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ARTICLES

EFFICACY IN EMERGENCY LEGAL PREPAREDNESS UNDERLYING THE 2014 EBOLA OUTBREAK†

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† This Article is based in part on a commentary in the Journal of Law, Medicine, and Ethics and related presentation by James G. Hodge, Jr. on September 23, 2014 at the Sandra Day O’Connor College of Law, Arizona State University (“ASU”). See James G. Hodge, Jr. et al., Global Emergency Legal Responses to the 2014 Ebola Outbreak Public Health and the Law, 42 J.L. MED. & ETHICS 595 (2014). While surveillance data related to the Ebola outbreak are updated through February 11, 2015, specific analyses of law and policy issues are limited to available information through October 31, 2014. The Authors acknowledge the following individuals for their expert input, research, and editing assistance: Anna Muldoon, MPH, Science Policy Advisor, Assistant Secretary for Preparedness and Response (“ASPR”), U.S. Department of Health and Human Services (“HHS”); Matt Saria and Rose Meltzer at the Sandra Day O’Connor College of Law, ASU; and Andrea Logue at the Mel and Enid Zuckerman College of Public Health, University of Arizona.
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I. INTRODUCTION

From its relative obscurity over the past three decades,1 Ebola viral disease (“EVD”) emerged as a substantial global biothreat in 2014 and 2015. The current outbreak of varied strains of Ebola, beginning in March 2014 in Guinea, is projected to impact hundreds of thousands of people2 over months,3 years, or even indefinitely.4 As of October 31, 2014, the spread of EVD was concentrated in several African countries (e.g., Sierra Leone, Liberia, Guinea, and an unrelated outbreak in Democratic Republic of Congo),5 with limited additional cases in Nigeria, Senegal, and Mali. Over 2,700 people are known to have died from Ebola in fewer than eight months in Liberia alone; the actual death toll may be far higher.6 At one point, the U.S. Centers for Disease Control and Prevention (“CDC”) estimated a worst-case scenario of 1.4 million new cases arising largely in already affected countries by early 2015.7 Reported cases in the affected regions are considerably less than these estimates, but with a fatality rate hover-

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ing near 50%,8 thousands more West Africans may perish before the end of this current outbreak.9

Countering these dire threats are multiple international and regional response efforts fueled by hundreds of millions of relief dollars. Critically-needed supplies are being funneled to West Africa. Thousands of health care workers (“HCWs”) from the United States, Europe, China, and Cuba, among other countries, are responding despite significant risks to their own health and safety.10 Rapid development and testing of vaccines and treatments are underway. In the interim, an array of existing experimental medications is currently being used or considered on a limited basis.11 These interventions may help lower human morbidity and mortality rates related to EVD so long as they are well-timed, efficacious, and ethically allocated.

Yet waiting for a medical panacea or vaccine that may be months or years in the making is not an option when hundreds of people are dying each week throughout West Africa.12 Immediate public health responses include declarations of emergencies at the international, national, and regional levels. On August 8, 2014, the World Health Organization (“WHO”) declared a public health emergency of international concern.13 Several West African nations have also declared formal states of emergency.14 Other countries or regions at risk for outbreaks may follow suit.15

10. WORLD HEALTH Org., Ebola Virus Disease, West Africa, supra note 8, at 6.
Emergency declarations\textsuperscript{16} authorize a profound array of public health measures that create layers of containment designed to curtail infection. Social distancing powers include closures, curfews, isolation, quarantine, travel restrictions, and even lockdowns.\textsuperscript{17} Some of these measures are known to limit the spread of infectious disease. Others are wielded despite little or no proof of their efficacy. In some instances, implementation of these public health emergency powers may even exacerbate the spread of Ebola and lead to other negative health impacts.

Imposing ill-advised, non-efficacious governmental powers in the guise of disease control (1) skew[s] Ebola modeling estimates from WHO, CDC, and others who assume that rates of transmission may diminish as social distancing measures take hold; (2) significantly infringes on civil and human rights, driving epidemics underground; and (3) increases human death tolls from Ebola and other unrelated conditions for which persons may lack access to treatment. Each of these results is untenable.

Clear scientific guidance is needed on the efficacy of legal interventions to protect the public’s health during emergencies. Meeting this objective is challenging given the multifarious public health impacts extending from EVD. As documented in Part II, these impacts extend well beyond those suffering from the disease. EVD threatens the health, lives, economy, and security of millions of people in different ways. Public health measures addressing EVD may carry broader, negative public health ramifications. The legal authorities to carry out these public health measures pursuant to emergency declarations are discussed in Part III (and illustrated in Appendix 1). Several West African countries have used multiple public health interventions in an attempt to control Ebola amidst objections and international criticism.

Part IV looks closely at the human rights implications of specific social distancing powers. Potential or actual breaches of human rights to life, health, and access to food, housing, and medical treatments, among other infringements, question the lawfulness of emergency powers that also lack proven efficacy. Building on this theme, Part V explores how use of public health powers in real-time emergencies may negate or derail broader public health outcomes. Three case studies of social distancing powers—Isolation, border closure, and lockdown—are presented. The viability and legality of these and other public health measures in response to Ebola are elucidated, followed by a brief conclusion.


\textsuperscript{17} James G. Hodge, Jr., Public Health Law in a Nutshell 93 (2013).
II. GLOBAL AND DOMESTIC HEALTH IMPACTS OF EBOLA

EVD has infected over 22,000 individuals, a majority of whom are women, and has claimed almost 9,000 lives in West Africa (as of February 11, 2015).\(^{18}\) CDC Director Tom Frieden likened the health threat from the current outbreak to that caused by HIV/AIDS, which has killed more than 36 million people worldwide since its emergence in the 1980s.\(^{19}\) While prior Ebola outbreaks were concentrated largely in rural areas, the disease has made its way in 2014 to impoverished urban areas of West Africa.\(^{20}\) Its rapid spread is owed to a “combination of dysfunctional health systems, international indifference, high population mobility, local customs, densely populated capitals, and lack of trust in authorities after years of armed conflict.”\(^{21}\) EVD has necessitated new approaches involving community training on proper handling of dead bodies to prevent further infection.\(^{22}\)

HCWs struggle to meet Ebola patients’ needs.\(^{23}\) Several West African hospitals closed due to a lack of available HCWs to staff them. In Bong County, Liberia, the closure of Phebe Hospital left 330,000 without any emergency hospital facilities.\(^{24}\) WHO, CDC, U.S. Department of Defense, Doctors Without Borders, and multiple other entities are attempting to recruit and train hundreds of new HCWs on proper techniques for treating patients while protecting worker...


\(^{19}\) Elizabeth Chuck, CDC Director on Ebola: ‘The Only Thing Like This Has Been AIDS, NBC News (Oct. 9, 2014, 10:29 AM). http://www.nbcnews.com/storyline/ebola-virus-outbreak/cdc-director-ebola-only-thing-has-been-aids-n222106.


safety. Not only is there a lack of trained HCWs, but also personal protective equipment (“PPE”), basic medical supplies, and sanitary water are in short supply.

With limited resources and personnel devoted to EVD responses, additional health threats from cases of malaria, typhoid, and HIV may rise at an alarming rate. In 2012, malaria led to 1,700 deaths in Liberia and an estimated 627,000 deaths worldwide. Typhoid and paratyphoid fevers killed more than 14,000 in Western Sub-Saharan Africa and 190,242 globally in 2010. Approximately 68% of all new HIV cases are reported in Sub-Saharan Africa. The Ebola outbreak has brought many control efforts for these and other diseases (e.g., measles) in Liberia, Sierra Leone, and Guinea to a standstill. Spikes in the infection rates of these conditions in the aftermath of Ebola may constitute the next public health crisis in these regions.

Children arguably suffer most during outbreaks. Routine vaccination programs have been completely halted or severely reduced, leading to potential deaths from vaccine-preventable diseases. While infant mortality rates in Liberia, Sierra Leone, and Guinea have declined in recent years, pregnant women lack access to medical cen-
ters to deliver their babies due to closures or unavailability of space.\textsuperscript{35} In the weeks ahead, this lack of access may increase infant mortality rates.\textsuperscript{36} Young children are also orphaned at a distressing rate due to Ebola deaths among their parents or caregivers.\textsuperscript{37}

Collateral impacts of Ebola in West Africa are equally significant. Agricultural production, tourism, mining, and service industries are all diminished in the affected regions.\textsuperscript{38} Border closures have halted commercial activities\textsuperscript{39} and limited food supplies.\textsuperscript{40} Food prices have increased an average of 24\% in Liberia, Guinea, and Sierra Leone, making available food unattainable for many.\textsuperscript{41} Markets emptied as government restrictions and fears of infection led people to avoid congregating.\textsuperscript{42} Labor shortages rose as workers became ill or took care of ill relatives.\textsuperscript{43} Deaths among farmers may leave fields fallow and threaten immediate food supplies.\textsuperscript{44} An estimated 750,000 West Afri-

\begin{itemize}
\item \url{www.unicef.org/infobycountry/sierra_leone_statistics.html} (last updated Dec. 27, 2013);
\item See id.
\item Marcelo Giugale, \textit{The Economic Impact of Ebola}, WORLD POST (Oct. 8, 2014, 9:00 AM), \url{http://www.huffingtonpost.com/marcelo-giugale/the-economic-impact-of-eb_b_5951458.html}.
\item Id.
\item Garrett Ingoglia, \textit{A Firsthand Account of Life at the Epicenter of the Ebola Outbreak in Monrovia, Liberia}, WORLD POST (Oct. 9, 2014, 10:45 AM), \url{http://www.huffingtonpost.com/garrett-ingoglia/a-firsthand-account-of-li_b_5958884.html}.
\item Hogan, \textit{Groups}, supra note 40.
\end{itemize}
cans are at risk of famine or death from malnutrition. According to the World Bank’s Ebola Impact Index, the total economic impact of EVD could exceed $32 billion by the end of 2015 if the virus spreads to neighboring countries in West Africa.

III. EMERGENCY DECLARATIONS AND SOCIAL DISTANCING MEASURES

Against this backdrop is the need to address the social and economic consequences of Ebola in West Africa and abroad through a series of legal preparedness efforts to stem its spread. Formal emergency declarations alter the legal environment to facilitate public health and medical responses, instantly allowing measures that might otherwise require considerable legal maneuvering absent a declaration.

Per Appendix 1, Ebola-related Emergency Measures in Select Countries, governments in Guinea, Liberia, Nigeria, and Sierra Leone declared emergencies that collectively impact nearly 200 million people. The declarations differ in form, content, duration, and substance, but each authorizes an array of flexible powers and corresponding measures to address the public health impact of Ebola. For example, each government may close schools, businesses, roads, or borders. Liberia closed government offices, placing workers on leave for thirty days to contain the spread of EVD. Sierra Leone declared a national “stay at home” day for reflection, education, and


prayer. Nigeria ordered all schools to remain closed for forty-three days beyond the usual summer vacation. Guinea closed all schools and universities indefinitely until measures aimed at controlling Ebola transmission took effect.

Each country also implemented stringent screening, surveillance, testing, and treatment measures, including widespread airport-screening procedures to evaluate passenger temperatures and symptoms. Nigeria screened all passengers arriving by air and sea in Lagos and Rivers State and retooled its polio eradication technology and infrastructure to trace contacts of initial Ebola cases. These combined procedures are credited with the containment of initial cases of Ebola in Lagos. Though purposeful, such measures are imperfect due to the epidemiology of the disease and limitations of available tests. As Ebola is only detectable and transmissible among symptomatic persons, asymptomatic persons, like Thomas Eric Duncan who left Liberia for Dallas, Texas, in late September 2014, can still slip through the cracks. Without an accurate, rapid test for the presence of EVD it takes hours to confirm that someone is infectious.

While Nigeria was declared “Ebola free,” resource limitations and other factors present substantial public health challenges to the re-

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54. *Id.* WHO Director Margaret Chan concluded as a result that “any country in the world experiencing an imported case can hold onward transmission to just a handful of cases.” *Id.*


mainly affected West African countries. Facing thousands of active cases of Ebola, governmental authorities in Liberia and Sierra Leone have instituted fourteen of the fifteen emergency measures listed in Appendix 1 including:

1. mandatory disinfection of all public facilities;
2. prohibitions on price increases;
3. waivers of import duties for certain sanitation products;
4. isolation of infected persons or quarantine of those exposed;
5. restrictions on public meetings and gatherings;
6. increasing surveillance and house-to-house searches;
7. border closures and travel curfews; and
8. lockdowns of entire communities.

Many of these measures may be considered extreme depending on the duration of emergency declarations, which can last for as few as ninety days (e.g., Liberia) or indefinitely (e.g., Guinea).

Though expansive, these interventions are constitutionally authorized in most nations affected by Ebola. Sierra Leone’s constitution allows the President to “take such measures as appear . . . necessary or expedient for the purpose of maintaining and securing peace, order and good government” during a public emergency. Constitutions in

61. See CONSTITUTION OF GUINEA 7 May 2010, title 5, art. 90, available at http://unpan1.un.org/intradoc/groups/public/documents/unpan/unpan049269.pdf (the constitutional limit to the duration of an emergency declaration in Guinea is twelve days, unless extended by the National Assembly). However, in declaring an emergency, President Alpha Condé formally banned persons “from leaving their homes until the end of their surveillance period” and instituted a ban on moving bodies “from one town to another until the end of the epidemic.” GUINEA DECLARES A NATIONAL HEALTH EMERGENCY, JAMAICA OBSERVER (Aug. 13, 2014, 7:39 PM), http://www.jamaicaobserver.com/news/Guinea-declares-Ebola-a-national-health-emergency.  
Guinea and Liberia similarly grant leaders leeway to coordinate and implement emergency response plans and to designate officials or entities in charge.

Most of these countries’ constitutions also permit restricting certain public rights during emergencies. Explicit restraints on freedoms of assembly and association are constitutionally authorized in Nigeria and Sierra Leone,63 paving the way for significant enforcement of social distancing measures. The constitutions of Liberia, Nigeria, and Sierra Leone allow use of forced or compulsory labor during emergency periods,64 which could potentially authorize forced deployment of security forces65 and HCWs.66 Individual and group detentions are also permitted despite explicit infringements of personal rights to travel and assemble. Constitutional provisions in Nigeria, Sierra Leone, and Liberia authorize warranted border restrictions, regardless of an emergency declaration67 despite WHO’s rejection of such practices due to inhibitions on trade of essential medical goods.68 Only


65. Liberia and Sierra Leone have deployed security forces to enforce Ebola containment measures, yet it is unclear if their deployment was “forced.” Anne Look, Liberia, Sierra Leone Deploy Troops to Contain Ebola, Voice of Am. (Aug. 8, 2014), http://www.voanews.com/content/liberia-sierra-leone-deploy-troops-to-contain-ebola/2407268.html.


Guinea’s constitution notes that emergency circumstances do not justify suspension of human rights.\textsuperscript{69}

On August 19, 2014, Liberia implemented a twenty-one-day quarantine of over 50,000 people in a Monrovian slum\textsuperscript{70} following an attack on an Ebola clinic. Facing public resistance and scrutiny, efforts to cordon the area were largely ineffective and lifted after just ten days.\textsuperscript{71} In Sierra Leone, the President ordered a three-day national lockdown instructing citizens to remain indoors from September 19–21.\textsuperscript{72} During this time, outreach workers canvassed residences educating the public on Ebola, handing out soaps, identifying active cases, and removing bodies of EVD victims.\textsuperscript{73} Countries like Senegal,\textsuperscript{74} Nigeria,\textsuperscript{75} Spain, France, Mali, and the United States\textsuperscript{76} have also isolated infected persons in health care settings to limit the numbers of Ebola cases in their jurisdictions.\textsuperscript{77}

Restrictive measures like these, often enforced by the country’s military or police forces, may be legally prescribed to contain infectious conditions or stymie acts of public resistance, fear, and denial.\textsuperscript{78} Concerning a condition like Ebola that can kill over half its victims in relatively short order, social distancing and other measures may arguably help control its spread. When such powers are abused, how-

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78. MacDougall, supra note 71.
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ever, they can unjustifiably infringe on human rights and freedoms to the detriment of the public’s health.

IV. Emergency Responses and Human Rights

Overzealous and unfounded disease control measures can impinge basic human rights leading ultimately to the spread of disease detrimental to the public’s health. Human rights are universal principles that include positive rights to life, liberty, security, travel, health, food, housing, and education, as well as freedoms of movement, of religious belief, and from discrimination. Health and human rights pioneer Jonathan Mann observed during the HIV/AIDS epidemic that threatening and excluding infected persons tend to drive cases of HIV underground, thwarting education and prevention efforts. Mann’s research illustrates how protecting and promoting health and human rights are linked. The United Nation’s High Commissioner for Human Rights, Zeid Ra’ad Al Hussein, echoed Mann’s wisdom in emphasizing how respect for human rights can prevent and cure disease, while ill-advised measures can drive cases underground.

Still, thirty years later, restrictive public health measures that may infringe upon human rights are being implemented in response to Ebola. As noted in Part II, a lack of functioning health care facilities in Ebola-affected countries denies individuals access to basic health care services in contravention of their human right to health. Developed countries also have a duty to provide international assistance to developing nations to realize fulfillment of their human rights obligations.


85. Onishi, supra note 70.
Yet, human rights are not absolute. In times of crisis, they may be restricted. The Siracusa Principles\textsuperscript{86} identify circumstances in which public health measures, like quarantine, may restrict human rights. Restrictions must: (1) be provided for and carried out in accordance with the law; (2) advance a legitimate objective of general interest; (3) be strictly necessary in a democratic society to achieve the objective; (4) represent the least intrusive means available to achieve the objective; (5) be based on scientific evidence and not drafted or imposed arbitrarily;\textsuperscript{87} (6) be subject to review;\textsuperscript{88} and (7) be limited in duration.\textsuperscript{89} Public health control measures that comply with the Siracusa Principles may justifiably infringe on human rights.

In other cases, infringements may be unacceptable,\textsuperscript{90} including through overzealous applications of social distancing measures in response to Ebola. Doctors Without Borders suggested Sierra Leone’s three-day lockdown, for example, led individuals to hide their symptoms and deceased family members and deprived the poor of access to increasingly expensive food.\textsuperscript{91} On August 7, 2014, Sierra Leone’s army reportedly blockaded Ebola-affected areas, limiting persons’ rights to travel (whether infected or not) and impeding their ability to obtain necessities.\textsuperscript{92} Human Rights Watch alleged Liberia’s ten-day quarantine\textsuperscript{93} of thousands of residents in West Point, Monrovia, significantly and disproportionally affected the poor, elderly, and others unable to evade restriction,\textsuperscript{94} in contravention of multiple Siracusa Principles.\textsuperscript{95} Closures of borders and markets, movement restrictions,

\begin{footnotesize}


\textsuperscript{88} Siracusa Principles, supra note 86, at Annex IIC.

\textsuperscript{89} Id.

\textsuperscript{90} GOSTIN, supra note 79, at 244.


\end{footnotesize}
and a lack of able workers caused food prices to escalate in Sierra Leone and Liberia. Liberian officers reportedly seized belongings of those violating curfew and extorted individuals at checkpoints. When the border between Liberia and Sierra Leone was closed in mid-August, Liberian armed forces were ordered to shoot on-sight anyone unlawfully entering the country. In late October, forty-three people quarantined in Jene newonda, Liberia, threatened to break out because they had no food. These and other reports implicate serious violations of human rights to life, health, security, freedom, and food outside the bounds of Siracusa Principles.

HCWs attempting to provide medical care and public health services have been harassed and attacked due to a lack of EVD education and mistrust. Eight HCWs were brutally murdered in Guinea while educating the public on how to prevent the spread of Ebola. Survivors, family members of those infected with Ebola, and orphans have been ostracized and discriminated against, leaving them without adequate food, housing, and care.

WHO warned against national travel bans and restrictions, arguing they will lead to human rights violations and worsened health outcomes by undermining response efforts. Still multiple countries have imposed bans. Saudi Arabia denied visas to 7,000 West African Muslims registered for the Hajj. Developed countries have restricted flights and other travel to and from the affected regions. In late October, Australia announced that it will not process any visas from Ebola-affected countries; those who already have visas may only enter the country after serving a twenty-one-day quarantine prior to

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96. Nebehay & Giahyue, supra note 41.
97. UNMEER, supra note 93.
their departure.\textsuperscript{104} Days later, Canada followed with similar restrictions.\textsuperscript{105} Singapore announced that citizens of Liberia, Guinea, and Sierra Leone need a visa to enter effective November 5, 2014.\textsuperscript{106}

Awareness of these and other human rights implications has led the UN, UNICEF, and others to limit negative impacts. The UN is training armed forces in Freetown, Sierra Leone to institute proper procedures at checkpoints, screening areas, and quarantines that respect human rights, including assuring adequate access to food and water for affected persons.\textsuperscript{107} UNICEF and Liberian partners opened a dedicated children’s care center for those who have lost a parent or parents to Ebola and must undergo quarantine.\textsuperscript{108} UNICEF plans to train 2,500 Ebola survivors (assumed to be immune to the disease) to care for quarantined and orphaned children and to assist in reuniting families.\textsuperscript{109} Despite a slow and criticized international response, over half of WHO’s $988 million plan has been funded and another $279 million pledged.\textsuperscript{110} The UN Coordination of Humanitarian Affairs Office estimates countries have committed $894 million and pledged another $928 million for preparedness needs.\textsuperscript{111} International pledges of HCWs, other personnel, and resources continue to rise.\textsuperscript{112}

V. \textbf{Empirical Foundations of Public Health Legal Measures}

In the throes of a highly infectious and deadly disease within resource-poor West African countries facing thousands of current and future cases and major collateral harms, a plethora of public health measures to counter Ebola may seem viable. However, three critical questions underlying the justified use of any restrictive public health


\textsuperscript{108} Id.

\textsuperscript{109} Id.


\textsuperscript{111} Id. at 13.

\textsuperscript{112} The U.S. currently has 900 governmental employees in West Africa, Britain sent 750 troops, including some medical officers, China pledged 170 health workers, Cuba pledged 165 HCWs, and the East African Community has deployed 600 workers; in addition, many other nations are providing financial and medical resources to fight Ebola outbreaks. \textit{Id.} at 14–15.
intervention must be asked. First, is the intervention authorized by routine or emergency public health laws in the affected jurisdiction?113 Second, does implementation of the intervention negatively impact the human rights of individuals without public health justification?114 If so, the measure may fail to promote global health based on existing theory and research.

Finally, is the public health measure efficacious? Public health measures that are lawful and consistent with human rights norms may still fail to effectively control diseases. Conversely, measures of questionable legality that infringe upon human rights may prove efficacious. These issues are addressed below through three case studies—focused on the efficacy of isolation, border closure, and lockdown—and related observations about the essential facets of efficacy of public health legal measures to control emerging infectious diseases.

A. Case Study 1 – Isolation

Isolation of patients with highly infectious diseases,115 including EVD,116 is routinely used to prevent the spread of the illness to patients, HCWs, family members, or others. Research suggests the practice curtails disease transmission, especially concerning conditions like Ebola that are not as easily transmitted as airborne viruses like influenza or measles.117 Proper use of barrier-nursing techniques and isolation of infected patients has historically been effective in reducing transmission to HCWs and limiting the spread of EVD in the greater community.118

113. See supra Part III.
114. See supra Part IV.
115. Isolation is “the separation, for the period of communicability, of known infected persons in such places and under such conditions as to prevent or limit the transmission of the infectious agent.” Lawrence O. Gostin & Benjamin E. Berkman, Pandemic Influenza: Ethics, Law, and the Public’s Health, 59 ADMIN. L. REV. 121, 171 (2007).
117. See generally Christophe Fraser et al., Factors That Make an Infectious Disease Outbreak Controllable, 101 PROC. NAT’L ACADEMY OF SCI. U.S. 6146 (2004) (isolation effective against SARS and other illnesses with post-symptomatic infectivity and moderate transmissibility, but not effective against influenza, using mathematical models).
118. For example, in the 1995 EVD outbreak in Kikwit, 67 HCWs became infected and 47 died prior to the implementation of proper patient isolation and the use of protective gear; only 3 infections occurred after implementation. Barbara Kerstiëns & Francine Matthys, Interventions to Control Virus Transmission During an Outbreak of Ebola Hemorrhagic Fever: Experience from Kikwit, Democratic Republic of the Congo, 1995, 179 (Supp. 1) J. INFECTIOUS DISEASES S263, S267 (1999) (“Key elements in the control of an [EVD] outbreak are the organization of an adequate isolation unit for suspected cases and the use of proper barrier-nursing techniques, using
Isolation nevertheless has some significant potential drawbacks. Its practice requires significant resources and impacts individuals' personal liberties. Isolated patients experience negative mental health effects, including depression, anxiety, and anger, and report dissatisfaction with their treatment. Dr. Kent Brantly, one of the first Western doctors to survive Ebola, described his isolation as a lonely experience: "I needed help to go to the bathroom, I needed water to drink. . . . I was scared and there was nobody there." HCWs may spend less time with isolated patients who thus experience more adverse events and failures of supportive care.

Significant debates among researchers and mathematical modelers challenge a presumption of efficacy of isolation in all cases. While evidence from past EVD outbreaks supports the efficacy of isolation, empirical evidence that isolation reduces disease transmission is lacking for some illnesses, including methicillin-resistant Staphylococcus aureus ("MRSA"), influenza, and HIV. Theoretical modeling testing isolation’s efficacy has indicated that isolation should be more effective against EVD than several other illnesses. For example, mathematical models of the 2003 severe acute respiratory syndrome


123. Abad et al., supra note 121, at 99, 101; Kirkland, supra note 119, at 768.

124. Kirkland, supra note 119, at 767 (evidence lacking on contact isolation’s efficacy against MRSA infections); Cole & Lai, supra note 121, at 404 (evidence lacking on contact isolation’s efficacy against MRSA infections); Fraser et al., supra note 117, at 6151 (arguing that isolation, contact tracing, and quarantine are unlikely to be successful against an influenza or HIV outbreak via mathematical models).
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(“SARS”) outbreak indicated its control was made possible solely through isolation.125 Modeling data based on the 2014 EVD outbreak in Liberia, however, suggests that isolation alone is insufficient to contain the disease.126 Only in combination with other control measures, such as sanitary burial, contact tracing, and quarantine, may it limit the spread of Ebola.127

Patient isolation can be effective, but it is not failsafe due to key practical difficulties. Delays in implementing isolation and other control measures reduce their effectiveness;128 Even with proper equipment and training, compliance with isolation procedures is rarely 100%.129 Studies suggest HCW compliance rates fall below 30% for illnesses requiring only contact isolation, such as MRSA.130 Even after isolation, Ebola patients and corpses can transmit EVD. The isolation of Thomas Eric Duncan still resulted in at least two HCWs contracting EVD.131 In Spain, a HCW was infected while providing treatment132 amidst reported lapses in the hospital’s existing isolation and treatment protocols.133 Still, with sufficient resources and sound execution, patient isolation can slow the spread of EVD, as shown in past outbreaks, and remains a key component of any intervention strategy against Ebola.


127. Id. at 993–94; Chowell et al., supra note 118, at 124–25 (aggregated control measures include surveillance, quarantine, education on strict barrier nursing techniques [including isolation] and the rapid burial or cremation of deceased patients).

128. Fraser et al., supra note 117, at 6150; J. Legrand et al., Understanding the Dynamics of Ebola Epidemics, 135 Epidemiology Infection 610, 610 (2006) (mathematical model of an EVD epidemic demonstrating the importance of rapid institution of control measures); Chowell et al., supra note 118, at 119 (mathematical model showing a two-week delay in implementing control measures doubles the final EVD epidemic size).

129. Even 90% isolation would be difficult if not impossible to achieve in West Africa. Pandey et al., supra note 126, at 994.

130. Cole & Lai, supra note 121, at 406 (noting that HCW compliance in another study increased to 97% when dealing with feces, lending to potential increased compliance with a known deadly pathogen such as EVD).

131. Versel, supra note 76.


B. Case Study 2 – Border Closures

Border closures entail multiple types of prohibitions on individuals’ entry into or exit from countries or regions via land, air, or water. However, WHO has consistently recommended against border closures in response to Ebola. The International Federation of Red Cross and Red Crescent Societies described border closures as “very irrational.” Nevertheless, these powers have been used extensively in countries impacted by Ebola, as well as those seeking to prevent its importation.

On June 11, 2014, Sierra Leone closed its borders with Guinea and Liberia to bolster Ebola containment efforts after confirming sixteen cases. On July 27, Liberia closed all but three of its border entry points in an effort to screen all travelers for Ebola. Liberia and Sierra Leone closed borders well before issuing formal emergency declarations. Guinea officially shut its borders on August 9, just


days after WHO declared a PHEIC.\textsuperscript{141} Senegal closed its land borders with Guinea and air borders with Nigeria, Sierra Leone, and Liberia.\textsuperscript{142} Côte d’Ivoire shut off its borders with Nigeria, Liberia, and Sierra Leone.\textsuperscript{143} In late October, several countries stopped issuing visas to persons from the regions most affected by the virus.\textsuperscript{144}

Border closures can potentially derail the flow of Ebola into a country, but also can limit importation of HCWs,\textsuperscript{145} food, and medical supplies to needed areas,\textsuperscript{146} effectively cutting off impacted regions.\textsuperscript{147} Without sufficient enforcement, border closures may be futile.\textsuperscript{148} Measuring their effectiveness is difficult in part because they are generally used in conjunction with other disease prevention measures.\textsuperscript{149} However, some studies have used mathematical simulation models to estimate the spread of influenza due to border restrictions. In 2006, researchers used a large-scale epidemic simulation to examine potential intervention options to address a novel influenza outbreak in Great Britain or the United States.\textsuperscript{150} Researchers found that border restrictions, even if 99.9% effective, may delay the peak of the U.S. pandemic by six weeks, but would not prevent the spread entirely.\textsuperscript{151} Another study examined the spread of flu following flight restrictions

\begin{itemize}
\item 143. \textit{Id.}
\item 147. See Giugale, \textit{supra} note 39.
\item 149. See, e.g., Timothy C. Germann et al., \textit{Mitigation Strategies for Pandemic Influenza in the United States}, 103 \textit{PROC. NAT’L ACADEMY SCI.} \textit{U.S.}, 5935, 5936 (2006); T. Déirdre Hollingworth et al., \textit{Will Travel Restrictions Control the International Spread of Pandemic Influenza?}, 12 \textit{NATURE MED.} 497, 498 (2006).
\item 151. \textit{Id.} at 449.
\end{itemize}
due to the 9/11 terrorist attacks. Researchers discovered that the peak date of 2001–2002 flu season in the United States was delayed by approximately one month, a delay not seen in France where flight restrictions were not imposed. Even if border closures and flight restrictions delay the spread of disease, they do not eliminate the risk entirely.

Varied border control policies in Nigeria and Senegal are illustrative. Both countries had limited numbers of Ebola cases initially, but within weeks were declared “Ebola free” by WHO. Senegal initially closed its borders with Guinea in March 2014, but re-opened land borders in May only to close them again on August 21. Reports conflict as to whether a Guinean university student, who became Senegal’s first and only confirmed case of EVD, entered the country before or after the August 21 border closure. Due to the discrepancy in the timeline of the Guinean university student’s crossing into Senegal, Senegal’s EVD case is interpreted by some as an example of the ineffectiveness of border closures, while others suggest border closures kept further disease out of the country. Conversely, Nigeria never closed its national borders while eradicating the disease. Despite their varying approaches to border closures, both countries moved quickly to trace contacts of the initial cases. Rigorous contact tracing and follow-up with potential cases are credited by WHO

153. Id. at 1829–30, 1832.
as crucial steps to preventing further disease spread within these two countries.  

C. Case Study 3 – Lockdown

On September 6, 2014, Sierra Leone announced a three-day lockdown of all residents in place from September 19–22. The objective was clear. As people remained in residences and out of public spaces, government officials would canvass the country, assess the impacts of Ebola, identify new cases, and remove the bodies of victims. The lockdown ended with Sierra Leone’s government declaring success in locating new patients and removing bodies for safe burial. However, operational pitfalls and risks plagued its execution and led to collateral damages. Doctors Without Borders concluded: “[L]ockdowns . . . do not help control Ebola as they end up driving people underground and jeopardising [sic] the trust between people and health providers.”

Sierra Leone’s lockdown appears to be unique as a public health measure. In reality it assimilated several traditional practices. Its breadth is similar to large-scale quarantine actions (also known as cordon sanitaire) used typically to cordon off persons who may have been exposed to infectious diseases for the duration of its incubation. During the SARS outbreak, Toronto quarantined 13,000 people who may have been exposed to the disease. The necessity of widespread quarantine of roughly 100 people for each actual SARS case identified have been criticized. Quarantine has been shown to effectively reduce the spread of smallpox in an attack scenario. Unlike tradi-

166. Id.
tional quarantine practices, however, the very limited duration of Sierra Leone’s three-day lockdown inherently limited its capacity to stymie the spread of EVD, which has a twenty-one-day incubation period.

In some ways, the lockdown replicated shelter-in-place orders used often during biological, chemical, and radiological incidents, and increasingly during security threats. Residents are asked to stay in their current locations until an all-clear order is issued, which may take hours or days. Shelter-in-place has been shown to be highly effective in reducing morbidity and mortality during chemical spills and active shooter events. Models show that its practice is also effective during a biological attack by preventing exposure to airborne biological agents. To the extent, however, that EVD already infiltrated populations in Sierra Leone, there is little chance that significant additional exposures via lockdown were thwarted. As well, only a small percentage of infected individuals could likely be identified during three days of lockdown.

Shelter-in-place orders may severely restrict individual movement and prevent supplies reaching large institutions and residents within the cordon. Doctors Without Borders raised parallel concerns as the Sierra Leone lockdown went into effect, noting that many poor residents purchase food daily and get water from communal wells that would be inaccessible. Reports of public disdain arose when government workers did not have food to offer, nor any appropriate places to receive health services given by HCWs.

House-to-house case identification and public education activities executed during Sierra Leone’s lockdown resemble more traditional public health measures. For example, contact tracing has been used

171. Whether officials achieved their goal of visiting every residence across the country is doubtful as pleas to extend the lockdown emerged to complete visits in urban areas. Sierra Leone Looks to Extend Ebola Lockdown as it Aims to Stop Spread, Guardian (Sept. 21, 2014, 2:30 PM), http://www.theguardian.com/world/2014/sep/21/sierra-leone-freetown-lockdown-ebola-continues.
173. Médecins Sans Frontières, supra note 164.
174. Poor Will Not Have Food or Water During Lockdown, Say Sierra Leoneans, Plan (Sept. 19, 2014), http://plan-international.org/about-plan/resources/media-centre/press-releases/poor-will-not-have-food-or-water-during-lockdown-say-sierra-leoneans/
175. Guardian, supra note 171.
effectively in outbreaks to control the spread of infections in many scenarios.\textsuperscript{177} Effective public communication has been credited with maintaining calm in Toronto during SARS and increasing voluntary quarantine compliance.\textsuperscript{178} Strong public education campaigns are generally seen as keystone efforts in any infectious disease control program, whether preventive or responsive to an outbreak.\textsuperscript{179} Mass notifications through phone or email are frequently used in many disasters, and pilot projects have examined the utility of house-to-house visits for vulnerable populations.\textsuperscript{180} Subject to future findings, the education and sanitation components of the lockdown may have helped to improve the public’s understanding of the spread of EVD and the need to seek health services.

During the Sierra Leone lockdown, 123 potential cases of EVD were identified.\textsuperscript{181} In addition, ninety-two bodies were removed for safe burial\textsuperscript{182} reducing the potential for spread through unsafe funeral practices. There is little evidence, however, to suggest that these cases would not have been identified through other means in the same time period without a lockdown. Coupled with substantial hardships posed by lack of food, access to water, lost wages, and reduced economic activity, the utility of national or city-wide lockdowns during public health emergencies is seriously questioned. As a method of taking a public health inventory, the successes of Sierra Leone’s national lockdown may be challenged when weighed against a bevy of deleterious impacts on the population, the great majority of which were not exposed to or infected with Ebola.

D. \textit{Essence of Efficacy of Emergency Public Health Powers}

These brief case studies on isolation, border closure, and lockdown illustrate the complexities of assessing the efficacy of varied public health measures to control Ebola. When medical practitioners speak of efficacy of medical treatments, they refer to “the net health benefits

\textsuperscript{177} Don Klinkenberg et al., \textit{The Effectiveness of Contact Tracing in Emerging Epidemics}, PLoS ONE (Dec. 20, 2006), http://www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0000012; Fraser et al., \textit{supra} note 117, at 6151.


\textsuperscript{179} \textit{See Addressing Communication Challenges During an Infectious Disease Emergency Response: State Experiences from the H1N1 Pandemic}, ASS’N OF STATE & TERRITORIAL HEALTH OFFICIALS, http://www.astroh.org/Programs/Infectious-Disease/Addressing-Communication-Challenges-During-an-Infectious-Disease-Emergency-Response/ (last visited Nov. 11, 2014).


\textsuperscript{181} Bajekal, \textit{supra} note 163.

achievable under ideal conditions for carefully selected patients. . . . An efficacious treatment is one that does more good than harm to those who receive it.”183 Public health researchers refer to efficacy in terms of interventions for which “studies show the strongest association between the intervention and the [desired] outcome.”184 “Efficacy,” concludes one source, “is the ability to produce a desired amount of a desired effect.”185

To the degree that efficacy is tied solely to detection and prevention of the spread of Ebola, the practice of isolation offers a reasonable example of success. However, assessing efficacy of public health legal interventions tied solely to Ebola-related improvements is misguided. By this standard, isolation that prevents the spread of Ebola but kills the patient for unrelated reasons would be considered efficacious. Public health measures that mitigate one threat to communal health but raise multiple others are not efficacious from a public policy perspective.

The essence of efficacy for purposes of public health legal interventions is broader in scope. It requires balancing the underlying legal authority for the intervention, possible impairments of human rights, and potential negative collateral health impacts (akin to what economists might refer to as “opportunity costs”).186 Under this conception of efficacy, each of the public health interventions noted above presents a mixed bag of outcomes.

Touting the merits of isolation as a disease control measure cannot be divorced from the negative impacts on patients and their families coupled with the spotty record of actual compliance and infection avoidance among HCWs and others. Gauging the effectiveness of Ebola-related border closures seems speculative when similarly-situated countries apply the intervention unevenly or without adequate enforcement. Declaring victory following the administration of a national lockdown in Sierra Leone seems fallacious when balanced against significant, albeit temporary, infringements on the rights to health, travel, and access to food and water.187 If none of these public health legal measures meets our threshold of efficacy to control Ebola, maybe our balance needs to be recalibrated or our conception is merely flawed.

185. Kirch, supra note 183.
186. Opportunity cost is defined as “the most highly valued opportunity or alternative forfeited when a choice is made.” Roger A. Arnold, Economics 5 (12th ed. 2015).
Yet, assessing the efficacy of these and other purported public health interventions consistent with our conception is critical. Public health officials may be authorized to use a litany of measures via emergency powers in principle, but if these choices lack effectiveness their use may be called into doubt for four essential reasons:

1. to the extent they infringe on human rights without justification they violate universal norms;
2. if these measures do not directly alleviate the impacts of Ebola while damaging populations in other ways, they cause more harm than good in contravention of ethical, legal, and human rights duties to protect the public’s health;
3. absent sufficient assessment of their potential efficacy, these measures cannot be used reliably as tools to control infectious diseases; and
4. lacking reliability, their use may actually detract from other public health efforts to control Ebola.

So which emergency public health measures should be implemented when efficacy is unknown or uncertain and all other potential interventions are unavailable (e.g., vaccines, HCWs), impractical (e.g., removal of all West African patients to high-level treatment centers), or dysfunctional (e.g., active surveillance systems)? Why not let governments in Liberia, Sierra Leone, Guinea, and Nigeria experiment with a gamut of public health measures when no other good options exist? A similar question in a different context might ask whether to allow the use of experimental drugs for Ebola when half of infected patients are going to die anyway. What’s the harm?

Minimal applications of experimental drugs can injure or kill patients. This is a regrettable consequence, but perhaps a risk that patients and practitioners are willing to take. Conversely, unproven use of alleged lawful public health interventions to control infectious disease outbreaks can destroy public trust and harm entire populations in contravention of legitimate public health practices grounded in science, not fiction. Balancing health and human rights requires solid data of an intervention’s efficacy (or lack thereof). Such practices cannot reflect a respect for human rights when there is no clear, strong, and repeatable assessment of their capacity to improve the public’s health. When the collective harms of disease control interventions infringe on human rights without public health justification, they not only lack efficacy, but also are unlawful as applied.

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188. For an example of an efficacious public health intervention, see Fidel Villegas, et al., Administration of Triclabendazole Is Safe and Effective in Controlling Fascioliasis in an Endemic Community of the Bolivian Altiplano, 6 PLOS NEGLECTED TROPICAL DISEASES 1 (2012) (triclabendazole is efficacious in treating endemic fascioliasis by reducing the intensity and prevalence of the illness).
VI. Conclusion

The spread of Ebola can be stopped, but how and at what price? Unwarranted uses of social distancing measures in affected West African countries may fail to control infectious diseases and negatively impact communal health by denying people access to food, medicines, treatments, and other life-sustaining services. There is a real potential that more persons may die from EVD in these regions due directly to deleterious public health practices applied across populations. More so, even greater numbers of persons may perish from causes other than EVD because public health interventions designed to halt the epidemic lack efficacy. To avoid these outcomes, public health powers must be tied to known outcomes across an array of communal health impacts. Humane, efficacious use of emergency public health powers coupled with major infusions of global resources and personnel may prevent excess morbidity and mortality from Ebola now, and for decades to come.
## Appendix 1. Ebola-related Emergency Measures in Select Countries
(Numerical data as of 2/17/15)

<table>
<thead>
<tr>
<th>Declaration Information</th>
<th>Guinea</th>
<th>Liberia</th>
<th>Nigeria</th>
<th>Sierra Leone</th>
</tr>
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<tbody>
<tr>
<td>Date</td>
<td>8/13/14</td>
<td>8/6/14</td>
<td>8/8/14</td>
<td>7/30/14</td>
</tr>
<tr>
<td>Duration</td>
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<td>99 days&lt;sup&gt;1&lt;/sup&gt;</td>
<td>6 months&lt;sup&gt;2&lt;/sup&gt;</td>
<td>60–90 days</td>
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<td>Type</td>
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<td>State of Emergency&lt;sup&gt;4&lt;/sup&gt;</td>
<td>National Emergency&lt;sup&gt;5&lt;/sup&gt;</td>
<td>State of Public Emergency&lt;sup&gt;6&lt;/sup&gt;</td>
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<tr>
<td>Declared By</td>
<td>President Alpha Condé</td>
<td>President Ellen Johnson Sirleaf</td>
<td>President Goodluck Jonathan</td>
<td>President Dr. Ernest Bai Koroma</td>
</tr>
<tr>
<td>Entity/Official in Charge</td>
<td>President Alpha Condé</td>
<td>President Ellen Johnson Sirleaf and Minister of Internal Affairs</td>
<td>Minister of Health, Professor Onyebuchi Chukwu</td>
<td>Presidential Task Force on Ebola</td>
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<tr>
<td>Affected #s</td>
<td>11,474,383</td>
<td>4,092,310</td>
<td>177,155,754</td>
<td>5,743,725</td>
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<tr>
<td>Potential Cases/Deaths&lt;sup&gt;7&lt;/sup&gt; + %</td>
<td>3,044/1,995 (66% death rate)</td>
<td>8,881/3,826 (43% death rate)</td>
<td>20/8 (40% death rate)</td>
<td>10,934/3,341 (31% death rate)</td>
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<td>Emergency Measures</td>
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<tr>
<td>Closures (borders, schools, markets)</td>
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<td>&lt;sup&gt;10&lt;/sup&gt;</td>
<td>&lt;sup&gt;11&lt;/sup&gt;</td>
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<td>14</td>
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13. See Address to the Nation, supra note 6.


15. Id.


18. Broadcast to the Nation, supra note 6.
23. Id.
25. Id.
33. Sirleaf et al., *supra* note 9, at 3.
34. Id.
35. INT’L SOS, *supra* note 11.