

**VIOLENT CIVIL CONFLICT AND ITS IMPACT ON HEALTH OUTCOMES:
A CLOSER LOOK AT KENYA'S 2007-2008 POST-ELECTION VIOLENCE**

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Submitted to the Graduate Faculty of
the Graduate School of Public in partial fulfillment
of the requirements for the degree of
Master of Public Health

University of Pittsburgh

2013

UNIVERSITY OF PITTSBURGH

Graduate School of Public Health

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ABSTRACT

The two aims of this thesis are as follows: first, to gain an understanding of the health-conflict literature and to create an analytical framework and second, to apply this framework to Kenya's 2007-2008 post-election violence. A comprehensive search of PubMed and the grey literature was conducted to inform both of these aims. The devastating health outcomes of violent civil conflict tend to be concentrated in vulnerable populations: children, adolescents and women. The health outcomes of violent civil conflict can be divided into four categories: economic and infrastructural, environmental, policy and social. Examples of these health outcomes include a cholera outbreak, low birthweight, interruptions in ART adherence and Posttraumatic Stress Disorder (PTSD).

The most common population level measures of these impacts are Health-Adjusted Life Expectancy (HALE), Disability-Adjusted Life-Years (DALYs) and the Dirty War Index (DWI). Retrospective surveys, census data, eyewitness accounts and media reporting are the sources of data for these tools and despite having specific limitations that must be considered before use, are the best available measures. In addition to this, there is a stark absence of new data in the field, denying it the proper attention by the international community. The 2007-2008 post-election violence in Kenya and its impact on health outcomes provides a real world example of public health relevance. Moving forward, conflict epidemiologists will play a vital role in

expanding available research in this field, helping to bring this field into the international community's consciousness and ensure that necessary emergency preparedness plans are in place to mitigate any negative health outcomes among vulnerable populations.

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PREFACE

A sincere thank you goes to Dr. Jessica Griffin Burke whose guidance and gentle nudging kept me on track to produce the present work. Thank you as well to Joanne Russell whose comments and dedication inspired my desire to write to the best of my ability. A very special thank you goes to Taylor Seybolt who agreed to be a reader on my committee despite not having worked with me previously. Finally, thank you to my family and friends for the unending support given to me throughout the writing process.

1.0 INTRODUCTION

Keeping in mind Gardemann's (2002) eight characteristics of public health(1):

“1) public health is peace promoting; 2) public health is reconciliation; 3) public health is democratic; 4) public health is border-crossing; 5) public health is worthwhile; 6) public health is preventative; 7) public health is based on science, skills and values; and 8) public health is a ray of hope.” (p.152-153)

there are two aims of this thesis. The first aim is to gain an understanding of the literature and the health outcomes of violent civil conflict. This will aid in the creation of an analytical framework detailing the impacts of violent civil conflict on health outcomes using a public health perspective and an ecological focus. The second aim will be to apply this framework to the politically contentious setting of Kenya's 2007-2008 post-election violence of 2007-2008 and its related health outcomes.

Approximately 310,000 deaths were caused by conflict in the year 2000 with more than half occurring in sub-Saharan Africa(2). Multiple researchers have found that the largest number of conflict deaths occurred among children and adolescents, but that nearly 25 percent of deaths were among women(2, 3). Excess deaths of males between the ages of 15 and 44(2) also impact the working age population's productivity. The World Health Organization (WHO) estimated that 0.70 percent of the global burden of disease in the year 2000 was due to conflict(2). Since this places conflict-related deaths well below other burdens, it is not considered a high priority by the international community. However, this is a mistake because of the many health outcomes of violent civil conflict that persist for years, or are not apparent until years after the conflict(3).

An upcoming field that is entirely focused on providing “science-based estimates of the...costs of war” on health is conflict epidemiology(4). Conflict epidemiologists focus on “relatively acute situations affecting large civilian populations, usually involving a combination of war or civil strife, food shortages and population displacement, resulting in significant excess mortality(4).” Thoms and Ron (2007) conduct retrospective mortality surveys using verbal autopsies among the refugee and internally displaced persons (IDPs) populations(4). To further prioritize the link between human rights, conflict and International Humanitarian Law, conflict epidemiology needs to collaborate with public health researchers, conflict analysts and human rights monitors (4).

While the most immediate health outcome of violent civil conflict is death, there are a variety of under-studied medium and long-term health outcomes(3), which can be divided into four categories: infrastructural and economic, environmental, policy and social(5, 6). WHO defines health as “a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity(7).” Using this definition, it becomes clear that violent civil conflict impedes the achievement of health. For this reason, this thesis’ primary focus will be on these medium and long-term health outcomes as they offer a more comprehensive picture of health after violent civil conflict ends.

Healthy Life Expectancy (HALEs) and Disability-Adjusted Life Year (DALY) are the main methods used to measure these health outcomes. The Dirty War Index is another method, but it serves a different purpose by measuring the belligerence of war. Retrospective surveys, census data, eyewitness accounts and media reporting are the sources of data for these methods, and while not perfect, are the best sources currently available.

This thesis brings together the frameworks and methods of the wide ranging health-conflict field and applies them to a single country – Kenya, at a specific point in the country’s history – the 2007-2008 post-election violence, and examines the specific health outcomes related to that point in time – a cholera outbreak, low birthweight, interruptions in ART adherence, and mental health issues such as Posttraumatic Stress Disorder. This unique approach attempts to create a bridge between the field’s frameworks and focus it on a single instance of violent civil conflict. This is a novel approach because most literature in this field does not focus on a single conflict, but rather on a conglomeration of them.

This thesis will begin by defining violent civil conflict and continue with a description of this theoretical framework’s methodology. Next, the results of aim one’s literature review will be discussed in detail, which includes the impacts of violent civil conflict on health outcomes, the commonly used population level measures of these health outcomes, their limitations and existing gaps in data. After that, aim two’s results will be examined, which includes an introduction to Kenya, its healthcare system, and a brief political history. The case study then delves into the 2007-2008 post-election violence and its aftermath by province and on population level health outcomes. Following this will be a discussion of the case study’s limitations, with a final discussion and conclusion section wrapping up everything.

2.0 DEFINING VIOLENT CIVIL CONFLICT

Violent civil conflict may be referred to as civil conflict, civil war, civil strife, violence or conflict and is also defined in a variety of ways. According to Ghobarah, Huth and Russett (2004), violent civil conflicts “are armed conflicts that challenge the sovereignty of an internationally recognized state and occur within that state’s boundary, resulting in 1,000 or more fatalities in at least one year(8).” Using this definition, Kenya’s post-election violence qualifies as violent civil conflict and merits study.

Zwi (2004) writes that violent civil conflict is driven by politics and economics(9). He states that violent civil conflict(9):

“[1] occur(s) within and across state boundaries, [2] ha(s) political antecedents typically relating to competition for power and resources, [3] (is) protracted in duration, [4] express(es) existing social, political, economic, and cultural structures and cleavages, and [5] (is) often characterized by one sector preying on other parts of the community.” (p.033)

When violent civil conflict has become politicized, there are three groups: the winners, the “conflict entrepreneurs” and the losers(9). Conflict entrepreneurs seek to “perpetrate (the) conflict because they profit economically or politically(9).” Keeping these conditions and groups in mind, it becomes easier to break down a complex situation and objectively look at its individual components and health outcomes.

Zwi and Ugalde (1989) include tribal and ethnic rivalries, intense nationalism, religious intolerance, uncompromising political ideologies, despotism and racism as part of their definition

of violent civil conflict(10). Violence is used to ensure one's will is achieved, particularly when loss of control is at risk(10). Another aspect of violent civil conflict they discuss is its organization. Organized violence is defined as “the inter-human infliction of significant, avoidable pain and suffering by an organized group according to a declared or implied strategy and/or system of ideas and attitudes(10).”

The research and analysis of the consequences of conflict from a public health perspective is vital. Coupland (2005) explains the need well by writing that “analyzing armed violence from a health perspective carries the advantage that it permits generic and objective consideration of the effects of armed violence on its victims – frequently a consideration driven by emotion...(11).” He also writes that since the WHO definition of health “encompasses a state of complete physical, mental and social well-being, it is both logical and intuitive that people's security, whether viewed collectively or at an individual level is necessary but not sufficient for their health(12).”

For the purposes of this thesis, the most relevant definition of violent civil conflict is the one offered by Ghobarah, Huth and Russett (2004) (5). The 2007-2008 post-election violence challenged the sovereignty of an internationally recognized state, Kenya; occurred within Kenya's boundaries and resulted in between 1,133 and 1,200 deaths from December 27, 2007 to February 28, 2008, which is less than a year's time. Looking at this definition from a public health perspective allows for a unique analysis of the impacts of violent civil conflict on health outcomes.

3.0 METHODS

This thesis' first aim was to gain an understanding of the health-conflict field, which was completed through a comprehensive literature review. The literature review began with the bibliography section of the article "Protection of health care in armed and civil conflict: Opportunities for breakthroughs" by Leonard Rubenstein (2012)(13). The key words used during the examination of the bibliography included healthcare, armed conflict and civil conflict. After compiling a couple of articles through citation chaining, a thorough search of the grey literature published by the ICRC was conducted. The author focused on studies and grey literature that were health-oriented, in that they started with health outcomes and moved backwards, rather than beginning with conflict and ending with health outcomes. Following this, Barbara Folb, MM, MLS, MPH; the Public Health Informationist for the Graduate School of Public Health, was consulted. With her help, comprehensive searches of PubMed, Ovid and Embase took place.

The key words searched for in PubMed were: violence, conflict and health in Africa; violence; war OR civil conflict; war OR civil conflict and health facilities; human rights abuses OR war crimes; human rights abuses OR war crimes and health personnel and health facilities; assaults; assaults and health personnel and health facilities; war OR civil conflict, assaults, health personnel and health facilities; violence and health personnel and health facilities; war OR civil conflict and violence and health personnel and health facilities. Mesh terms included human

rights abuses, war crimes, health personnel and health facilities. After Ms. Folb concluded that there was not a lot of literature being pulled up by PubMed, citation chaining was started anew.

After reading 28 articles published in journals such as the *Lancet*, the *American Political Science Review*, *Conflict and Health*, *Social Science and Medicine*, the *Croatian Medical Journal*, *BMJ*, the *Journal of Acquired Immune Deficiency Syndromes*, *International Studies Quarterly*, *Annals of General Psychiatry*, the *American Journal of Tropical Medicine and Hygiene*, the *British Journal of Psychiatry*, the *Journal of Traumatic Stress*, *Prehospital and Disaster Medicine* and *PLOS Medicine*, the information was synthesized into models based on the four categories (economic and infrastructural, environmental, policy and social, (5, 6)) detailing the impacts of violent civil conflict. These models were then extrapolated to the specific case of Kenya and its post-election violence of 2007-2008.

Reading these articles informed the second literature review, which was necessary to gain an understanding of the health-conflict field's relationship to the 2007-2008 post-election violence in Kenya. The key words searched for in PubMed were: Kenya, violence, post-election violence, conflict and health. After collecting a handful of articles, citation chaining commenced. Citation chaining was done to such an extent for both literature reviews that articles already collected were being pulled up again. The author found two journal articles relating to the cholera outbreak, three articles relating to ART adherence, one article relating to birthweight and four articles relating to mental health issues such as PTSD.

To supplement the information of the post-election violence, a search of the *Daily Nation*, Kenya's most popular daily newspaper, and the *BBC* was done, resulting in two articles from the *Daily Nation* and three from the *BBC*. Reports issued by different departments within Kenya's government, including the Ministry of Public Health and Sanitation, the Ministry of

Medical Services, the National Bureau of Statistics, the Commission on Revenue Allocation, the Ministry of National Planning and Development and Parliament were collected. Grey literature was also obtained from Mercy Corps, the Hague Justice Portal, the Open Society Justice Initiative, the International Crisis Group, and the CSIS Global Health Policy Center.

The studies detailing the four health outcomes of Kenya's 2007-2008 post-election violence (a cholera outbreak, low birthweight, interruptions in ART adherence and mental health issues such as Posttraumatic Stress Disorder) were chosen due to the frequency in which they appeared in PubMed's search results. However, more importantly, they are specific examples of several of the four categories detailing the impacts of violent civil conflict. The cholera outbreak, low birthweight and mental health issues, including PTSD, are health outcomes related to the social impact of violent civil conflict. Interruptions in ART adherence and the cholera outbreak are health outcomes related to the infrastructural impacts. As more studies become available, health outcomes will be linked to the environmental and policy impacts of the 2007-2008 post-election violence in Kenya.

The methodologies of these studies included a case-control study(14), a mixed methods analysis that included a retrospective cohort analysis and key informant interview to complement the quantitative data(15), a retrospective cohort study(16), an analysis of the data from the 2008-2009 Kenyan Demographic and Health Survey regarding all children born 15 months before and after the beginning of the 2007-2008 post-election violence(17), a retrospective assessment using two-stage cluster sampling(18) and a retrospective assessment using a random sample generated from a demographic surveillance system database(19).

Kenya held presidential elections on March 4, 2013 and during its run-up, the international community, as well as Kenyan citizens, was waiting to see if violence would break

out again. Due to the author's Peace Corps service in Western Kenya from 2010 until 2012, this topic was of extra interest. Seeing the burned out buildings in Kakamega that still needed repair and feeling the tensions in her community when the International Criminal Court (ICC) brought charges against the original "Ocampo Six(20)" brought home the reality of the post-election violence's impact.

4.0 AIM ONE RESULTS: LITERATURE REVIEW

4.1 THE IMPACTS OF VIOLENT CIVIL CONFLICT ON HEALTH OUTCOMES

The most immediate and direct impact of violent civil conflict on health is death(9, 10, 21), which is measured quantitatively and qualitatively(2, 10). However, the indirect effect of conflict on mortality is defined as “the number of deaths following a war minus the number of deaths that would have occurred in the same period if the war had not occurred(2).” The previous working ratio of indirect to direct conflict deaths was 9:1, emphasizing the complexity of violent civil conflict(2). However, Murray, King, Lopez, Tomijima and Krug (2002) found that this ratio had no actual basis(2), therefore this is an example of the erroneous use of numbers in the health-conflict field. However, this is a distinct problem from that of unreliable data, which will be discussed further in the following section. Nevertheless, most indirect deaths from violent civil conflict are concentrated in the civilian population(5). These numbers are higher in groups that suffered discrimination pre-violent civil conflict, as they are likely to still be marginalized, resulting in more barriers to accessing health services(3).

Levy (2002) (21) describes a different set of consequences related to violent civil conflict that are considered to be:

“a) Long-term effects [including] physical disabilities to...psychological trauma; b) the social fabric of society [is damaged to the extent that] all activities of normal life are disrupted; c) the infrastructure of society...are destroyed...; d) war displaces people, making them refugees...or internally displaced persons...; e) the environment [is

damaged]; f) war and the preparation for war, drains human, financial, and other resources away from more productive activities; and g) war fosters a culture of violence.” (p.114-115).

These disabilities can lead to long-term health needs, which are often left unmet in the aftermath of violent civil conflict because the health sector has deteriorated(5, 9). Morbidity due to communicable diseases such as cholera and HIV also increases, while the psychological stress of violent civil conflict can result in depression or post-traumatic stress disorder (PTSD)(3, 9, 22). Negative reproductive health outcomes are also possible, including an increased number of stillbirths, prematurity and low birth-weight(9).

Quantifying these health outcomes depend on a country’s civil registration system(2). However as basic health services fail to function properly during times of violent civil conflict, cause of death data is inaccurate, if recorded at all. Since violent civil conflict tends to be highly politicized both within countries and without, it is easy for data to be misrepresented(2, 23). Nevertheless, available data can divide the impacts of violent civil conflict on health outcomes into four categories: infrastructural and economic, environmental, policy and social(5, 6, 21). These impacts are detailed below in four figures developed by the author, which are read left to right.

4.1.1 Economic and Infrastructural Impacts of Violent Civil Conflict

The first category describes the economic and infrastructural impacts of violent civil conflict (Figure 1).

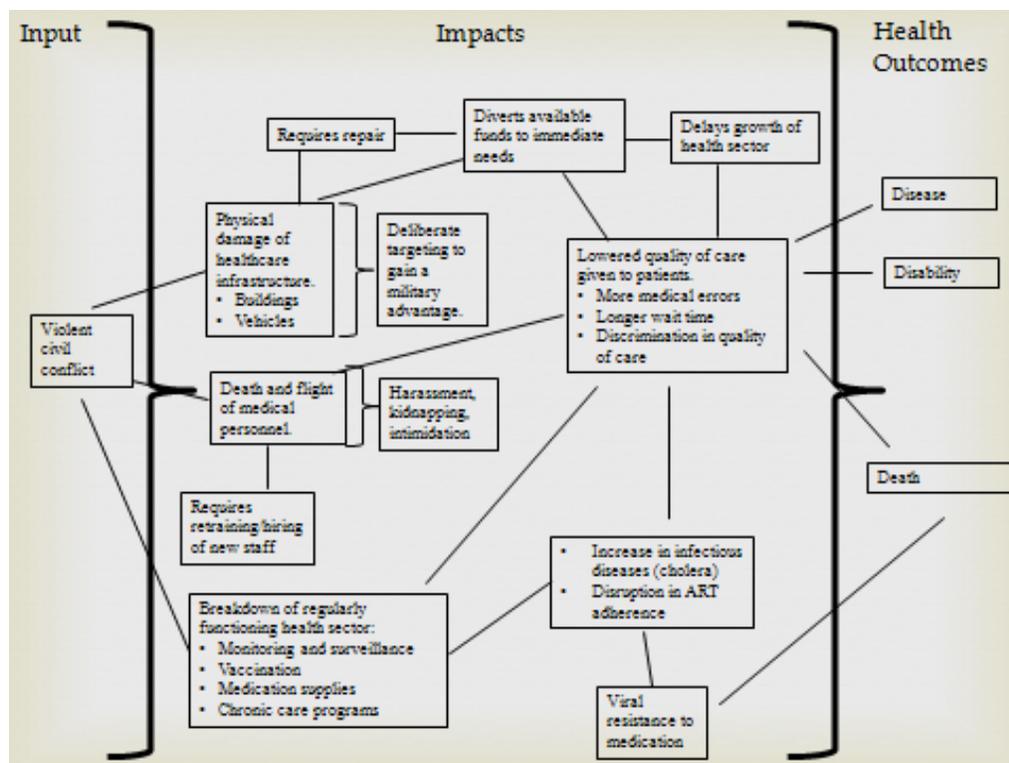


Figure 1 - Economic and Infrastructural Impacts of Violent Civil Conflict

Health is impacted by the damage done to a country’s healthcare infrastructure(5, 10, 24). This includes physical damage to hospitals, clinics, and other medical facilities(5, 9, 10, 24-26); the death of medical personnel(9, 10, 24) and their flight to safer areas(10, 24). Other impediments to a functioning health sector include diminished training of staff, loss of continuous and complementary health care, reduction in monitoring and surveillance, lack of supplies and reduced infectious disease control(3, 10, 24). These impediments lead to lowered quality of care for patients and more medical errors leading to death or disability.

According to the International Committee of the Red Cross (ICRC) and Rubenstein and Bittle (2010), there are four trends in violence against healthcare: violence against health care facilities, violence against the wounded and sick, violence against health care personnel and violence against medical vehicles(24, 27). Violence against healthcare facilities falls into four categories: deliberate targeting in order to gain military advantage; deliberate targeting for

political, religious or ethnic reasons; unintentional attacks, i.e. collateral damage; and the looting of drugs and medical supplies(24, 27). Violence against the wounded and sick include blocking and interfering with medical access, discrimination in quality of care and discontinuation of care(24, 26). Violence against health care personnel includes kidnapping, killing, harassment, intimidation and arrest(24, 26), often resulting in their emigration(13). Unfortunately these types of attacks often occur in countries with the lowest number of health care workers(13). Violence against medical vehicles include interference with the vehicle's transport, theft and tampering(24, 26). Medical vehicles include ambulances, aircraft and vehicles transporting medical supplies or equipment(24, 26).

Following the end of the violent civil conflict, existing health infrastructure has to be repaired, further diverting resources to immediate need instead of future growth and development(3, 25). Violent civil conflict can have a five-year negative impact on economic growth(3), leading to inadequate funding for public health programs while hospital services are restored, medical personnel are trained and buildings are repaired(3, 8, 21, 25). Training medical personnel is a long-term commitment, which means in the short-term, patients will encounter a shortage of trained professionals. All of this combines to leave populations vulnerable to infectious diseases and other negative health outcomes because there are no comprehensive public health programs conducting monitoring and evaluation, surveillance or outreach campaigns(3, 8, 21, 25).

Health is also impacted by a loss of funding during times of violent civil conflict(3, 5, 8, 10, 21, 25). However, it is important to note that there is no clear link showing that military funding during times of violent civil conflict would necessarily have gone to the health sector if there was no conflict(25). Nevertheless during violent civil conflict, there are fewer resources

available and public health prevention is often put on the back burner, making it more difficult to meet emerging health challenges(3, 5, 21). These challenges include an increased number of epidemics due to the large-scale movement of civilians, soldiers and other combatants(3-5, 21). Instead of focusing on programs such as immunization campaigns and mobile voluntary testing and counseling, attention is turned towards curative care for injured civilians and combatants(3, 10, 25). This reprioritization of health weakens any attempt to change health policy dealing with non-conflict related matters(9, 25).

4.1.2 Environmental Impacts of Violent Civil Conflict

The second category describes the environmental impacts of violent civil conflict (Figure 2).

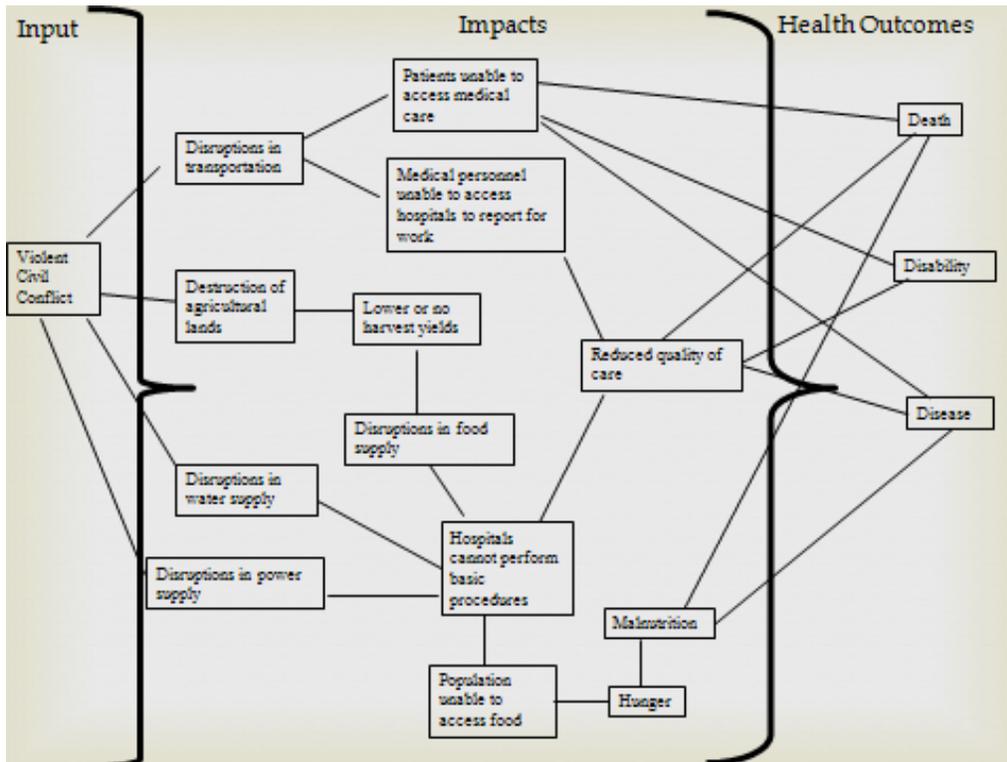


Figure 2 - Environmental Impacts of Violent Civil Conflict

Health is impacted by disruptions in transportation, the water and food supply and power grids(3-5, 10, 21, 22, 25). When transportation is interrupted, patients are unable to access medical care(3, 10, 12, 24, 26) and medical personnel are unable to report for duty(3, 5, 10, 24). Without electricity or water, hospitals are unable to perform basic functions, lowering quality of care(3, 12, 21, 26), which can result in death, disability or disease. When the food supply is interrupted due to transportation stoppages, individuals are unable to access food, which results in hunger(10). If left unresolved, hunger may become malnutrition(5, 10, 22, 25). In addition, the destruction of agricultural lands leads to lower harvest yields, which could push the population towards famine(21), making an already volatile situation worse.

4.1.3 Policy Impacts of Violent Civil Conflict

The third category describes the policy impacts of violent civil conflict (Figure 3).

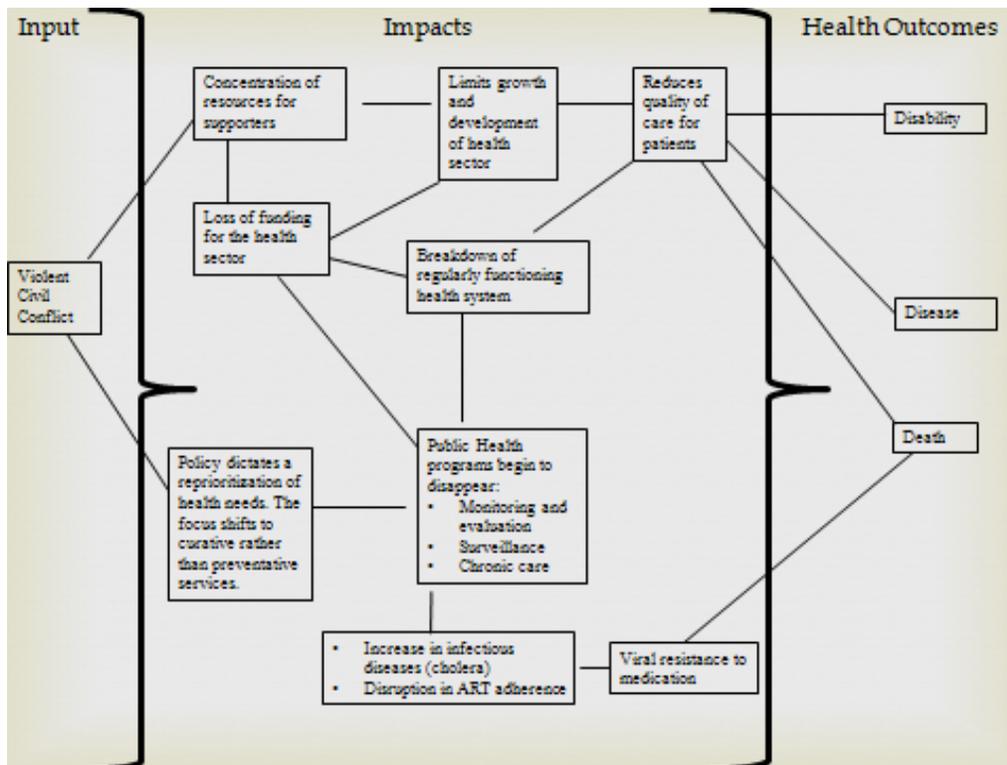


Figure 3 - Policy Impacts of Violent Civil Conflict

Health outcomes “reflect the political competition among groups over investment and resource decisions regarding the level and distribution of health services(3).” In poorer countries, much of the population lives in rural areas with limited access to health care, including preventative services and campaigns(3). Due to the complexities of violent civil conflict, these populations are more vulnerable to increased risk of death, disease and disability(3). Those in charge of the political system are more likely to focus resources on their supporters rather than on the whole population(3), further limiting the growth and development of the health sector(25). This lowers the quality of care for patients and contributes to the breakdown of the regularly functioning health system. Those excluded tend to be in more need of public health services due to their

myriad of risk factors, among them poverty, illiteracy, and financial insecurity(3). In addition, violent civil conflict can cause a reprioritization of health needs from preventative to curative care, resulting in a reduction of public health programs, i.e. monitoring and evaluation, surveillance and chronic care. All of these factors lead to death, disability and disease.

4.1.4 Social Impacts of Violent Civil Conflict

The fourth category describes the social impacts of violent civil conflict (Figure 4).

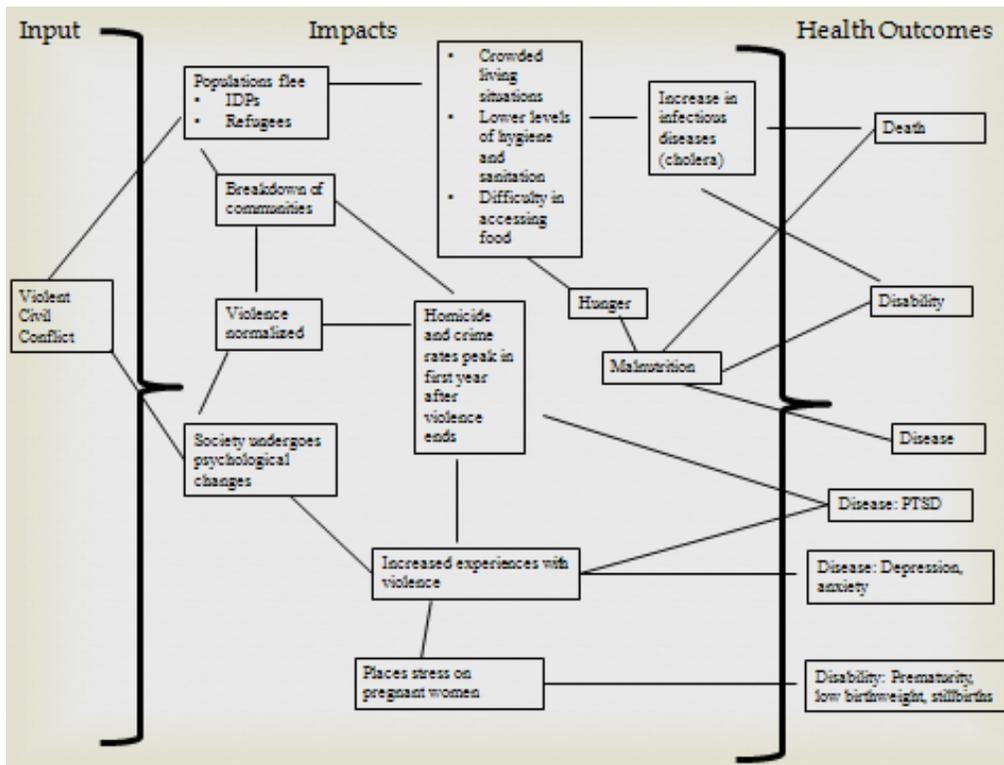


Figure 4 - Social Impacts of Violent Civil Conflict

Social changes due to violent civil conflict also impact health outcomes. In some cases, portions of the population are forced to flee, either to other countries, becoming refugees; or within their own country, becoming internally displaced persons (IDPs). Both refugees and IDPs are at

higher risk of disease and death due to crowded living situations, low levels of sanitation, unclean water sources and malnutrition.

Social changes also reflect health outcomes. Violent civil conflict dramatically and sometimes irreparably damages societies(3, 5, 8). Violent civil conflict based on pre-existing ethnic tensions can lead to systematic discrimination that reduces health outcomes and access to health care services(3, 5). Homicide and crime rates rise during this time, peaking in the first year after violent civil conflict's end(3). This is in part due to the psychological transformations(3) societies undergo that normalize violence and killing(8), which cannot be automatically switched off when conflict is resolved. Among the most common perpetrators are young men(3), who then suffer psychological conditions that are often left untreated due to the limited functionality of the healthcare system.

Violent civil conflict results in death, disease and disability. A reprioritization of health policy, a diversion of funds away from the health sector and the normalization of violence within a society also impacts health outcomes. From the available literature, it is possible to create four categories detailing the impacts of violent civil on health outcomes: economic and infrastructural, environmental, policy and social(5, 6). These four categories are of particular importance to Kenya and its 2007-2008 post-election violence because it allows for the selection of specific health outcomes (a cholera outbreak, low birthweight, interruptions in ART adherence and mental health issues such as PTSD) to represent the larger analytical framework.

4.2 POPULATION LEVEL MEASURES AND THEIR LIMITATIONS

The most common population level measures of health outcomes in the health-conflict field are Health-Adjusted Life Expectancy (HALE) and Disability-Adjusted Life-Years (DALYs). HALE, simply put, measures the quality of an individual's health throughout their life. DALYs, meanwhile, measure the overall disease burden, expressed as the number of years lost due to disease, disability or early death. The Dirty War Index (DWI), while not measuring health-outcomes, is a useful tool for “linking international humanitarian law to make public health outcomes directly relevant to prevention, monitoring, and humanitarian intervention for the moderation of war's effects(23).” Retrospective surveys, census data, eyewitness accounts and media reporting while the sources of data for the above mentioned measures, have their own set of limitations that need to be considered.

4.2.1 Health-Adjusted Life Expectancy (HALE)

One way to measure health outcomes at the population level is described by Iqbal (2006) and Ghobarah, Huth and Russett (2003): HALE(5, 8) is a summary measure of health, previously known as Disability-Adjusted Life Expectancy (DALE)(5). HALE “subtracts the number of years an individual is expected to spend with a disability as a burden of disease from the total life expectancy at birth(5)” and is then expressed as a single number using years of life as the unit(5, 8). Since the measure is so information-sensitive, it relies heavily on vital registration of births and deaths as well as health surveys of death, disease and disability by age and gender(8). Statistical modeling is used when data is missing, resulting in standardization that allows for cross-country comparisons(8).

In his study, Iqbal (2003) looks at changes in HALE from 1990 to 2001 in all member states of WHO(5), using the independent variable conflict, which is broken down into “major” verses “intermediate war.” Major war results in at least 1,000 battle deaths in one year while intermediate war has at least 25 deaths in one year, but more than 1,000 deaths in the conflict’s history(5). Iqbal (2003) found that violent civil conflict alone may not significantly impact long-term health outcomes, but as the number of conflicts increase, outcomes decline(5) as every additional conflict subtracts seven months off a country’s HALE(5). Infrastructure destruction, population movement and the diversion of resources away from the health sector(5) are all factors that contribute to a declining HALE. Additionally, Iqbal (2003) concluded that there is a significant short-term impact from violent civil conflict particularly when it fits the definition of major war(5). More access to international humanitarian assistance during times of violent civil conflict mitigates some of the long-term health consequences(5). However, long-term goals, such as rebuilding the health sector after violent civil conflict has ended, suffer.

Ghobarah, Huth and Russett (2004) also use HALE to measure health outcomes, but the authors were careful to not confuse the impact of violent civil conflict with other economic and political variables(8). They ensured that their main independent variable, death from violent civil conflict, was not a proxy for other conditions that cause violent civil conflict by controlling for a variety of factors(8). In their study, the intensity and duration of conflict is particularly relevant as is how ethnicity affects health spending (8). Their results showed that countries involved in violent civil conflicts in the 1990s suffered a loss of healthy life across seven of the age-gender groups. At its worst, seven years of healthy life were lost per 100 people for every 100 civil conflict deaths(8).

HALE does have some limitations that must be considered when it is being used. First and foremost, it is an information-intensive process that requires vital registration data for births and deaths, as well as health surveys of death, disease and disability by age and gender(8). When this information is missing, statistical models are necessary to estimate outcomes. While this is not ideal, it is recognized by WHO and international agencies as the best available option for dealing with missing data. Since WHO only began to collect data in 1999, information for previous years is unavailable(8), limiting the scope of analysis for previous years.

4.2.2 Disability-Adjusted Life-Years (DALYs)

DALYs, or Disability-Adjusted Life-Years, are another way to measure health outcomes. DALYs “contain detailed information on 23 major diseases and conditions on categories of the population distinguished by gender and five age groups(3).” The age groups are 0-4, 5-14, 15-44, 45-59 and 60 and above(8). DALYs “reflect the life years lost due to deaths from a particular condition contracted during the year plus the expected disability to be incurred by other people who suffered from the same condition in that same year(8).” According to WHO, DALYs measure “the gap between current health status and an ideal health situation where the entire population lives to an advanced age, free of disease and disability(28).”

Ghobarah, Huth and Russett (2003) look at the impact of violent civil conflict on the incidence of death and disability by specific infectious disease(3). The authors find that an additional 8.01 million DALYs were lost worldwide in 1999 due the impact of violent civil conflict between 1991 and 1997(3). They also hypothesize that “more DALYs are lost with the occurrence and increasing severity of civil conflicts within a country(3).” This is partially due to the displacement of large segments of the population, who are more susceptible to infectious

diseases, especially if they settle in IDP or refugee camps. In some countries that experience violent civil conflict, the crude mortality rates among refugees is five to 12 times higher than average(3). However, it is important to note that on average, tropical countries lose more DALYs from infectious diseases due to regular background conditions(3).

A country undergoing violent civil conflict is strongly associated with an increased loss of healthy life in all age categories except for the elderly. For example, girls under five living in a country in 1999 that had experienced violent civil conflict in the preceding few years, lost on average 28.5 more DALYs per 100 girls compared to a country with no violent civil conflict experiences(3).

4.2.3 The Dirty War Index (DWI)

The Dirty War Index, or DWI, is “a data-driven public health tool that identifies rates of particularly undesirable or prohibited, i.e. “dirty,” outcomes inflicted on populations during war (i.e. civilian death)(23).” DWI is unique because it incorporates laws of war, i.e. “international humanitarian laws and customary standards regarding the treatment of civilians and combatants(23)” into its data collection method, which expands its interpretation, but only if cause of death information is available(23). DWI is calculated as follows: (Number of “dirty,” i.e., undesirable or prohibited cases/Total number of cases) x 100(23). An example of a DWI ratio is civilian mortality to combatant mortality, calculated as follows: (Number of civilians killed/Total number of civilians and combatants killed) x 100(23).

Since DWIs are ratios, it is easy to compare them by country, by weapon use and by type of death, etc.(23). Military commanders can also evaluate loss of life from accepted methods of war, i.e. bombings. DWIs range from 0 (the best) to 100 (the worst). Hicks and Spagat (2008)

note that DWIs analyze whether the practice of war is just and not if the reason for war is just(23). For this reason, a DWI of three should not be ignored when compared to a DWI of 50 as both measure undesirable outcomes(23). As a concluding note the authors specify that DWIs “only recognize the crucial matter of outcomes: the killing, injury, or abuse of individuals and populations who should be protected from war(23).”

DWIs add a humanitarian and moral aspect to the scientific research methods of standard conflict research, facilitating a broader discussion base when looking at the impact of violent civil conflict on health outcomes. Additionally DWIs increase scrutiny on and accountability of those committing dirty war acts(11). Sondorp (2008) supports using DWIs because they uniquely express “public health findings as a ratio, in combination with a link to a specific international humanitarian law(29).” As such, DWIs fill the gap that previously existed between public health quantitative data and its use by human rights agencies and policymakers(29).

DWI, while an innovative tool, has several limitations that need to be considered. Before interpreting a DWI, it is necessary to discover the ratio’s source. Inaccurate sources create inaccurate DWIs, which could have political ramifications depending on its importance. Another limitation is data availability. Data from severe conflict areas are likely to be both scarce and unreliable, preventing DWIs from being fully utilized. Taback (2008) suggests that selection bias, missing data and censoring are other limitations(30). Since the data collected are from secondary sources such as media reports and hospital records, they are likely not as accurate as data from primary sources(30), resulting in inaccurate DWIs. Missing data can be modeled, but censoring can lead to underreporting. These factors could cast doubt on the appropriateness of using DWIs for policy and legal purposes(30).

4.2.4 Sources of Data for HALE, DALYs and DWI

Retrospective surveys, census data, eyewitness accounts and media reporting are among the sources of data for HALE, DALYs and DWI. Retrospective surveys can be administered to assess sibling, parental or spousal survival(2). Among the limitations when using retrospective surveys is recall bias. Under the stress of fleeing, IDPs and refugees may remember conditions and causes of death differently, inadvertently skewing data. However, it is possible that participants are deliberately prevaricating in order to protect themselves or family members(4). Retrospective surveys are also costly, time-consuming and require intensive training and experience(4). For these reasons, it is extremely difficult to undertake one in an insecure setting. Survey teams and participants are also at risk from the general atmosphere of insecurity, as well as from reprisals by government or opposition forces(4).

Data can be also be collected from official government reports, such as census(2). However health information systems, such as civil registration, often cease to function(2) during times of violent civil conflict, necessitating a reliance on estimates, eyewitness accounts and media reporting. These sources of information often inaccurate, with eyewitness' accounts affected by the stress of the situation and the accuracy of media reporting dependent on the outlet and intended audience. This uncertainty is reflected in the ratio of people injured to killed in modern conflicts, which ranges from 1.9 to 13.0(2).

Despite this, these are often the best available sources of information, especially when researchers have difficulty accessing conflict zones. HALE and DALY are internationally recognized health outcome measurements used by international organizations such as WHO and the World Bank. Due to these organizations' credibility, the use of HALE and DALY are unlikely to be challenged in the future. Therefore studies using these measurements are valid as

long as their limitations are mentioned by researchers. Since DWIs are used to measure the undesired “dirty” outcomes during times of violent civil conflict(23) and place a value judgment on the ratios, they are unlikely to gain international recognition and use. However, they are still a useful tool for humanitarian agencies and lawmakers looking to incorporate a way to combine a public health perspective with international customary practice.

4.3 EXISTING GAPS IN DATA

A crucial gap in the current health-conflict literature is the lack of new research(13, 26). Mortality surveys have rarely been done for modern conflicts(29) resulting in reliance on faulty or outdated data. This is due to the difficulty of conducting on the ground research during times of conflict(4, 10, 13, 26). As a result, the role of conflict epidemiologists is becoming increasingly important. However by using retrospectively administered surveys among clearly delineated samples of IDPs and refugees, a lack of information about conditions that forced dislocation occurs(4). This can be remedied by including survey questions addressing this gap. Conflict epidemiologists also fill the gap that exists in the humanitarian literature on the reporting of mortality due to conflict, by providing “rigorously assembled scientific data(4),” which then serves as an evidence base for policymaking. Zwi (2004) also recognizes the gap between evidence and policy(9). Since the health-conflict field is relatively new, there has been little effective collaboration between disciplines to produce sound practices and solutions. Collecting both quantitative and qualitative data will pave the way for “better practice(9).” Qualitative data will help express the voice of those negatively impacted(12, 31), while quantitative data will give numbers about them.

Orbinski, Beyrer and Singh (2007) detail two current reporting models to record human rights abuses(31), which if applied to conflict epidemiology could be very helpful. In the first of these, the state-reportage model, organizations report directly to the government(31). However, these reports can be ignored. In the second model, wide-dissemination, agencies report to the international community as well as governments in order to raise accountability(31). These models provide a good framework for reporting, but need scientific evidence to be credible. For this reason it is very important for conflict epidemiologists, public health researchers and health workers collaborate.

There is currently no systematic way to track types of attacks on hospitals(27), limiting data analysis that would support emergency preparedness. In 2009, WHO launched a program to ensure hospitals' safety during violent civil conflict, but did not require attacks to be tracked(27), missing a valuable opportunity. Due to the unavailability of data, there has not been a systematic review of targeted attacks in over 15 years(27). However in 2011, the ICRC published a report detailing types of violence, including the targeting of hospitals, but only on the 16 countries in which they operate(13, 26). The report's methodology is weak due to an overreliance on media and humanitarian agencies, but it successfully raised awareness about the difficulties hospitals face(13).

This lack of data creates an atmosphere in which it is difficult to hold governments or international agencies accountable for ignoring short and long-term damage to the health sector. This also means that this is not a priority topic in the international arena(12, 13). Without this data, there is no way to provide evidence showing that security is a prerequisite to health(12). Currently available reports do not provide enough information on the scope of the problem, because they underestimate the number of attacks(13, 27).

While not an international priority in and of itself, when children become involved there are certain protections in place. The United Nations Children’s Fund (UNICEF) has recognized that children are unfairly impacted by violent civil conflict, particularly when it comes to accessing hospitals for medical care. As such, the Office of the Special Representative of the Secretary-General for Children and Armed Conflict lists six grave violations(13, 32), among which are attacks against schools and hospitals. Grave Violation Five states that “parties to a conflict must not attack schools or hospitals, or other education or medical facilities ordinarily used by children(32).” Those who ignore these Six Grave Violations may find themselves facing crimes against humanity or war crimes(32). The 4th Geneva Convention, Article 48, Additional Protocol I provides this protection and gives the International Criminal Court (ICC) jurisdiction to try these crimes(32). These violations are taken seriously because they obstruct the right of children to attain the “highest...standard of physical and mental health(32).”

That this is considered a grave violation is reflected in the April 2011 Report by the Secretary-General, Agenda item 64 (a) “Promotion and protection of the rights of children” which states “hospitals have also borne the brunt of conflicts around the world...leading to the disruption of the delivery of health services and/or closure of hospitals(33).” The Secretary General suggested “expanding the gateway to the annexes of my report to include parties that attack schools and/or hospitals(33),” which if actualized, paves the way for more in-depth data collection by conflict epidemiologists, humanitarian agencies and public health researchers.

5.0 AIM TWO RESULTS: KENYA CASE STUDY

5.1 INTRODUCTION

Kenya is a geographically, ethnically, linguistically and meteorologically diverse country. It is a country of contradictions: laughter and anger, efficiency and inefficiency and life and death. The current population is approximately 40.5 million people with 22 percent living in urban areas(34, 35). There are approximately 42 tribes in Kenya, of which the largest are the Kikuyu (22 percent), Luhya (14 percent), Luo (13 percent) and Kalenjin (12 percent)(34, 35). While the official languages are Kiswahili and English, there are a variety of dialects and sub-dialects spoken by the different tribes. The main religions are Protestantism (47 percent), Roman Catholicism (23 percent) and Islam (11 percent)(34, 35). Kenyans take religion very seriously with Sundays devoted entirely to church-going and prayer.

The majority of the land in Kenya is arid or semi-arid with only 20 percent arable(35). The country is divided into lowlands and highlands with varying climates(35). Generally speaking there are two periods of rainfall interspersed with dry seasons; however, this has been changing over the past couple of years(36). Notable physical features include the Maasai Mara, Mount Kenya, the Great Rift Valley, Lake Victoria and Lake Nakuru. The capitol, Nairobi, is the largest city followed by Mombasa and Nakuru(37).

Kenya's main exports are tea, horticultural products and coffee and its largest trading partners are Uganda, Rwanda and the Netherlands(34). The largest contributors to its GDP are agriculture and forestry; wholesale and retail trade, repairs; and manufacturing(38). The currency is the Kenyan shilling, which experienced 14 percent inflation in consumer prices over the past year(34).

Following a spate of attacks on tourists in Coast Province in August and September 2011, Kenya invaded Somalia in October 2011 to prevent further attacks by Al Shabaab, a group that is funded by Al-Qaeda(34). Since the invasion, there have been numerous grenade attacks in public places, such as bus stops and nightclubs in Nairobi. Most of the attacks in Nairobi have occurred in Eastleigh, an area populated mainly by Somali immigrants. Similar attacks have occurred in Garissa, a city in North Eastern Province with a large Somali population.

5.2 THE STATE OF KENYA'S HEALTHCARE SYSTEM

As a result of the 2008 power-sharing agreement, the Ministry of Health was split into the Ministry of Public Health and Sanitation and the Ministry of Medical Services(39). Despite the split being purely political in order to give both parties equal representation in the government, it has had some administrative benefits. The two divisions, while complimentary, have two distinct ministerial strategic plans(39). The Ministry of Public Health and Sanitation's goal is to improve the efficiency of public health and sanitation programs, while embracing new innovations to foster economic growth(40), while The Ministry of Medical Services' goal is to reduce health inequities and improve health outcome indicators(41).

There is a shortage of trained healthcare professionals that is overburdening the healthcare system(42), leading to long wait time for patients; low morale among staff(43), which impacts quality of care; and a general lack of respect for patients. Facilities are chronically understaffed with physician density at 1.4 per 10,000 population and nursing and midwifery personnel density at 11.8 per 10,000 population(44). This highlights what Rubenstein (2012) writes: that the impact of violent civil conflict on healthcare services are felt most in countries that start out with lower numbers of health care workers(13).

Many doctors are going into private practice, leaving to work overseas or choosing to work in cities for more money at better facilities(43). Two separate strikes were held by doctors and nurses in December 2011 and March 2012 over low pay and too many patients. These strikes crippled the healthcare system and resulted in a high number of deaths because no one would treat patients. Overall, the shortage of trained healthcare professionals has an impact on mortality rates, particularly maternal, perinatal, neonatal and child.

5.3 A BRIEF POLITICAL HISTORY

Kenya achieved self-rule from England on June 1, 1963 and gained independence on December 12, 1963(35). These dates are public holidays known as Madaraka Day and Jamhuri Day respectively. Independence came after a prolonged armed resistance known as the Mau Mau Rebellion in the 1950s(35). Among the many political parties found in Kenya are PNU (Party of National Unity), formerly headed by Mwai Kibaki; KANU (The Kenya African National Union), formerly headed by Uhuru Kenyatta; and ODM (The Orange Democratic Movement), headed by Raila Odinga(45). Support for these parties tends to be determined by tribe: PNU and KANU

have strong Kikuyu bases and ODM is traditionally Luo. The March 4, 2013 presidential elections further complicated matters because they caused a massive reorganization of parties and alliances.

Kenya was divided into eight provinces and 158 districts up until March 5, 2013, when the system devolved into 47 counties(46), following the mandate set out in the new constitution ratified on August 27, 2010. The constitution also abolishes the position of prime minister and establishes a bicameral legislature(28). This devolution will benefit Kenya in the long run because it streamlines the government hierarchy into only two divisions: the national government and the county government, instead of the previous five. The goal of having only two divisions is to eliminate redundancies and increase efficiency.

5.4 THE 2007-2008 POST-ELECTION VIOLENCE AND ITS AFTERMATH

Kenya has long been considered a bastion of democracy in East Africa, with the United Nations even locating one of their four main branches in Nairobi. However, this fell apart after the 2007 presidential elections. On December 27, 2007, Kenya held presidential elections with two forerunners – Raila Odinga of ODM and incumbent President Mwai Kibaki of PNU. Odinga lead by one million votes as the count concluded, but a few hours later, President Kibaki was declared the winner(47). Allegations of election fraud led to violent clashes throughout Kenya from December 27, 2007 until February 28, 2008, when Kofi Annan brokered a power-sharing deal between ODM and PNU(47). During this time between 1,133 and 1,200 people were killed; 3,561 were injured and approximately 600,000 were internally displaced(34, 47, 48). As of February 2013, there were still 100,000 IDPs due to the post-election violence(49)

No discussion of the post-election violence is complete without an understanding of the ICC trial and its defendants. In February 2008, the Kenyan Government established the Commission of Inquiry on Post-Election Violence (CIPEV), informally known as the Waki Commission after the Court of Appeals chair, Judge Philip Waki(50). The Waki Commission published its findings in October 2008, stating that if the government failed to establish a tribunal comprised of national and international judges to investigate and prosecute the responsible parties of the post-election violence within six months, the findings would be given to the ICC(47, 51). In February 2009, the government vetoed a bill establishing a local tribunal and the case was handed over to the ICC in July 2009(47, 51).

The three defendants in the two cases are Uhuru Kenyatta, William Ruto and Joshua Arap Sang(52). Charges were confirmed against these three by Pre-Trial Chamber II in January 2012(52). Uhuru Kenyatta, the son of Kenya's first president Jomo Kenyatta, served as Deputy Prime Minister and Minister of Finance under President Mwai Kibaki(52). He is an alleged "indirect co-perpetrator" who is charged with "crimes against humanity of murder, forcible transfer, rape, persecution and other inhumane acts(52)." Kenyatta, a Kikuyu, is alleged to have directed the Kikuyu-led gang known as 'Mungiki' to attack ODM supporters(52). William Ruto, the Member of Parliament from Eldoret and former senior member of ODM, is charged with the same crimes. He allegedly prepared a plan of violence against PNU supporters a year before the elections took place and executed it through the assistance of Joshua Arap Sang(52). Sang, a radio host in Eldoret with KASS FM at the time of the 2007 elections, is charged with contributing to "crimes against humanity of murder, forcible transfer and persecution(52)." He did this by sharing coded messages about times and locations of attacks in Nandi to ODM supporters via his radio show "Lene Emet(52, 53)." On March 11, 2013 charges were dropped

against Francis Muthaura, originally one of the four defendants, by the ICC for lack of evidence(54).

In 2012, Uhuru Kenyatta and William Ruto formed the Jubilee Coalition to run for political office(55), with the understanding that if they won, Kenyatta would serve as President and Ruto as Deputy President. Despite violating Kenya's newly ratified Constitution by maintaining his position as Deputy Prime Minister(56) while under investigation by the ICC, Kenyatta was allowed to run for president(57). On March 9, 2013, he was declared the winner of the presidential elections with 50.07 percent of the vote over his main rival Raila Odinga's 43 percent(58). When the ICC trial resumes in July 2013, Kenyatta will be a sitting president and Ruto his deputy, which blurs the lines of responsibility for the post-election violence.

As a result of the post-election violence, Kenya has suffered long-term economic, environmental, political, social impacts(59). The loss of revenue resulting from the closure of businesses during the post-election violence was a particularly devastating economic impact(59). Environmental impacts were felt through the destruction of land and property that led to food insecurity(59). Political divisions were turned aside as leaders were forced to work with each other in the new coalition government. In the name of unity, Kenyatta, a Kikuyu, joined forces with Ruto, a Kalenjin, and ran for president(55). However, there were murmurs that in the name of peace, freedom of speech was violated since no one wanted to be seen as instigating trouble. The social impacts were expressed through the erosion of the sense of community that Kenyans prided themselves on as neighbors turned on each other. Even as communities struggled to rebuild, pre-existing ethnic cleavages were deepened(59).

5.4.1 Post-Election Violence by Province

Among the most common forms of violence during this time was looting, burning of houses and shops, beatings, murder, forced circumcision and rape. Of the perpetrators, 70 percent were youth, but these youth accounted for only five percent of the total youth population(59). This is a hopeful statistic as it suggests violence was concentrated in a small segment of the population. The main provinces impacted by the post-election violence were Rift Valley, Nairobi, Coast, Nyanza and Western(60).

5.4.1.1 Rift Valley Province

Rift Valley Province was the site of some of the worst violence(59), due to the pre-existing ethnic tensions between the Kalenjins and Kikuyus. These tensions boiled over into attacks against neighbors and community members which included the gang raping of women and the killing of men with pangas (machetes)(61). Attacks were concentrated in Nakuru and Naivasha, damaging their local economies. Both are important economic hubs: Nakuru is one of the main transit points out of Kenya, while Naivasha is home to the cut flower industry that supplies Europe.

5.4.1.2 Nairobi

The violence in Nairobi was particularly well-organized, especially in Kibera, Nairobi's largest slum. Mungiki orchestrated attacks against Luos, Luyhas and Kalenjins, forcing them to leave behind their property in exchange for their lives(62). Joining the fray were the police, who actively took sides against those living in Kibera(62).

5.4.1.3 Coast Province

The majority of the violence in Coast Province was directed against the minority Kikuyu and Kisii communities, who supported PNU(62), as the majority of the Province's voters supported ODM. The tensions in Coast were also exacerbated by religion, as most inhabitants are Muslim with a minority Christian population.

5.4.1.4 Nyanza Province

During the post-election violence, Shikanga, Mutonga, Abade, Amwayi, Ope, Limo, Mintz, Quick, Breiman, and Feikin (2009) (14) report that Nyanza Province suffered from a

“lack of public transportation, multiple work stoppage “mass action” days, and impromptu roadblocks on rural roads, greatly complicating access to health facilities...Many staff in health facilities...who had left their posts to go to their home areas to vote and celebrate Christmas were unable to return. Health facility staff of rival ethnic backgrounds also fled their posts...out of concern for their personal safety. Health facilities experienced shortages in critical supplies during the months after the election...Staff and supply shortages were most acute in January and February during the height of the post-election violence, but persisted into March and April...” (p.1088)

5.4.1.5 Western Province

In Western, violence was concentrated in Mumias and Kakamega with large portions of both towns being razed and burned. Western is mainly occupied by the Luhya tribe, who had supported ODM; so it was natural they targeted the minority Kikuyu and Kisii tribes who had supported PNU(62). The violence against these minority tribes was different in that its main intent was to drive them out and destroy their property(62). In addition, government facilities were targeted in Western more so than in other Provinces(62).

5.5 POPULATION LEVEL HEALTH OUTCOMES

Recent studies have looked at the impact of the post-election violence on health outcomes among different populations, including people living with HIV/AIDS and IDPs. These populations were more susceptible to negative health outcomes, including a cholera outbreak(14), low birthweight(17), interruptions in ART adherence(15, 16) and mental health problems such as depression and PTSD(18, 19). These four health outcomes were chosen because they represent the larger analytical framework introduced in section four and offer the Kenyan healthcare sector important considerations for future periods of violent civil conflict.

The cholera outbreak, low birthweight and mental health issues such as PTSD are specific health outcomes of the social impact of violent civil conflict as represented in Figure 4 – Social Impacts of Violent Civil Conflict. The interruptions in ART Adherence and the cholera outbreak are specific health outcomes of the infrastructural impacts of violent civil conflict as represented in Figure 1 – Economic and Infrastructural Impacts of Violent Civil Conflict. In addition, these particular studies have certain methodological advantages despite their limitations that make their use all the more compelling.

5.5.1 Cholera

From January to April 2008, a cholera outbreak spread among ten districts in Nyanza Province. The two conditions necessary for a cholera outbreak were present at this time: first there were large geographic shifts in the population leading to cramped living quarters, which contributed to the breakdown in basic hygiene and sanitation. Secondly, cholera was already present in the population and the previous factors contributed to its rapid spread(63). The Kenya Ministry of

Health reported 790 confirmed cases and 53 deaths, with a Case Fatality Rate (CFR) of 6.7 percent(14). This is much higher than the 3.8 percent CFR recorded by WHO from 2000 to 2007(14). Shikanga, Mutonga, Abade, Amwayi, Ope, Limo Mintz, Quick, Breiman, and Feikin (2009) hypothesize that this discrepancy is due to the post-election violence(14). As the outbreak progressed (and as time moved further away from the onset of violence), the CFR declined until it reached 2.8 percent in April 2008(14).

Compounding the situation, were hospital staff and supply (including IV fluids and ORS) shortages. Shikanga, Mutonga, Abade, Amwayi, Ope, Limo, Mintz, Quick, Breiman, and Feikin (2009) write that “compared with optimal pre-election staff numbers, at the time of the case-patient admission, hospital administrators reported a 49% deficit in nurses, 46% deficit in clinical officers, and 33% deficit in medical officers(14).” These personnel shortages meant that hospitals were even more ill-equipped to deal with outbreaks of infectious diseases. This could be seen in the median wait time of 18 hours between admission and death(14). Additionally, underreporting of cholera deaths was highly likely due to the breakdown in “passive health facility-based surveillance(14).” Even in periods of non-violence, civil registration coverage of causes of death is between 25 and 49 percent(44), well below WHO standards for accurate reporting(64).

Considering these cholera deaths in larger analytical framework, it becomes clear that these deaths represent the infrastructural and social impacts of violent civil conflict on health outcomes. Using Figure 1 – Economic and Infrastructural Impacts of Violent Civil Conflict, it is possible to see that an increase in infectious diseases, i.e. cholera, is a result of the breakdown of the regularly functioning health sector. Circumstances in this particular cholera outbreak which may be attributed to the breakdown of the regularly functioning health sector are a shortage of

medical supplies, medical personnel and a reduction in monitoring and surveillance programs(14).

Using Figure 4 – Social Impacts of Violent Civil Conflict, it becomes apparent that this cholera outbreak was also a result of the crowded living situations and lowered levels of hygiene and sanitation due to large geographic shifts of the population(14). Since cholera was already present in the population, these cramped unsanitary conditions became the ideal breeding ground for the bacterium. Infectious disease outbreaks do not occur in a vacuum – they are heavily influenced by external factors, and in this case are reflective of the infrastructural and social impacts of violent civil conflict.

Shikanga, Mutonga, Abade, Amwayi, Ope, Limo Mintz, Quick, Breiman, and Feikin's 2009 study detailed the cholera outbreak in Western Kenya, which occurred after the 2007-2008 post-election violence(14). One of the methodological limitations of their case-control study is recall bias. The authors found that it was possible that participants recalled deaths more than survivals, contributing to their higher CFR(14). In addition, the authors did not directly ask participants if the post-election violence impacted their ability to access medical care(14). However, this was also a strength because cholera cases are often underreported, resulting in an underestimation of the burden of cholera mortality and morbidity(14). This fact was one of the justifications as to why this study was selected to serve as an example of the infrastructural and social impacts of violent civil conflict on health outcomes. The complexities involved in the cholera outbreak reflect the complexities in the linkages shown by Figures 1 and 4.

5.5.2 Low Birthweight

Women and children are the most vulnerable victims of violent civil conflict. Taking this a step further, Bell, Prata, Lahiff and Eskenazi (2012) hypothesize that the resulting social, economic and political disruptions of the 2007-2008 post-election violence are “associated with poorer health outcomes in the population, in particular, the health of pregnant women and their offspring(17).” Times of violent civil conflict can cause maternal stress, which is associated with reduced birthweight(17). Additionally, each “unit increase of prenatal life event stress was associated with” a 55g to 99g decrease in infant birthweight(17), suggesting that pregnant women who experienced the post-election violence would give birth to lower birthweight infants than usual.

This is an important consideration because currently eight percent of children born in Kenya suffer from low birthweight, which can lead to infant morbidity and mortality(35). This study is the first of its kind to “examine political violence and its association with poor pregnancy outcome(s)...(17).” These poor pregnancy outcomes were further impacted by the declining health sector and limited patient access to basic resources(17). The 2007-2008 post-election violence can be considered a “population-wide stressor(17)” with far-reaching implications for the future health of mothers and infants.

Bell, Prata, Lahiff and Eskenazi (2012) stated that “pregnancy during or immediately after the Kenyan Crisis will be associated with lower birthweight infants, particularly among infants of Kikuyu women living in the high conflict regions (i.e. Nairobi and Rift Valley)(17).” Using the 2008-2009 Kenyan Demographic and Health Survey (KDHS), Bell, Prata, Lahiff and Eskenazi (2012) compare all children born in the 15 months before and after the beginning of the post-election violence (i.e. December 27, 2007 to February 28, 2008) and categorize them as

“exposed” or “unexposed” infants(17). Being an “exposed” infant was significantly associated with having a lower than average birthweight than being an “unexposed” infant(17) was. The most significant association was found among Kikuyu women living in a high conflict region who were exposed during their second trimester(17). These women’s infants had average birthweight reductions of 564.4g(17).

These findings are important for the Kenyan government to consider as the country moves forward with future presidential elections. Despite a peace agreement in place, the social impacts of violent civil conflict can be experienced for months and years afterwards. As will be seen in the studies looking at ART adherence, having a contingency plan to focus care on the most vulnerable populations is essential to mitigate further detrimental health outcomes.

Referring back to the larger analytical framework represented by Figure 4 – Social Impacts of Violent Civil Conflict, it is possible to see low birthweight as a health outcome of the social impacts of violent civil conflict. Violent civil conflict causes society to undergo psychological changes, which results in the normalization of violence and leads to more experiences with violence. Exposure to violence puts added stress on pregnant women which can result in negative reproductive health outcomes, such as low birthweight, prematurity and stillbirths(17).

Bell, Prata, Lahiff and Eskenazi’s 2012 study of the linkages between civil unrest and birthweight uses the 2008-2009 Kenyan Demographic and Health Survey as the data source. Survey weights were used to account for the complex sampling design (17), allowing the authors to account for the exclusion bias of not including those without a recorded birthweight(17). This study is important because it the first to “investigate the association between political violence and the ‘stress/poor pregnancy outcome’ model in a low-resource setting(17).” For this reason,

this study was selected to highlight the social impacts of violent civil conflict on health outcomes.

5.5.3 Interruptions in ART Adherence

The next group of studies analyzes the impact of the post-election violence on ART adherence. The first two studies look at children because not much is known about how they are affected by violent civil conflict(15, 16). The acute and long-term health impacts are seen more prominently in children, as they are more susceptible to abandonment, malnutrition and communicable diseases(16). Children who are HIV positive are even more vulnerable to disruption in care as they can contract opportunistic infections or develop viral resistance to their medications(16). It is for these reasons that looking at the health of child populations can be indicative of adult health.

The first study in this group looks at clinic attendance and ART adherence in Western Kenya among children 14 years and younger(15). This study is important because it is among the first to examine the provision of care for HIV positive children during times of conflict(15). Vreeman, Nyandiko, Sang, Musick, Braitstein, and Wiehe (2009) examined a child population, numbering over 10,000, enrolled in USAID-Academic Model Providing Access to Healthcare (AMPATH) clinics using quantitative and qualitative measures. This included a retrospective cohort analysis and key informant interviews with healthcare providers(15). Of the 10,000; 2,585 were eligible because they had been seen in AMPATH's clinics between October 27 and December 25, 2007. They were then tracked to see if they attended their regularly scheduled appointments on a monthly basis from December 27, 2007 to April 15, 2008.

Surprisingly, 93 percent of patients returned to care; of those on ART, 95 percent returned(15). This may be partially due to AMPATH's handling of the chaotic situation: staff members met on a daily basis; they sent response teams into IDP camps to track patients; they publicized instructions for patients on reaching care and they established a 24-hour hotline to make this easier(15). Fear for personal safety was identified as the major barrier for those who did not return to the clinics(15). Also mentioned were a lack of resources and irregular transportation(15). Additionally, Vreeman, Nyandiko, Sang, Musick, Braitstein, and Wiehe (2009) suggest that most of these individuals belonged to targeted minority tribes(15). However, due to the sensitive nature of the post-election violence, the study did not identify these tribes(15).

Healthcare providers faced their own set of barriers in returning to work, including the inability to obtain food and having their homes burned. In some cases they were not "able to provide care in particular clinics because of the perceived risk to members of their ethnicity in that community and experiencing mistrust from patients because of the providers' ethnicity(15)." However due to AMPATH's trusted position within the community, AMPATH's clinics were able to re-open within a week of the violence's commencement(15).

The next study in this series looked at the same population, but added a third time period from April 16 to December 31, 2008 to assess the post-election violence's long-term impact(16). Yoder, Nyandiko, Vreeman, Ayaya, Gisore, Braitstein, et al. (2012) found that children on ART had lower levels of loss-to-follow-up (2.6 percent) compared to children not on ART (6.8 percent)(16). In this study, the minority tribe, identified as the Kikuyus, were found to have higher levels of loss-to-follow-up, regardless of whether they were on ART or not(16). Similar barriers discussed included a lack of resources and transportation(15, 16). However, AMPATH's

quick response the post-election violence may have mitigated negative long-term impacts since loss-to-follow-up levels were so low. This response is a good framework for other clinics to emulate.

The third study looked at disruptions in HIV treatment (i.e. ART) with a secondary focus on the population's mental health status due to the widespread post-election violence(18). The study took place ten weeks after the elections at twelve health facilities and three IDP camps in Rift Valley, Nyanza and Central Provinces, among adults ages 15 and above who were on ART or followed other chronic medication regimes(18). This resulted in a total of 1,294 patients and 336 IDPs(18) at 12 health facilities and nine IDP camps(18). These twelve health facilities served 22 percent of the national ART patient population(18), making for a representative sample.

Only nine percent of patients were found to have not returned to their routine health facility after the post-election violence(18). However, only 6.3 percent of patients with HIV did not return, which was not enough to be statistically significant(18). Rift Valley had the highest percent (25) report that they were unable to access care during the 2007-2008 post-election violence, possibly due to the higher rate of patient displacement (22 percent) there compared with the other two Provinces(18). One possible explanation for these low levels is that these health facilities, anticipating the business of the holidays and the election, had doctors gave out a two month supply of ART to patients instead of the regular one month(18).

In terms of mental health, few patients personally experienced violence (2.5-14 percent) but many had witnessed it (18-59 percent)(18). Those who experienced violence were significantly more likely to suffer from depression and anxiety symptoms, but having HIV was not found to be associated with these symptoms(18). IDPs had higher rates of personally

experiencing violence and subsequently higher rates of depression and anxiety symptoms, indicating a need for expanded access to treatment for mental health issues during times of violence(18).

These findings indicate that the 2007-2008 post-election violence had a short-lived negative impact on health services which translated into the disruption of only a few patients' ART adherence(18). These negative impacts were mitigated by the facilities' foresight in dispensing a two month supply of medication rather than the regular one month. AMPATH clinics did the same, resulting in lower rates of ART disruption among HIV positive children. These actions suggest that having a contingency plan in place for emergency situations will help prevent wide-spread medication interruptions(15, 16, 18).

Interruptions in ART adherence is a health outcome of the larger framework detailing the infrastructural impacts of violent civil conflict as shown in Figure 1. Violent civil conflict causes the regularly functioning health sector to break down, which includes shortages of medications and supplies and a reduction in chronic care programs, such as those supporting people living with HIV/AIDS.

These three studies all used a variation of the retrospective study design. As a result, they all share recall bias as one of their limitations. Vreeman, Nyandiko, Sang, Musick, Braitstein, and Wiehe's 2009 study identifies an underestimation of the number of patients receiving medical care due to faulty record keeping the first weeks after the 2007 election(15). While the small drop in ART adherence levels is a good sign of the strength of AMPATH's precautionary measures, the clinical implications of this drop are not well-known due to the lack of routine testing of viral loads and resistance(15). The results of this study are not particularly generalizable(15), but provide an in-depth analysis for the Kenyan Ministry of Public Health and

Sanitation and the Ministry of Medical Services. The follow-up study by Yoder, Nyandiko, Vreeman, Ayaya, Gisore, Braitstein, and Weihe (2012) faced the same limitations and had the same benefits to offer the two Ministries(16).

The 2009 study by Bamrah, Mbithi, Mermin, Boo, Bunnell, Sharif, and Cookson identified several additional limitations, which included the fact that the study took place later than initially anticipated(18). Additionally, information was not collected about those who had still not returned to health care facilities and the impact of the 2007-2008 post-election violence could have had significant effects at the district or sub-district level that were not represented at the provincial level(18). Since convenience sampling was used, the results are not generalizable(18), but are useful to the two Kenyan ministries of health.

5.5.4 Mental Health: Posttraumatic Stress Disorder (PTSD)

Witnessing or being a victim of the 2007-2008 post-election violence profoundly impacted individuals and Kenyan society as a whole. The causes and the effects of PTSD have been well-studied, but only in the context of developed countries. In lesser developed countries there is not a lot of research available. This is why Harder, Mutiso, Khasakhala, Burke and Ndeti's (2012) study is so important – it looks at the determinants of PTSD in the context of a lesser developed country, specifically Kenya(19). Studying the youth population is necessary because childhood and adolescent PTSD, if left untreated, can lead to chronic mental disorders and other adverse outcomes(19). Most cases of PTSD in Kenya are undiagnosed and untreated as there are only 31 registered psychologists and 14 psychiatrists for a population of over 40 million(34, 35, 65).

Not every traumatized youth will develop PTSP, but experiencing multiple traumas and being female increases a person's risk(19). Since the post-election violence was wide-spread, it

was possible to randomly select a youth population that had experienced high levels of violence, including rape, forced circumcision, and murder(19). Of the 552 youth selected, 47 percent had experienced more than five traumatic events; of these, 79 percent reported that at least one of the traumatic events had occurred during the post-election violence(19). The overall prevalence of PTSD in this sample was 12 percent six months after the 2007-2008 post-election violence ended(19), much higher than the prevalence rate of five percent as reported by Seedat, Nyamai, Njenga, Vythilingum and Stein (2004)(66). In this instance, being female was not significantly associated with an increased likelihood of developing PTSD(19).

Impoverished youth from informal settlements do not typically have access to advanced mental healthcare, leaving them at the mercy of their situation and experiences. As a result, it is imperative that mental health services be incorporated into primary care. Emphasizing this is the 12 percent prevalence rate of PTSD within this population(19). As these individuals enter the workforce, it is important for any mental health disorder to be diagnosed and treated so that their working capacity and earning potential are not negatively impacted.

Relating PTSD to the larger analytical framework outline by Figure 4 – Social Impacts of Violent Civil Conflict, it becomes apparent that this is a health outcome of the social impacts of violent civil conflict. Violent civil conflict causes society to undergo psychological changes, resulting in the normalization of violence, which leads to homicide and crime rates peaking in the first year after violence ends and an increased number of experiences with violence. PTSD is a result of both of these factors.

Harder, Mutiso, Khasakhala, Burke, and Ndetir's (2012) study relies on data collected retrospectively from a random sample selected from a demographic surveillance system database operated by the CDC(19). Along with the set of limitations related to a retrospective study

design, the authors identified a few other limitations. The first was the transient nature of the informal settlements and their inhabitants, making it more difficult to differentiate between a missing house number and a family that was not able to be located(19). This difference was important to the study because participants were randomly selected from housing clusters(19). Another limitation was the use of a Western-style assessment of PTSD that did not incorporate local constructs(19). However, every PTSD diagnosis was confirmed by a Kenyan psychologist. Since this study happens to be the only one that examine PTSD in a developing country and its results match others from developed countries, lends towards its accuracy(19).

A cholera outbreak, low birthweight, interruptions in ART adherence and mental health issues such as PTSD are four health outcomes of Kenya's 2007-2008 post-election violence that represent the infrastructural and social impacts of violent civil conflict. Despite each study's respective limitations, several of them are the first of their kind to detail specific health outcomes of violent civil conflict in a developing country. These studies are useful for the Kenyan Ministry of Public Health and Sanitation and the Ministry of Medical Services in their preparation to mitigate negative health outcomes in future instances of conflict.

6.0 LIMITATIONS

The first aim of this thesis was to synthesize the current relevant literature on conflict as it relates to health outcomes, both in the short and long-terms. This has been accomplished to the best of the author's ability. However, there are several limitations that merit discussion. First of all, the field of emergency preparedness is largely ignored. This was done on purpose as it was beyond the scope of the primary research question. However, this field does play an important part in mitigating the negative impacts of violent civil conflict on health outcomes. With emergency preparedness plans in place, a population's level of risk of disease, disability and death is reduced.

Secondly the author may have missed literature not found in the PubMed searches that would have complemented the discussion presented here. It is also possible that literature negating the discussion was missed as well. Certain articles were unobtainable due to restricted access, but the author did her best to find similar articles or articles by the same author in order to rectify this. Since the field is not exceedingly large, these missing articles should not pose problems to the discussion's veracity and strength.

The 2007-2008 post-election violence in Kenya occurred approximately six years ago, which has been enough time for certain studies to be carried out, but others are likely still in process. Due to this short timeframe, the true long-term impact of the violence has yet to be calculated using HALE and DALYs. These measures are an important quantitative component

for detailing health outcomes. DWIs would be a useful tool to look at how and by whom deaths were caused, but it is beyond the author's ability to calculate these ratios. It is possible due to the relatively short timeframe between the conclusion of the violence and the writing of this thesis that studies are currently being carried out that would have further informed the discussion. In addition the health-conflict literature did not cover environmental degradation to an advanced degree. This is another component that would help explain the food security situation following the 2007-2008 post-election violence.

7.0 DISCUSSION AND CONCLUSION

Approximately 310,000 deaths were caused by conflict in the year 2000 with more than half occurring in sub-Saharan Africa(2). Multiple researchers have found that the largest number of conflict deaths occur in children and adolescents, but a quarter are among women(2, 3). WHO has estimated that 0.70 percent of the global burden of disease in the year 2000 was due to conflict(2). Since this places conflict-related deaths well below other burdens, it is not considered a priority by the international community.

The existing literature in the health-conflict field is diverse and identifies many components of violent civil conflict and its impact on health outcomes. The most immediate health outcome of violent civil conflict is death, while the longer-term health outcomes include disease and disability, which are not as well-studied(9, 10, 21). These impacts can be divided into four categories: infrastructural and economic, environmental, policy and social(5, 6, 21). However despite this versatility, there are still stark gaps in existing data. There has not been a comprehensive review of conflict-ridden countries and their health outcomes in over 15 years(27), leading to a reliance on outdated data and inaccurate data collection methods such as eyewitness accounts or media reporting.

Nevertheless, this gap allows conflict epidemiologists to flourish. Conflict epidemiologists specialize in collecting data during “relatively acute situations affecting large civilian populations, usually involving a combination of war or civil strife, food shortages and

population displacement, resulting in significant excess mortality(4).” By collaborating with their fellow public health researchers, these gaps can slowly be filled.

In Kenya this topic is particularly relevant as its 2007-2008 post-election violence resulted in between 1,133 and 1,200 deaths; 3,561 injuries and approximately 600,000 internally displaced persons(34, 47, 48). Of the 600,000 internally displaced persons, there were still 100,000 IDPs as of February 2013(49). Most of these health outcomes were concentrated among women and children, two of the most vulnerable populations during times of violent civil conflict. The health outcomes of the 2007-2008 post-election violence included a cholera outbreak(14), low birthweight(17), interruptions in ART adherence(15, 16) and mental health problems such as depression and PTSD(18, 19).

Seventy percent of the post-election violence’s perpetrators were youths(59), which helps explain why Harder, Mutiso, Khasakhala, Burke and Ndeti (2012) found a PTSD prevalence rate of 12 percent among this population six months after the post-election violence ended(19). After presidential elections were held on March 4, 2013, Kenyans and the international community watched to see if violence would break out again. It did not.

Moving forward, more research is need in the health-conflict field, particularly in countries such as Kenya which may not have a recent history of violent civil conflict. This is important for any future attempts to mitigate the negative impacts of violent civil conflict. If it is known which populations are the most vulnerable and how they will be impacted in the short- and long-term, it becomes easier to organize and implement emergency preparedness plans. Additionally, it is important that future research examine the weight of evidence behind the four categories of impacts detailed in the four figures. As more research percolates among the international community, the health-conflict field will slowly become a priority.

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