors as a deliberate choice made by the individual (Djemai 2010) rather than trying to understand better how behavioral responses may vary across people. Nevertheless, available literature on behavior variation in risk suggests a

positive relationship between increased risk-taking and non-HIV mortality factors (Oster 2009). Oster (2009) investigates how individual-level responses to risk vary according to changes in life expectancy from health-related conditions in SSA. Using a model of sexual behavior choice among HIV-positive and HIV negative individuals, he suggests that risk responses decrease when expected future survival (increased life expectancy) is longer. The study empirically supports the argument that individuals with longer life expectancy (those who have more future life years to lose from HIV) are more likely to alter their behavior and engage in risker sexual activities than those with a decreased life expectancy from HIV. If individuals with HIV tend to be less risk-averse than non-HIV positive individuals, aggregated risky behavior should decrease with higher levels of HIV.

Motivations for Rebellion

Rebel Recruitment

For group-organized violence to occur, there needs to be a groups of incentivized and organized actors within the respective state who has motivations for achieving independence, taking over the government, or seeking to alter government policies to some degree. In cases of large scale conflict, armed rebel groups use organized violence in opposition to the state to achieve a political end. For a rebel group to be viable, they must have the capacity and capability to engage in violence against the state. What makes an individual want to join a rebel group in the first place?

Literature analyzing the incentive systems adopted by various armed rebel groups posits that rebel groups behave similarly to a mafia or gang (Gates 2002). Contract enforcement is at the base of recruitment efforts. In order to be successful, a rebel group must be able to recruit and

motivate its soldiers to fight and have the sufficient capacity and ability to engage in combat (Gates 2002). Therefore, recruits are obtained and incentivized through various benefits from higher up the organizational hierarchy of the group. All rebel organizations distribute benefits that are either pecuniary or non-pecuniary in nature. Pecuniary benefits include tangible awards, such as monetary funds, drugs, or alcohol. The West Side Boys were a split-off army faction, turned rebel group in the Sierra Leone Civil War. They offered crack cocaine, heroin, ephedrine and diazepam, and marijuana as rewards for committing violent crimes (Utas & Jörgel 2008).

On the other hand, nonpecuniary benefits are more extensive in scope and depend on an agent's utility and value during assigned tasks. For example, some groups may be incentivized by "fighting the good fight." Some are incentivized by sadistic behavior, given license to commit dangerous and violent acts as rewards for completing tasks. Recruiters can even offer a sense of security by promising solidarity, making vulnerable possible-recruits feel like they have a group in which they belong. Weinstein argues that potential recruits choose to partake or abstain from joining based on economic returns for their labor. Rebel recruiters can offer short-term incentives or promise future benefits to be provided after specific tasks are complete or the group secures victory. In order for potential recruits to be motivated to join the organization, the rewards and incentives must exceed the value of what a recruit would earn if they did not participate in the movement (Weinstein 2005).

However, it is not always up to the recruit whether they participate — the practice of coercive poaching and recruiting methods are common. Young recruits and children are routinely abducted and forced to join rebel organizations out of threat for their lives, as demonstrated by RENAMO, a Mozambican national resistance organization (Weinstein 2005).

Studies estimated that around 90% of RENAMO forcefully coerced potential recruits into the organization (Weinstein 2005).

The practice of recruiting children by guerilla groups, violent non-state actors, and warlords is a prevalent and consistent human rights violation (Gates 2002; Singer 2002). Children are perceived as vulnerable and are at a higher risk for exploitation. Children are abducted and violently forced into armed combat (Foster & Williamson 2000) and recent assessments estimate that 75-80% of civil wars involve the use of child soldiers by rebel groups (Faulkner et al 2019). Occasionally, voluntary enlistment is possible if children are faced with depraved conditions (Singer 2002).

To the degree that HIV does impact recruitment efforts, it is likely to be associated with the streamline of potential recruits that is created though the increasing "lost orphan generation." HIV impacts child soldiering through a process of parental loss. In 2010, over 25 million children lost either one or both parents from HIV/AIDS-related complications and one-third of cases occurred in SSA (Leyenaar 2005). The number of victims and the stigma associated with the disease can increase the burden on family members and communities responsible for caring after the orphaned children, placing them in a higher risk situation for being exploited by outside parties.

Opportunity Costs

Although most literature has primarily pointed to HIV as a product of conflict, others have considered its impact on the decision to rebel (Kustra 2017). An opportunity cost is the value of what a person decides to give up when making a decision, the price of a missed opportunity. When weighing a decision with multiple courses of action, the opportunity cost (the price of the

options not chosen) is taken into consideration. People are more likely to forgo an action when the opportunity cost is high and engage in certain actions when the opportunity costs are low. In terms of rebellion, an opportunity costs is the value of what is foregone in order to participate in the movement. Kustra (2017) builds on the opportunity cost model where the possibility of death is an opportunity cost that fluctuates with life expectancy. Shorter life expectancies, due to any one condition, make individuals less concerned about alternative risks (Rosen 1998). Kustra theorizes that HIV is the 'condition' that, by reducing life expectancy, lowers the opportunity cost for rebellion and incentivizes individuals to participate in violent conflict. The HIV-onset theory asserts that "Young men who are infected with, or at high risk for infection by, HIV are more accepting of other risks of death since they believe HIV has or will greatly decrease their life expectancy" (Kustra 2017, page 3).

If the prospects for living with HIV are bleak, and there is little hope for better outcomes in the future, infected individuals would be more inclined to participate in violent activities because they "have nothing to live for" (Kustra 2017, page 3). If the future for living with HIV is grim, and a positive diagnosis will result in a quick and painful death, individuals are less concerned about the risks of engaging in armed conflict. Instead of a positive diagnosis inspiring individuals live out their lives out with their families and loved ones, individuals see their time better spent participating in a rebellion. Probit analyses using data sourced from Uppsala conflict database and health care indicators from the World Health Organization supports the theory that decreases in life expectancy are associated with the increased likelihood of civil war. However, the relationship between HIV and civil war onset are statistically insignificant.

Beyond life expectancy, the opportunity costs of joining a rebellion are often associated with econometric measures, most typically levels of income per capita (Elbadawi & Sambanis

2002; Collier & Hoffer 1998, 2002). Utilizing a probit and tobit regression model and the Singer and Small dataset of civil war occurrence from 1960-92, Collier & Hoeffler (1998), find empirical evidence suggesting the proxy variables for economic opportunity costs (per capita income) is highly significant on the occurrence and duration of civil war. The loss of income per capita lowers the opportunity cost of rebellion, partly, because people who have more money simply have more to lose compared to those who have less. Another interpretation is that income per capita can reflect the cost of recruiting rebel labor (Collier & Hoeffler 2002). Higher per capita incomes make the cost of recruitment more expensive, making rebellion more difficult and could be a proxy indicator signifying greater government military capabilities (Collier & Hoeffler 2002).

Expanding on the model of opportunity costs and rebellion, the 'greed' versus 'grievance' theory of opportunity costs posited by Collier and Hoeffler (2002) investigates the causal mechanism for civil war initiation. The 'greed' theory focuses on the opportunity costs of financing operations of rebel groups and the 'grievance' theory incorporates opportunity costs of ethnic fragmentation and political repression. Analyzing civil wars from 1960-99, the authors find empirical evidence suggesting that income structure is statistically significant to conflict risk. Higher incomes can strengthen government military expenditures through various taxation mechanisms, or the effect of higher incomes can increase enrollment of young males in secondary schools, continuing education for those most vulnerable to joining a rebellion, is associated with lowering the risk of conflict. It could also be that higher incomes are associated with generally more positive outlooks regarding the future. If economic prospects are good, the motivation for rebellion decreases.

Before discussing my theory of disease and conflict, it is essential to discuss the shortcomings of the HIV-opportunity cost theory and outline why HIV may not be the public health concern to consider in the opportunity cost-conflict model. I then present my argument for non-HIV diseases and conflict.

CHAPTER THREE: THEORETICAL EXPECTATIONS AND HYPOTHESES

Revisiting the HIV-Conflict Model

The HIV-conflict study (Kustra 2017) is the only quantitative investigation into HIV's effect on conflict. The paper intended to gain a better understanding of HIV's effect on the likelihood of civil war and it does present evidence suggesting that life expectancy-conflict model should be further investigated. However, the HIV-conflict argument relies on assumptions that overlook many aspects of HIV's changing outlook, including improved access to treatment and increases in life expectancy due to advances in ART care. The primary argument for the HIV-conflict model heavily relies on a quote from a British army officer who makes a specific comment about Kamajors in Sierra Leone Civil War. ''The incredibly high rate of HIV and AIDS among [Africans] makes them fearless. They have nothing to live for anyway'' (Hoffman 2011, 244). There is no empirical evidence to support this claim that very well may be nothing more than an off cuff remark or a biased interpretation from the perspective of a single officer. The use of the quote, besides being logically bizarre, rests on what can only be described as a nakedly racist assumption that most African men are HIV positive. Nonetheless, Kustra (2017) misuses the quote and generalizes it to Africans everywhere and uses it to as evidence to develop an HIV-conflict model. This model is problematic for several reasons.

First, this theory relies on assumptions that do nothing to address or consider resilience among HIV-positive individuals. Broadly, resilience refers to a process in which adversity confronts an individual, they either overcome, respond to, or adapt to the changes in a way that allows them to continue leading and living their lives at a normal, or near-normal, capacity (De Santis et al 2013). Indeed, an HIV-positive diagnosis qualifies as adversity. Despite of an

adverse diagnosis, people have lives they want to live. They may use their newfound knowledge of status as a motivator for personal development (Betancourt et al 2011), contrary to theory's assertion that they "have nothing to live for anyways" (Hoffman 2010, page 244; qtd Kustra 2017, page 3).

Second, even if HIV-positive individuals had "nothing to live for," and even if the assumption that most African men are HIV positive were correct, the theory would still rely on those men knowing they are, in fact, HIV positive. Between 1990 and 2012, this is a fanciful assumption. Representative survey data on status awareness is unavailable for the 1990s. However, a cross-sectional demographic health survey in Kenya (2003) and Malawi (2003-2004) suggest an estimated 20% of HIV-positive individuals in Kenya and 16% of HIV-positive individuals in Malawi were aware of their HIV status at the time of data collection (Anand et al. 2009). The WHO, UNAIDS, and UNICEF conducted extensive demographic health surveys in 12 SSA countries regarding knowledge of HIV status (Matovu & Makumbi 2007). The countries include Botswana, Cameroon, Ethiopia, Ghana, Kenya, Lesotho, Malawi, Mozambique, Nigeria, DRC, Tanzania, and Uganda. Estimates ranged, but between 12-25% of men and 8-24% of women were aware of their status in 2007 (Matovu & Makumbi 2007).

A 2012-2013 national HIV survey in Kenya study shows the percent change in the percentage of the population getting tested for HIV (Ng' ang et al 2014). In 2012, over 70% of Kenyans received HIV tests and some point in their lives, compared to 36.6% in 2007. Screening of women increased from 40.7% (2007) to 80.4% (2012) nationally, and men's screenings increased from 24.9% to 62.5%, respectively (Waruiru et al 2014). Commonly cited barriers to HIV-testing include a perceived low-risk personal infection, negative perceptions of testing facilities, vast distances between communities and clinics, transportation costs, stigmatization,

the fear of discrimination, and compromised confidentiality (Anand et al. 2009; Matovu & Makumbi 2007). Before screening measures became increasingly available, it was not common for people to be aware of their serostatus. The above estimates were presumably even lower in the 1990s.

Third, even if a high level of people have HIV, and even if a high proportion of them know their status, the argument assumes they are well enough to fight. The incubation period for HIV to develop into AIDS is about ten years (HIV/AIDS 2019). Therefore, it is not unheard of for people to learn about their positive status only once their health begins to decline from HIV-related complications or from contracting an opportunistic infection. In the 1990s and early 2000s, it would often have been the case that potential fighters would only learn their status when they were becoming too ill to fight.

Early detection and screening services have changed the outlook of status awareness over the past 15 years. With the use of early screening and increased resources in HIV research and treatment, individuals are beginning to learn about their HIV status before their health declines. At which point, ARTs become effective long-term care that can extend life expectancies to normal, pre-outbreak levels (Pandey & Galvani 2019). It is medically possible for individuals to lead normal, healthy lives with virtually undetectable viral loads with access to the appropriate long-term treatment and care (Pandey & Galvani 2019). Access to ARTs increased from 2.9 million people in 2006 to 21.8 million in 2017 and has been accompanied by a 51% reduction in HIV-related mortality and a 17% reduction in new annual incidences (Pandey & Galvani 2019). When ARTs are taken with regularity, they block the replication of HIV-infected CD4 cells, decreasing an individual's overall "viral load" (Pandey & Galvani 2019). With a decreased viral

load, there is less virus in the body to attack healthy immune cells, allowing people to live longer and relatively normal lives.

Figure 1 depicts the changes in the global number of deaths averted due to increased access to ARTs from 1990 to 2016 using data from UNAIDS. The y-axis represents the number of deaths and deaths averted. In 2005, before the uptake in ARTs, the deaths from HIV reached a high point of around 6 million, whereas the deaths exceeded several million. In 2010, more lives were being saved with ARTs, but it was not until 2016 when the number of deaths averted (4 million) surpassed the number of deaths (2 million). The improvements in therapy access are partly attributable to the increased funding by international national and non-governmental organizations into HIV research and treatment. Funding amounted to a few hundred thousand dollars globally in 1982. In 2019, funding reached a combined $34.8 billion from domestic, private, and international efforts in 2019 (The Global HIV/AIDS Epidemic 2019). In SSA, donor funding for HIV treatment and outreach has surpassed that for water supply, sanitation services, and agriculture between, and more recently, outpaced funding for education (Dionne 2017).

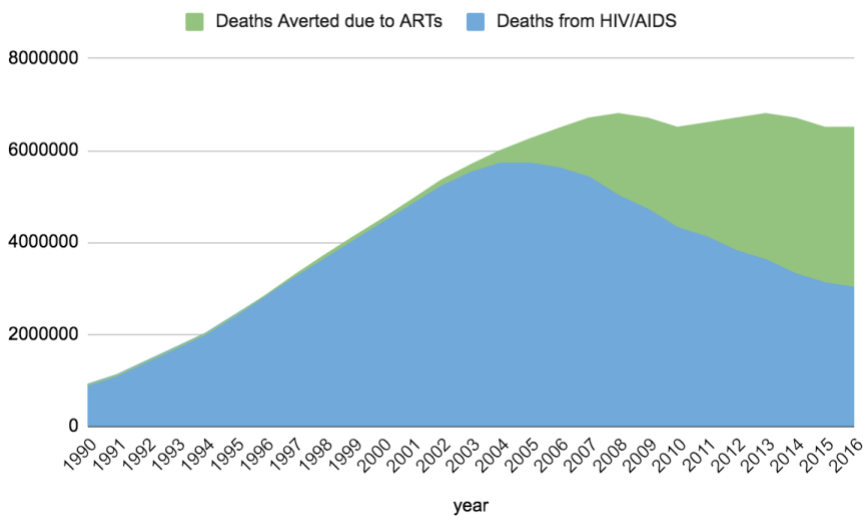

Figure 1: Global Changes in HIV-Related Deaths Averted Due to ART Treatment

Data Source: USAIDS

Lastly, the literature on rebel recruitment overwhelmingly suggests that coercion is the dominant method of acquiring recruits (Gates 2002; Weinstein 2005). This idea is contrary to the HIV-onset assumption that individuals willingly join a rebellion in light of a positive HIV diagnosis (Kustra 2017). A 2003 study using closed-ended questionnaires from 1,042 respondents examines the motivations for individuals joining insurgent and counterinsurgent factions during the Sierra Leone Civil War (Humphreys & Weinstein 2008). When asked "why did you join?," 87.8% of respondents in the Revolutionary United Front claim they were recruited by abduction, followed by 9.6% claiming they supported the group's political goals and 2.4% claiming individuals within the group have better living conditions than those outside the group.

Further, children are forced to engage in violent conflict with regularity and in high numbers. Estimates from the GBD (2017) suggest that from 1990-2017 in SSA, the deaths, years of life lived with a disability (YLD), and DALYs for children ages 5-14 were consistently and

significantly lower than any other age group. Nevertheless, their participation in combat in SSA is consistently high. Additionally, the HIV-conflict assumes that HIV infections automatically creates an increase in the supply of more soldiers. However, the increased supply of potential rebels does not automatically mean there will be violent conflict. Beyond the assumption that HIV-positive Africans have nothing to live for, there is no clear mechanism through which HIV incentivizes participation in violent conflict.

The point I want to make is not that the disease-conflict model cannot be a useful security concept in political science research. Rather, the concept is certainly useful, although in a much different way than Kustra suggests.

Argument

According to the GBD (2017), the leading causes of early death and disability from diseases in low-income countries in 1990 were lower respiratory infections, enteric illnesses, and maternal and neonatal complications. Reports on the leading causes of early death show that in 1990, early deaths from HIV ranked nineteen, while neonatal disorders ranked first, and respiratory infections were second. Enteric conditions follow in third place. Comparatively, 2017 shows some improvement with neonatal disorders ranked second, respiratory infections fourth, and diarrheal illness ranked fifth. HIV ranked in eighth place (GBD 2017). In 2017 Central SSA, enteric illnesses account for 6.6% of total deaths, tuberculosis, and lower respiratory infections accounted for over 16% of total deaths, compared to 4.7% for HIV. Environmental risk factors for relatively preventable diseases that pose a significant health burden includes a lack of access to safe water and sanitation services and a lack of access to basic handwashing facilities. The WHO (Keenan 2019) estimates globally, around 2 billion people do not have safely-managed

drinking water services, 3 billion lack access to basic handwashing facilities, and just over 4 billion people utilize unsafe sanitation services and infrastructure. A 2019 UN-Water report suggests that in SSA, 28% of the population has access to single-home sanitation facilities, and only 24% of the population can access safe drinking water. Improvements in public infrastructure, more generally in both rural and urban areas, could significantly reduce the burden from enteric and respiratory infections, among others.

Another problematic disease is malaria, a vector-borne disease caused by the transmission of a protozoan parasite, primarily through Anopheles mosquitos. Although malaria is not a current public health issue in Western societies, 40% of the world's population, primarily in low-income countries, is at high risk of contracting and transmitting it (Ricci 2012). Malaria is not exclusive to the impoverished, but the deprivations associated with poverty can significantly increase the risk and burden of the illness. Malaria can adversely impact housing quality, nutrition, and inequalities in health care access (Ricci 2012) of which can be partially explained by weak governance. Families that live at low-income levels can lack the economic choices and opportunities for employment, which can hinder access to preventative measures such as bed nets and insecticides.

Kim Dionne (2017) notes the gap in disease burdens and donor funding for HIV/AIDS and malaria in sub-Saharan Africa. From 1995 to 2013, there were more cases of malaria than HIV. Nevertheless, donor funding for HIV consistently surpassed funding for malaria. Donor funding for HIV outpaced funding for water supply services, sanitation services, and agriculture between 2003 and 2011. Funding for HIV even surpassed funding for education between 2007 and 2011 (Dionne 2017). The increased and sustained funding for HIV research and care may be why the overall disease burden of HIV is improving quicker than alternative conditions. HIV continues to

receive a large portion of international and domestic public health funding for research and increasing access to HIV-specific services and treatments. Due to the chronic nature of HIV and its long incubation period, increased funding can stem from the potential longevity of living with the illness. When infected with malaria, a dysentery infection, or respiratory illness, a person is temporarily ill. Once they recover, they can lead healthy lives, free of routine medical services, and repeated care. The burden of such diseases could be reduced by increasing investments into infrastructure more generally, such as health care facilities, safe water, and sanitation facilities.

Figure 2 illustrates a comparison of disease DALYs in SSA from 1990-2017. The numbers along the y-axis represent the percentage of DALYs for each category of illness out of 100%. In 1990, before improved access to ARTs, the DALY rate for HIV was around 3%, compared with illnesses like enteric infections (12%), respiratory infections (16%), and maternal and neonatal complications (12%). In 2005, HIV increased to 15% of the total DALYs in SSA, surpassing the conditions mentioned above. The ramp-up of testing may partly explain the spike during the early 2000s. Between 2005 and 2017, no other category made as much improvement in decreasing DALYs than HIV. In 2017, the disability and premature death from HIV was around 8%, comparable to enteric illnesses and significantly lower than respiratory infections and maternal/neonatal conditions. The increased deaths averted due to ARTs starting in 2005 in Figure 1 corresponds to the decrease in HIV DALYs following the 2005 peak in Figure 2.

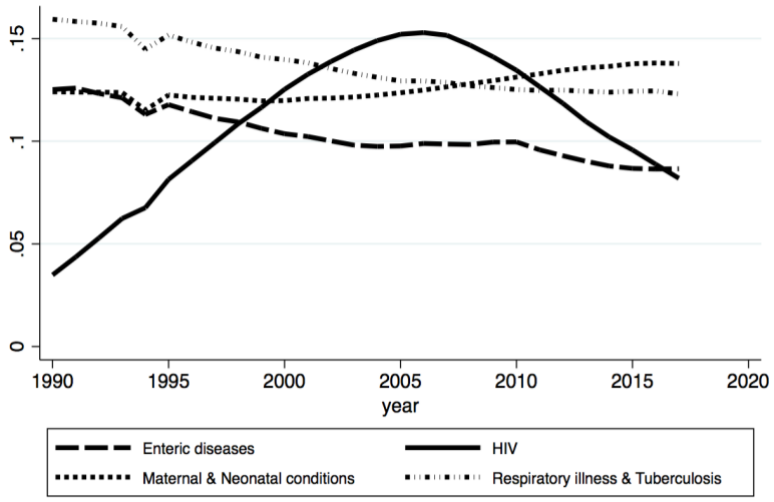

Figure 2: Comparison of DALYs in SSA, 1990-2017

Data Source: GBD

Further, Western societies perceive HIV to be among the most pressing issues for developing nations. Public opinion data from Afrobarometer, a pan-African surveying organization focusing on public attitudes towards society and governance, suggest an alternative narrative in regards to African attitudes towards HIV. Except for Botswana, Namibia, and South Africa - countries with higher prevalence rates on average - the survey suggests that the overwhelming majority of individuals are more concerned about alternative health issues than for HIV (Afrobarometer 2004). More recently, Dionne (2018) argues that people living in countries with high-prevalence rates perceive HIV as a very low priority, even among people affected by it. Therefore, which issues do people care about in Africa? The Afrobarometer published alternative cross-national surveys measuring popular public priorities from 2005-2006. The average HIV prevalence rate among surveyed countries was 9.2%. Nevertheless, public perceptions of HIV as a priority (7.3%) falls behind unemployment (40.2%), poverty (26.4%), and food access (23.1%). Unemployment and food security remained a priority, but water, infrastructure, and health more broadly are also important issues for the greater African public.

In light of the sustained burdens of relatively preventable diseases compared to HIV, improved life conditions of people living with HIV, and the lack of HIV as a public priority in throughout SSA, I do not think that HIV is the public health concern that best fits the disease - conflict model. I argue that health conditions , unrelated to HIV, may be a potential driver of conflict because of their ability to incite violence through a different process.

My theory of disease and the onset of violent conflict derives from the sociological concept of relative deprivation (RD). A widely accepted definition of relative deprivation is "an actor's perception of a discrepancy between their value expectations and their value capabilities" (Gurr 1970). Value expectations are the circumstances or materials of life to which people believe they are justly entitled, and value capabilities are the circumstances or materials people think they are capable of getting and maintaining (Gurr 1970). According to the RD theory, it is not an absolute deprivation of goods or conditions that lead people to political violence. Instead, it is the perceived discrepancy between expectations and reality of a situation (Farooq et al 2017). Perceived deprivations in education, health care, and employment create an aggression-frustration mechanism for collective dissatisfaction, which can manifest into political violence, social movements, or revolutions (Farooq et al 2017). Unlike previous studies on disease and conflict (Kustra 2017), I do not assert that adverse health conditions can lead to outright civil war. Instead, I argue that disease burdens may lead to acts of smaller, localized cases of violence that can be considered as social banditry.

Hobsbawm (1959) first introduced the concept of the social bandit, referring to the organized political unrest of the aggrieved against oppression. Social banditry ranges from collective protests to the use of physical violence. However, participants are generally not perceived to be criminal by society, and the moral code of the respective community constrains

their course of action (Blok 1974, pg. 494). Social bandits are not revolutionaries or political reformers. Their agenda "does not go beyond the restoration of the traditional order which leaves exploitation of the poor and oppression of the weak within certain limits" (Blok, 1972, pg. 494). If the burden from relatively preventable diseases is high enough for an extended period, a perceived weakness in state capacity may influence opportunistic social banditry for health 'reform' that manifests as physical violence.

I intersect the RD theory with the concept of social banditry and public health to build a theory around disease conditions and conflict. Elevated disease burdens and the perceived deprivation of socio-economic conditions contributing to sustained adverse health conditions can trigger an aggression-frustration mechanism. If sustained long enough, the aggression-frustration mechanism may lead to a collective dissatisfaction over time that may manifest as violent conflict. I argue diseases that are less connected to individual decision-making and are more connected to the presence of health poor infrastructure more generally may be a motivator for violent conflict. The perceived disparities of social and physical conditions directly attributable to the disease burdens are more likely to lower the opportunity costs of participating in acts of violence, thus increasing the likelihood of conflict.

It is not necessarily sick individuals who become incentivized to participate in banditry. Instead, it may be healthy individuals witnessing the adverse socio-economic conditions connected to increased (or sustained) disease burdens. Adverse socio-economic conditions can include but are not limited to, poverty, a lack of roads, or inadequate or inaccessible health care facilities and services, access to clean water resources, limited proper handwashing facilities, and the lack of access to functioning sanitation and sewage systems. Such conditions are basic physiological and safety-based needs. Without the proper provisions and commitments from

governments and local authorities to secure these necessities for general populations, the risk of transmitting and spreading preventable illnesses increases. Increases in disease burdens can be a signal to those who are disaffected to coordinate together if they view the state as lacking or having weakened capacity. The goal is not to overthrow the state. Instead, the goal is to improve the socio-economic conditions responsible for persistent adverse public health outcomes.

Hypotheses

To thoroughly reexamine the HIV-onset theory, I use updated health metric data to bridge the empirical gap, testing the relationship between HIV and the onset of violent conflict. In light of the vast improvements in HIV-related care, increased access to screenings and treatment, and significant decreases in generalized HIV burdens over the past decade, I suspect there is no relationship between HIV and violent conflict, contradicting claims made by Kustra (2017) that HIV is a valid driver of violence.

Hypothesis 1: An increase in HIV conditions will have no effect on the likelihood of violent conflict.

The second hypothesis corresponds to my argument of disease and the onset of violent conflict. To the degree that life expectancy is vital for the prospects of rebellion, diseases unrelated to HIV, generally associated with unfavorable socioeconomic conditions, are more likely to motivate individuals to partake in acts of violence. My second hypothesis is as follows:

Hypothesis 2: An increase in non-HIV conditions will have a positive effect on the likelihood of violent conflict.

CHAPTER FOUR: RESEARCH DESIGN

Dependent Variable

The dependent variable (DV), the onset of violent conflict, comes from the UCDP/PRIO Armed Conflict Dataset, the leading provider of data relating to organized political violence from 1946 to the present. The DV is measured by cases of violence that resulted in a minimum of 25 battle-related deaths in a given year. The variable is binary with values of 0 or 1. A value of 0 represents a year in which a minimum of 25 battle-related deaths was not recorded. A value of 1 represents a year in which at least 25 recorded battle-related deaths occurred. To better isolate the health conditions leading up to the outbreak of violent conflict, I lag the dependent variable for one year. Therefore, the dependent variable data points capture either HIV or non-HIV conditions one year before the onset of conflict. To best capture moments of violent social banditry, I choose a minimum 25 battle-related death threshold. This is the same DV as used on the 2017 Kustra HIV-onset study. However, in the 2017 study, Kustra uses 25 battle-deaths in a given year to test the relationship of HIV conditions on the likelihood of civil war. A smaller threshold of battle-deaths in a given year is better suited for this study because social banditry tends to be more isolated events, fewer battle deaths compared to a civil or interstate war. Among 37 countries in SSA (see Table 1) and 2,656 observations, 89 cases from 1990-2012 met the criteria to be coded as 1.

Table 1: Countries Under Analysis

The Gambia	Togo	Rwanda	Namibia
Mali	Cameroon	Djibouti	Lesotho
Senegal	Nigeria	Ethiopia	Botswana
Benin	Gabon	Eritrea	Swaziland
Niger	CAF	Angola	Madagascar
Cote d' Ivoire	Chad	Mozambique	Burundi
Guinea	Dem. Rep. Congo	Zambia	Ghana
Burkina Faso	Uganda	Zimbabwe	South Africa
Liberia	Kenya	Malawi	Tanzania
		Sierra Leone	

Explanatory Variables

The independent variables are the years of life lost (YLL) for HIV, non-HIV, and for all YLL combined. YLL is an alternative measurement for premature mortality, measuring the lost years of life due to premature death. It is the difference between the age of premature death and the expected life expectancy of an individual. The YLL value considers the age when death occurs. Therefore, deaths at a younger age carry more weight deaths that occur at an older age. This indicator is generally used in health care planning and is particularly useful in comparing the premature mortality experiences between different populations and demographics. The non-HIV and all YLL variables measure mortality for both communicable and non-communicable diseases and conditions that are listed below in Table 2. The data comes from the GBD. This database quantifies health loss on over 350 diseases and risk factors and disaggregates data from 145 countries from 1990 to the present. The data is collected using local and national-level censuses reports, vital registrations (birth and death records), disease registries, and representative health surveys.

Table 2: Categories of the non-HIV YLL variable

Communicable diseases & conditions	**Non-Communicable diseases & conditions**
Sexually transmitted infections excluding HIV	Neoplasms
Respiratory infections & tuberculosis	Cardiovascular disease
Enteric infections	Diabetes and kidney disease
Typhoid and paratyphoid	Digestive disorders
Tropical diseases	Neurological disorders
Leishmaniasis	Sense organ disease
Intestinal nematode infections	Congenital birth defects
Meningitis	Urinary diseases
Acute hepatitis	Gynecological disorders
Maternal and neonatal disorders	Oral disorders
Nutritional deficiencies	Injuries
	Self-harm and interpersonal violence

Control Variables

The concept of violent conflict is multidimensional and is compounded by a range of factors. Based on existing conflict literature, I incorporate a variety of controls to isolate the effect of disease burdens on the likelihood of violence. I account for potential economic output effects by controlling for two different gross domestic product (GDP) indicators from the World Bank: GDP per capita and GDP growth. The GDP per capita measures the sum of gross value added by resident producers in the economy and is based in U.S. dollars. GDP growth measures the annual percentage change in the volume of a country's economic output. Population discrepancies between countries could drive variation in the DV. For instance, it could be the case that conflict is more likely to strike in nations with larger populations. Thus, it is essential to control population size. It may also be the case that democracies have fewer cases of violent conflict compared to non-democracies. Therefore I include a proxy control for regime type, the openness of executive recruitment.

Variations in religious demographics could impact the onset of violent conflict. For example, predominantly Muslim countries are overrepresented among countries with high levels of internal non-state and one-sided violence. They have higher participation rates in inter-state conflicts (Gleditsch & Rudolfsen 2016). Consequently, I incorporate a religious control variable that measures the percentage of the population that is Muslim. It continues to be debated whether or not a country's ethnic composition impacts the chances of violence. To account for any effect of ethnic differences in the population, I include a control for ethnic fragmentation. Lastly, existing conflict literature suggests that societies with youth bulges are more war-prone than countries without and "youthful populations and the economic and psychological frustrations that enable political instability" (Gaan 2015). A youth bulge is when the population of young men ages 15-24 accounts for at least 20% of the total population. One theory is that societies with larger youthful populations put a strain on the labor markets of a country because there is an access labor force and a deficit in available jobs. The tensions produced by an oversaturated labor force and a lack of jobs can lead to grievances that manifest as violence. To control for any potential effect of the youth bulge, I use marriage age as a proxy control variable.

One control that this study does not account for is state capacity. Several proxy measures for state capacity from the World Bank were considered: the percentage of roads and the percentage of primary and secondary education enrollment. However, the individual addition of each variable dropped the number of cases by, at best, 24%. Descriptive statistics are listed below in Table 3.

Data Limitations

Quantitative research using data for SSA is inherently problematic because the region's statistics are often missing, incomplete, or under-reported, limiting the number of overall observations. This is an inescapable problem for empirical research using African data. There are cases of conflict in SSA that unaccounted for in the PRIO dataset. For example, the years of the Rwandan civil war from 1991-1994 do not have recorded battle-related deaths. This is only one of many that are excluded from the dataset. It is not uncommon to have missing data for African countries, especially for areas that experience higher levels of conflict. Access to more comprehensive conflict data would be an obvious benefit to this project and future studies into African affairs. Another common issue is that quantitative papers investigating individual-level theories of conflict rely primarily on state-level data. This research paper is no exception. Individual-level analysis data for why individuals participate in violent conflict is mostly unavailable. Therefore, state-level data are routinely used in conflict research because there is no publicly available, better alternative. However, empirical evidence from recent studies on rebellion suggests that using state-level data to make inferences at the individual level may be appropriate for this type of study. In a study on informal social controls and civil war onset, Schroeder and Thyne (2012) find that state-level and individual-level data provided starkly similar results when investigating the individual desire to rebel.

Table 3: Descriptive Statistics

Variable	Name	Definition	Min.	Max.	Source
Dependent	Violent Conflict Onset	The 1st year a conflict resulted in 25 battle-related deaths at minimum	0	1	UCDP/PRIO
Independent	YLL HIV	Years of life lost due to HIV	-0.9	15.8	GBD
Independent	YLL Non-HIV	Years of life lost due to non-HIV illnesses	8.7	19.9	GBD
Independent	All YLL	Total YLL across all diseases	8.1	19.9	GBD
Control	GDP per Capita	GDP per capita ($US)	3.9	11.1	WB
Control	GDP Growth	Percent of GDP Growth per capita	-65	102.8	WB
Control	Population	Country Population	13.1	21	WB
Control	Xropen2	Openness of executive recruitment	0	16	Polity IV
Control	Muslim	Percent of the population who are Muslim	0	99.8	Polity IV
Control	Ethnic Fragmentation	Level of ethnic heterogeneity	0	147	Vanhanen '99
Control	Marriage age	Average age of men entering their 1st marriage	19.8	34.5	WB

Model Specification

To test my hypotheses, I use probit regressions to measure the effect of disease conditions on the likelihood of violent conflict. I specify a probit model because the dependent variable has a binary value of either 0 or 1. The econometric model is as follows:

$$Pr(Y = 1) = \Phi(ß0 + ß1*X1 + ß2*X2 + ß3*(X1*X2) + ß'X' + \varepsilon)$$

Probit regressions model the probability that Y = 1 using the cumulative standard normal distribution function. The Y corresponds to the dependent variable, the onset of violent conflict. Phi (Φ) represents the standard normal distribution and its cumulative distribution function. The purpose of this model is to constrain the distribution between 0 and 1 for looking at the probability of a certain value in Y given a vector of predictive variables (X1 or X prime). Beta zero (ß0) represents the constant intercept for Y, and beta one and onward (ß1, ß2, etc.) are the slope coefficients that estimate the average change in the z-score probability of Y = 1. Beta X (ß'X') corresponds to the control variables, and ε corresponds to an unknown error term (Bliss 1934). There are two probit models testing the effects of disease burdens on the likelihood of violent conflict.

Following the probit models, I use predicative margins to predict responses to violent conflict if every individual in the sample lost the same number of life years from either HIV or a non-HIV condition. The x-axis corresponds to the YLL from each of the independent variables and the y-axis corresponds to the likelihood of violent conflict in percentages. The final graph is a scatter plot showing the DALYs for HIV and non-HIV diseases one year before the onset of violent conflict.

CHAPTER FIVE: DATA & ANALYSES

Probit Regressions

Table 4: Effect of Disease Conditions on the Likelihood Violent Conflict: SSA 1990-2012

	Model 1	Model 2	Model 3
HIV YLL	**-0.0235**	--	--
	(-0.29)	--	--
Non-HIV YLL	--	**0.817***	--
	--	(2.32)	--
All YLL	--	--	**0.756***
	--	--	(2.21)
GDP Per Capita	-0.113	0.0145	-0.00282
	(-1.02)	(0.15)	(-0.03)
GDP Growth	0.0173*	0.0184*	0.0181*
	(2.20)	(2.17)	(2.17)
Population	0.185	-0.668	-0.608
	(1.68)	(-1.79)	(-1.69)
Xropen	0.005	0.0064	0.00627
	(0.46)	(0.57)	(0.57)
Ethnic Frac.	-0.00435	-0.0054	-0.00525
	(-1.27)	(-1.56)	(-1.50)
Muslim	0.0081*	0.0079*	0.00830**
	(2.52)	(2.48)	(2.66)
Marriage Age	-0.026	0.0292	0.0241
	(-0.46)	(0.42)	(0.35)
Constant	-2.053	-3.513	-3.343
	(-1.02)	(-1.65)	(-1.58)
N	**730**	**730**	**730**

Note: Z critical value statistics in parentheses. All regressions include a spatial lag of one year. The symbols *, **, and *** represent statistical significance at the 10, 5, and 1 percent levels.

Probit Analyses

Two probit models are investigating the effect of disease conditions on the likelihood of violent conflict are presented in Table 3. Model 1 tests the effect of HIV YLL conditions, Model 2 tests non-HIV YLL conditions, and Model 3 tests the effect of all YLL (both HIV and non-HIV). All three models utilize the same control variables and have 730 observations. The direction of the z-score is not indicative of the strength of the effect of the independent variable. Rather, it illustrates the direction of the relationship.

Model 1 produced a z-score of -0.02. This negative z-score suggests a negative correlation between HIV and conflict, but this result is statistically insignificant. I do not have the evidence that the z-score is not due to chance, and the null hypothesis cannot be rejected. Based on this particular model, HIV conditions do not affect the likelihood of violent conflict, which aligns with my argument. Since the early 2000s, national, international, and non-governmental institutions have made a concerted effort to prioritize HIV as a public health concern. As a consequence of the visible public and private effort to understand the effects of the disease and to improve short and long-term HIV-related health care, its burden has significantly reduced from 2005 to the present day by multiple indicators: YLL, DALYs, deaths, incidences, prevalence rates. A continued, successful, long-term public campaign into HIV awareness and research may be responsible for unprecedented amounts of funding into HIV research and health care services that lead to dramatic improvements. In SSA, donor funding for HIV treatment and outreach outpaced funding for the water supply, sanitation services, agriculture, and education (Dionne 2017). Precisely because of this influx of funding is why the burden of HIV has a positive outlook compared to other diseases or conditions that do not receive the same, coordinated international attention.

The z-score produced in Model 2 is 0.82, with statistical significance at the 10% level. A positive and significant z-score suggests that non-HIV conditions affect the likelihood of violence, supporting my second hypothesis. Given the direction and significance of Model 2, I reject the null hypothesis and accept that non-HOV conditions positively affect the likelihood of violent conflict. Model 3 tests all YLL, both HIV and non-HIV, on the likelihood of violence. A statistically significant z-score of 0.75 supports my broader argument that health conditions may be linked to outbursts of violence. It is not necessarily sick individuals who become incentivized to participate in violence. Instead, it may be healthy individuals witnessing the adverse socio-economic conditions connected to increased (or sustained) disease burdens. High disease burdens can generate grievances strong enough to incite violence. The grievances stem from weakened governance – the lack of funding for adequate infrastructure and avenues to access for that infrastructure can increase the opportunity cost for rebellion. If physical and health-related conditions are only perceived to worsen, the potential payoff from using violence may outweigh the value of the future where underling conditions for disease transmission do not improve. It may not necessarily be the diseases themselves that spark political unrest. Instead, it is the socio-economic conditions and lack general infrastructure that helps satisfy conditions for disease transmission that are contested.

Predictive Margins

Predictive margins are useful for approximating the amount of change in Y that will be produced by a one-unit change in X. The x-axis represents the number of YLL, and the y-axis represents the chance of violent conflict in percentages. Figure 2 tests the predictive margins for HIV conditions on the likelihood of violent conflict. The likelihood of violence steadily decreases and

becomes less likely as the HIV burden rises. However, the margins for each value overlap with one another, signifying that HIV YLL has no statistical significance on the likelihood of violent conflict. Although the trend is negative, the results are insignificant, and I reject my first hypothesis. Again, I accept the null hypothesis that there is no relationship between HIV conditions and the chances of violence.

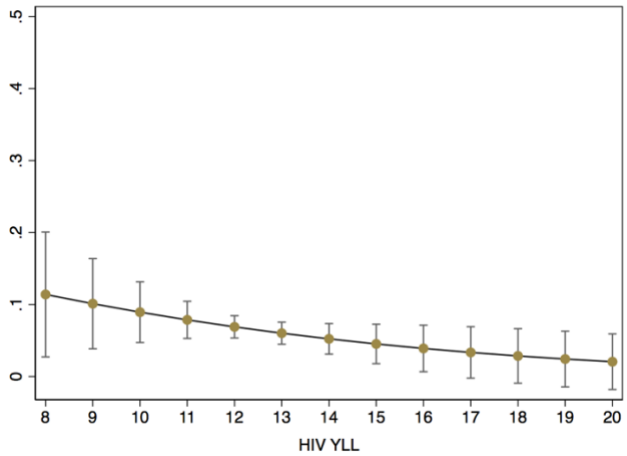

Figure 2: Predictive Margin Plot of HIV YLL Effect on Violent Conflict

Data source: PRIO Conflict dataset & GBD

Figure 3 measures the predictive margin effect of non-HIV conditions, and the results suggest a positive relationship. Between 8 and 16 YLL, the effect of non-HIV conditions is insignificant. From 17 YLL and up, non-HIV conditions' effect becomes statistically significant, offering further support for my second hypothesis. With a loss of 17 years, there is about a 10 percent chance of the outbreak of violent conflict. When the burden increases to 18 years lost, the likelihood of violence is around 15%. A loss of 19 years comes with a 20% chance of violence occurring. With a loss of 20 years, the likelihood of onset increases to around 27%. Based on this

evidence, I reject the null hypothesis an again accept the claim that non-HIV conditions have a positive effect on the likelihood of violence.

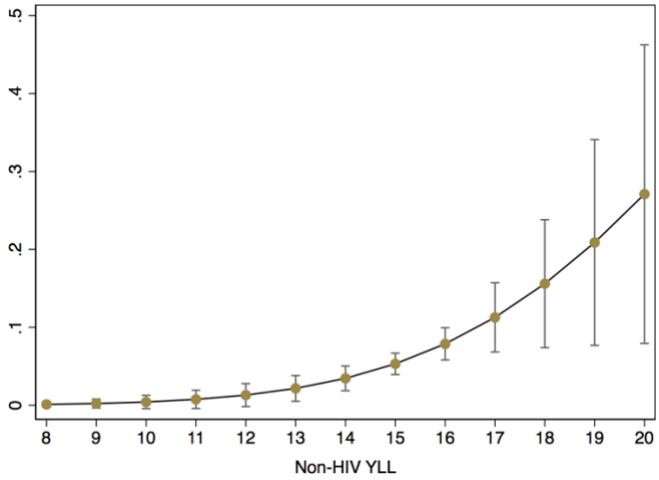

Figure 3: Predictive Margin of Non-HIV YLL Effect on Violent Conflict

Data source: PRIO Conflict dataset & GBD

Scatter Plot

Figure 4 is a scatterplot depicting disease conditions one year before the outbreak of violent conflict. The scatter plot reports two data points for the same event. Each year will have a brown (non-HIV) and blue (HIV) dot corresponding to YLL one year before a conflict is recorded. If there is a year where there is not the same number of teal and brown dots, it is probably the case where the YLL values are similar and overlap with one another. The x-axis represents the year before a conflict occurs that resulted in 25 battle-related deaths. The y-axis represents the percentage of either HIV or non-HIV YLL in a single year.

The results of the scatterplot are stark. Non-HIV YLL are consistently higher than HIV conditions across observations. Looking closer at the data, in 1990, one year before the outbreak of the Sierra Leone Civil War, HIV accounted for .01% of the total YLL while non-HIV YLL accounted for 77.5% of total YLL. In cases where the range between HIV and non-HIV values is smaller, there is still a notable difference in the burden levels. For example, in 1997, one year before the breakout of the Eritrean-Ethiopian war, the HIV YLL for the country was 8.85%, and non-HIV related YLL accounted for 78.01%. In 1999 leading up to the second Liberian civil war, HIV accounted for 4.33%, and non-HIV accounted for 76.86% of total YLL. The general trend of this scatter plot follows this pattern; One year before violent conflict was recorded, HIV conditions were far less of a public health burden than non-HIV illnesses.

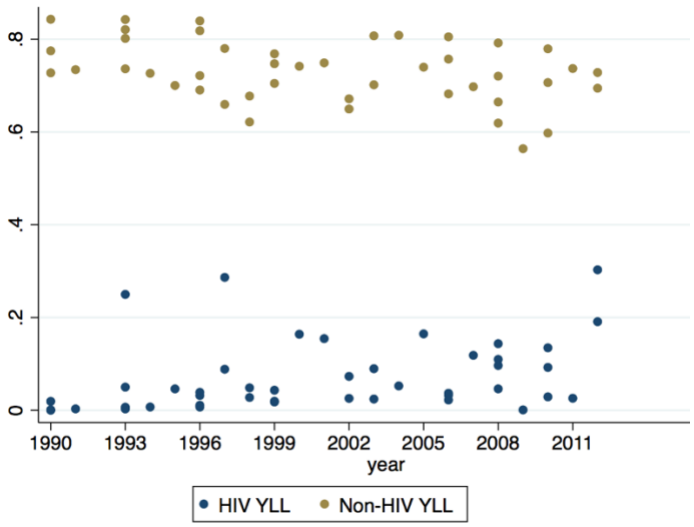

Figure 4: Scatter Plot of DALYs One Year Prior to Cases of Violent Conflict

Data source: PRIO Conflict dataset and the GBD

CHAPTER SIX: DISCUSSION

Social scientists and public health experts have long recognized an association between conflict and disease. However, the research on the topic overwhelmingly investigates disease trends as a consequence of conflict, rather than a cause. Studies investigating disease as a cause of conflict are few and far between. This paper aims to help bridge the empirical gap between conflict and public health research in SSA by testing the effect of more comprehensive and disaggregated health metrics from the Global Burden of Disease project against conflict onset data from the Peace Research Institute Oslo. I began with a systematic review of the literature around conflict and disease as it relates to soldiers and military organization, risk-taking, and motivations for rebellion, along with rebel recruitment and opportunity cost literature. I then present a theoretical and empirical critique of the existing HIV onset theory before positing my disease burden and violent conflict theory. I assert that improvements in access to and effectivity of ARTs have significantly decreased the burden of living with HIV. Access to early detection screening services and exposure to long term therapy can reduce viral loads of HIV to undetectable levels, allowing HIV-positive individuals to lead seemingly healthy lives.

In contrast, non-HIV disease burdens have fluctuated little over time and currently account for more DALYs, deaths, YLL than from HIV in SSA. Elevated non-HIV burdens, combined with the perceived deprivation of socio-economic conditions contributing to sustained adverse public health conditions, can trigger an aggression-frustration mechanism that manifests as small-scale violent conflict. I argue that diseases less connected to individual decision-making and more connected to the presence of poor infrastructure are more likely to incentivize the use of violence among the aggrieved. Using an alternative measure for premature mortality (YLL) provided by the GBD, I find robust empirical support for my theory of disease and conflict.

Probit analysis and predictive margins depict statistical significance between non-HIV conditions and the likelihood of violent conflict. The results also highlight important implications for public health and security policymakers. The empirical findings suggest that if disease burdens are associated with increased chances of violence, it is imperative to invest resources and funding into public infrastructure that can substantially reduce the burden of relatively preventable diseases.

For example, increasing access to safely managed water and sanitation facilities could significantly reduce the burden of many enteric and parasitic infections. According to the Center for Disease Control (2014), an estimated 88% of deaths from diarrheal illnesses are attributable to a lack of access to safe water and sanitation services, and 90% of the victims are children under the age of five years. A study on the cost-effectiveness of water and sanitation intervention (Haller et al 2007) suggests that over ten years piped water supply and improved sewer connections "would achieve maximum health gains [estimated at] 71 million DALYs." Such a project would cost a global investment of 48 to 60 billion U.S. dollars (Haller et al 2007, page 474). However, this is the more expensive intervention option for the SSA region due to economic restraints. Improvements in the water supply using pit latrines may be more cost-effective, and more and other low-cost options may be more appropriate for countries with smaller budgets. However, with a cut in costs, the health benefits would not be as high as piped water installments.

This article uncovers a couple of crucial topics for future conflict research. In the literature review, I briefly discuss how HIV may impact strategic military capacity by weakening national security through direct HIV transmission, and indirectly through governments reallocating funds away from military services into health care costs (Tripodi & Patel 2004).

Research on the topic of HIV and military budget allocations remains theoretical and has yet been empirically investigated. Future research can employ empirical models to investigate the question, to what extent do HIV indicators affect military spending and budget allocation? I also discuss the idea that HIV impacts child soldiering through a process of parental loss. Particularly, HIV may play a role in creating a streamline of potential recruits by increasing the "lost orphan generation" (Leyenaar 2005). However, the argument has not been empirically investigated. Therefore, a new research question could be to what capacity does HIV conditions affect child recruitment levels among rebel groups?

Future research on the topic of disease as a driver of conflict should continue to extend beyond the public health issue of HIV. Using disaggregated health metric data for a variety of alternative life expectancy indicators for specific diseases and testing their effect on conflict would undoubtedly be a place to start. The disease burden in SSA is not uniform, and countries vary in their public health issues. Therefore, to better understand the relationship between health as a driver for conflict, conducting and comparing single-country case studies could be useful. At the very least, this article suggests that non-HIV disease conditions may have sufficient implications for the study on the drivers of violent conflict and warrant further investigation into the topic. I advocate for political scientists to consider the intersection of public health and conflict as a component of future security studies research.

APPENDIX: DATA SOURCES

USAIDS data on deaths averted due to ARTs (Figure 1)

http://www.aidsinfoonline.org/gam/libraries/aspx/home.aspx

Global Burden of Disease (Figure 2; Independent Variables)

http://ghdx.healthdata.org/gbd-results-tool

Kustra Replication Data
http://www.tylerkustra.com/#Publications

LIST OF REFERENCES

Anand, A., Shiraishi, R. W., Bunnell, R. E., Jacobs, K., Solehdin, N., Abdul-Quader, A. S., ... & Diaz, T. (2009). Knowledge of HIV status, sexual risk behaviors and contraceptive need among people living with HIV in Kenya and Malawi. *Aids*, *23*(12), 1565-1573.

Anema, A., Joffres, M. R., Mills, E., & Spiegel, P. B. (2008). Widespread rape does not directly appear to increase the overall HIV prevalence in conflict-affected countries: so now what?. *Emerging themes in epidemiology*, 5(1), 11.

Ba, O., O'Regan, C., Nachega, J., Cooper, C., Anema, A., Rachlis, B., & Mills, E. J. (2008). HIV/AIDS in African militaries: an ecological analysis. *Medicine, Conflict and Survival*, *24*(2), 88-100.

Betancourt, T. S., Meyers-Ohki, S., Stulac, S. N., Barrera, A. E., Mushashi, C., & Beardslee, W. R. (2011). Nothing can defeat combined hands: Protective processes and resilience in Rwandan children and families affected by HIV/AIDS. *Social Science & Medicine*, *73*(5), 693-701.

Bliss, C. I. (1934). The method of probits. *Science*.

Blok, Anton. "The peasant and the brigand: social banditry reconsidered." *Comparative studies in Society and History* 14.4 (1972): 494-503.

Boutayeb, A. (2009). The impact of HIV/AIDS on human development in African countries. *BMC Public Health*, *9*(S1), S3.

Caldwell, J. C. (1997). The impact of the African AIDS epidemic. *Health Transition Review*, *7*, 169-188.

Collier, P., & Hoeffler, A. (1998). On economic causes of civil war. *Oxford economic papers*, *50*(4), 563-573.

- (2002). On the incidence of civil war in Africa. Journal of conflict resolution, 46(1), 13-28.

De Santis, J. P., Florom-Smith, A., Vermeesch, A., Barroso, S., & DeLeon, D. A. (2013). Motivation, management, and mastery: a theory of resilience in the context of HIV infection. *Journal of the American Psychiatric Nurses Association*, *19*(1), 36-46.

De Waal, A. (2013). *AIDS and Power: Why there is no political crisis yet*. Zed Books Ltd.

Dionne, K. Y. (2017). *Doomed interventions: The failure of global responses to AIDS in Africa*. Cambridge University Press.

Djemai, E. (2010). *HIV-Related Risk Taking Behavior and Income Uncertainty: Empirical Evidence from Sub-Saharan Africa* (No. urn: hdl: 123456789/7310). Université Paris-Dauphine.

Elbadawi, I., & Sambanis, N. (2002). How much war will we see? Explaining the prevalence of civil war. *Journal of conflict resolution*, *46*(3), 307-334.

Elbe, S. (2002). HIV/AIDS and the Changing Landscape of War in Africa. *International Security*, 27(2), 159-177.

Faulkner, C. M., Powell, J., & Lasley, T. (2019). Funding, capabilities and the use of child soldiers. *Third World Quarterly*, *40*(6), 1017-1039.

Fearon, J. D., & Laitin, D. D. (2003). Ethnicity, insurgency, and civil war. *American political science review*, *97*(1), 75-90.

Foster, G., & Williamson, J. (2000). A review of current literature on the impact of HIV/AIDS on children in sub-Saharan Africa. *AIDS-LONDON-CURRENT SCIENCE THEN RAPID SCIENCE PUBLISHERS THEN LIPPINCOTT RAVEN-*, *14*, S275-S284.

Gaan, N. (2015). Youth Bulge: Constraining and Reshaping Transition to Liberal Democracy in Afghanistan. *India Quarterly*, *71*(1), 16-36.

Garrett, L. (2005). The lessons of HIV/AIDS. *Foreign Aff.*, 84, 51.

- (2005). *HIV and National Security: where are the links?* (p. 27). New York: Council on Foreign Relations.

Gates, S. (2002). Recruitment and allegiance: The microfoundations of rebellion. *Journal of Conflict resolution*, *46*(1), 111-130.

Global Burden of Disease Collaborative Network. Global Burden of Disease Study 2017 (GBD 2017) Results. Seattle, United States: Institute for Health Metrics and Evaluation (IHME), 2018. Available from http://ghdx.healthdata.org/gbd-results-tool.

The Global HIV/AIDS Epidemic. (2019, September 30). Retrieved March 11, 2020, from https://www.kff.org/global-health-policy/fact-sheet/the-global-hivaids-epidemic/

Gleditsch, N. P., & Rudolfsen, I. (2016). Are Muslim countries more prone to violence?. *Research & Politics*, *3*(2), 2053168016646392.

Gleditsch, Nils Petter; Peter Wallensteen, Mikael Eriksson, Margareta Sollenberg & Håvard Strand (2002) Armed Conflict 1946–2001: A New Dataset. Journal of Peace Research 39(5): 615–637.

Gurr, T. (1970). Why men rebel. *Princeton, PUP*.

Gurses, M., & Mason, T. D. (2010). Weak states, regime types, and civil war. *Civil Wars*, *12*(1-2), 140-155.

Haacker, M. (2002). *The economic consequences of HIV/AIDS in Southern Africa* (Vol. 2). International Monetary Fund.

Haller, L., Hutton, G., & Bartram, J. (2007). Estimating the costs and health benefits of water and sanitation improvements at global level. *Journal of water and health*, *5*(4), 467-480.

Hankins, C. A., Friedman, S. R., Zafar, T., & Strathdee, S. A. (2002). Transmission and prevention of HIV and sexually transmitted infections in war settings: implications for current and future armed conflicts. *AIDS*, 16(17), 2245-2252.

Hegre, Harvard, and Nicholas Sambanis. 2006. ‘‘Sensitivity Analysis ofEmpirical Results on Civil War Onset,’’ Journal ofConflict Resolution 50 (4): 508-35.

Hill, E. M., Ross, L. T., & Low, B. S. (1997). The role of future unpredictability in human risk-taking. *Human Nature*, *8*(4), 287.

History of HIV and AIDS overview. (2019, October 10). Retrieved February 8, 2019, from https://www.avert.org/professionals/history-hiv-aids/overview

HIV/AIDS. (2020). Retrieved March 11, 2020, from https://www.afro.who.int/health-topics/hivaids

HIV/AIDS. (2019). Retrieved February 8, 2020, from https://www.who.int/news-room/fact-sheets/detail/hiv-aids

Hoffman, D. (2011). *The war machines: young men and violence in Sierra Leone and Liberia*. Duke University Press.

Humphreys, M., & Weinstein, J. M. (2008). Who fights? The determinants of participation in civil war. *American Journal of Political Science*, *52*(2), 436-455.

Institute for Health Metrics and Evaluation (IHME). GBD Compare. Seattle, WA: IHME, University of Washington, 2015. Available from http://vizhub.healthdata.org/gbd-compare. (Accessed January 20, 2019).

Institute for Health Metrics and Evaluation, Human Development Network, The World Bank. The Global Burden of Disease: Generating Evidence, Guiding Policy – Sub-Saharan Africa Regional Edition. Seattle, WA: IHME, 2013.

Iqbal, Z., & Zorn, C. (2010). Violent conflict and the spread of HIV/AIDS in Africa. *The Journal of Politics*, 72(1), 149-162.

Keenan, A. (2019, June 18). 1 in 3 people globally do not have access to safe drinking water – UNICEF, WHO. Retrieved March 1, 2020, from https://www.who.int/news-room/detail/18-06-2019-1-in-3-people-globally-do-not-have-access-to-safe-drinking-water-unicef-who

Kustra, T. (2017). HIV/AIDS, Life Expectancy, and the Opportunity Cost Model of Civil War. *Journal of Conflict Resolution*, *61*(10), 2130-2157.

Lammers, J., & Van Wijnbergen, S. (2008). HIV/AIDS, risk aversion and intertemporal choice.

Leyenaar, J. K. (2005). HIV/AIDS and Africa's orphan crisis. *Paediatrics & child health*, *10*(5), 259-260.

Marshall, Monty G., Ted Robert Gurr, and Keith Jaggers. 2014. ‘‘Polity IV Project: Political Regime Characteristics and Transitions, 1800-2013.’’ Center for Systemic Peace, Vienna, VA. www.systemicpeace.org/polity/polity4.htm.

Matovu, J. K., & Makumbi, F. E. (2007). Expanding access to voluntary HIV counselling and testing in sub-Saharan Africa: alternative approaches for improving uptake, 2001–2007. *Tropical Medicine & International Health*, *12*(11), 1315-1322.

McInnes, C., & Rushton, S. (2010). HIV, AIDS and security: where are we now?. *International Affairs*, 86(1), 225-245.

Miles, S. H. (2003). HIV in insurgency forces in sub-Saharan Africa—a personal view of policies. *International journal of STD & AIDS*, 14(3), 174-178.

Mills, E. J., & Nachega, J. B. (2006). HIV infection as a weapon of war. *Lancet Infectious Diseases*, *6*(12), 752-753.

Rights, A. (2004). Broken bodies, torn spirits: Living with genocide, rape and HIV/AIDS. *A publication of African Rights*.

Moore, W. H. (1995). Rational rebels: overcoming the free-rider problem. *Political Research Quarterly*, *48*(2), 417-454.

Molez, J. F. (1998). The historical question of acquired immunodeficiency syndrome in the 1960s in the Congo River basin area in relation to cryptococcal meningitis. *The American journal of tropical medicine and hygiene*, *58*(3), 273-276.

Oster, E. (2012). HIV and sexual behavior change: Why not Africa?. *Journal of health economics*, *31*(1), 35-49.

Pandey, A., & Galvani, A. P. (2019). The global burden of HIV and prospects for control. *The Lancet HIV*, *6*(12), e809-e811.

Pollock III, P. H., & Edwards, B. C. (2019). *The essentials of political analysis*. Cq Press.

Quammen, D. (2012). *Spillover: animal infections and the next human pandemic*. WW Norton & Company.

Ricci, F. (2012). Social implications of malaria and their relationships with poverty. *Mediterranean journal of hematology and infectious diseases*, *4*(1).

Sachs, S. E., & Sachs, J. D. (2004). Africa's children orphaned by AIDS. *The Lancet*, *364*(9443), 1404.

Sagala, J. K. (2006). HIV/AIDS and the military in sub-Saharan Africa: Impact on military organizational effectiveness. *Africa Today*, 53(1), 53-77.

- (2008). HIV/AIDS prevention strategies in the armed forces in sub-Saharan Africa: A critical review. *Armed Forces & Society*, 34(2), 292-313.

Shell, R. (1999). The silent revolution: The AIDS pandemic and the military in South Africa. *Consolidating Democracy in South Africa*, 29.

Singer, P. W. (2002). AIDS and international security. *Survival*, 44(1), 145-158.

Spiegel, P. B., Bennedsen, A. R., Claass, J., Bruns, L., Patterson, N., Yiweza, D., & Schilperoord, M. (2007). Prevalence of HIV infection in conflict-affected and displaced people in seven sub-Saharan African countries: a systematic review. *The Lancet*, 369(9580), 2187-2195.

Spiegel, P. B. (2004). HIV/AIDS among conflict-affected and displaced populations: Dispelling myths and taking action. *Disasters*, 28(3), 322-339.

Spiegel, P. B., Schilperoord, M., & Dahab, M. (2014). High-risk sex and displacement among refugees and surrounding populations in 10 countries: the need for integrating interventions. *AIDS*, *28*(5), 761-771.

Thomas, A. G., Grillo, M. P., Djibo, D. A., Hale, B., & Shaffer, R. A. (2014). Military HIV policy assessment in sub-Saharan Africa. *Military Medicine*, 179(7), 773-777.

Thyne, C. L., & Schroeder, R. D. (2012). Social constraints and civil war: Bridging the gap with criminological theory. *The Journal of Politics*, *74*(4), 1066-1078.

Tripodi, P., & Patel, P. (2002). The global impact of HIV/AIDS on peace support operations. *International Peacekeeping*, 9(3), 51-66.

-(2004). HIV/AIDS, peacekeeping and conflict crises in Africa. *Medicine, Conflict and Survival*, 20(3), 195-208.

Uppsala Conflict Data Program. (2014). ‘‘UCDP/PRIO Armed Conflict Dataset v.4-2014a.’’ Uppsala University. Accessed January 11, 2019. www.ucdp.uu.se.

UN-Water. (2019) World Water Development Report 2019: 'Leaving no one behind': UN-Water. Retrieved March 3, 2020, from https://www.unwater.org/world-water-development-report-2019-leaving-no-one-behind/

Utas, M., & Jörgel, M. (2008). The West Side Boys: military navigation in the Sierra Leone civil war. *The Journal of Modern African Studies*, *46*(3), 487-511.

Vanhanen, Tatu. 1999. ‘‘Domestic Ethnic Conflict and Ethnic Nepotism: A Comparative Analysis.’’ *Journal of Peace Research* 36 (1): 55-73.

Virginie, S., Yasmin, H., & Sally, B. (2010). Assessing the impact of mass rape on the incidence of HIV in conflict-affected countries. *AIDS (London, England)*, *24*(18), 2841.

Wang, X. T., Kruger, D. J., & Wilke, A. (2009). Life history variables and risk-taking propensity. *Evolution and Human Behavior*, *30*(2), 77-84.

Waruiru, W., Ngare, C., Ssempijja, V., Gachuki, T., Njoroge, I., Oluoch, P., ... & Kim, A. A. (2014). The status of HIV testing and counseling in Kenya: results from a nationally representative population-based survey. *Journal of acquired immune deficiency syndromes (1999)*, *66*(Suppl 1), S27.

Weinstein, J. M. (2005). Resources and the information problem in rebel recruitment. *Journal of Conflict Resolution*, *49*(4), 598-624.

Whiteside, A., De Waal, A., & Gebre-Tensae, T. (2006). AIDS, security and the military in Africa: a sober appraisal. *African Affairs*, 105(419), 201-218.

The World Bank. (2014). ‘‘World DataBank.’’ Accessed January 20, 2019. databank.world bank.org/data/home.aspx.

World Health organization. (2013) The Global Burden of Disease: Main Findings for Sub-Saharan Africa. Retrieved April 1, 2020, from https://www.worldbank.org/en/region/afr/publication/global-burden-of-disease-findings-for-sub-saharan-africa