



The Liberian Health System: the Epitome of Inequality and a Burden of History

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The Liberian Health System: The Epitome of Inequality and a Burden of History

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Abstract

The need for responsive and resilient health systems is undeniable. A health system is fundamentally an expression of citizenship. Moreover, currently observed health systems, in most parts of the world, and especially the Global South, are shaped by the broader historical context. It is also undeniable that history informs inequalities, and these inequalities bleed into observed institutions and systems. It is this understanding that should underpin reforms designed to strengthen health systems. By reducing health inequalities, in health access and outcomes, a social justice lens with a preference for poor and disenfranchised citizens is indispensable.

This thesis will explore how the legacy of historical grievances and the entrenchment of inequalities in Liberia have resulted in the perpetuation of a weakened health system. A further examination of how the demographic and epidemiologic transitions, coupled with changes in the political and ecological landscape have help shape the current health system is explored. Moreover, the link between health and economic well-being is also examined.

To begin this critical exploration, the work poses fundamental questions to current and future practitioners of global health in the prologue. Why do we see the persistence of a dearth of clinical care in sub-Saharan African countries? What historical factors inform this observation? Using Liberia as a case study of sought, a brief exploration of some of the structural and institutional inequities from its inception as a republic are examined. The work than moved to

advancing the argument that a strong and resilient health system that is informed by contextual nuances could ameliorate suffering, promote efficient and effective utilization of resources, and advance social cohesion. A further examination of the 2014-2016 Ebola Virus Disease epidemic in West Africa as an expose on the human and economic costs of a weakened Health care delivery system is presented. This work uses a framework developed by Professor Rifat Atun, DEPLESET framework—account for the Demographic, Economic, Political, Legal and Regulatory, Epidemiological, Socio-cultural, Ecological and Technological landscape that frame a health system and was previously used in the examination of health system in Latin America, to explore some of the questions enumerated above.

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Part 1. Political economy/background

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I. Prologue

Resource Extraction and the Dearth of Healthcare in Sub-Saharan Africa: An Exposition of Practices That Arrested Human Development in Africa.

Sometimes it feels like this. There I am standing by the shore of a swiftly flowing river and I hear the cry of a drowning man. So, I jump into the river, put my arms around him, pull him to shore, and apply artificial respiration. Just when he begins to breathe, there is another cry for help. So, I jump into the river, reach him, pull him to shore, apply artificial respiration, and then just as he begins to breathe, another cry for help. So back in the river again, reaching, pulling, applying, breathing, and then another yell. Again, and again, without end, goes the sequence. You know, I am so busy jumping in, pulling them to shore, applying artificial respiration, that I have no time to see who the hell is upstream pushing them all in.

—John B. McKinlay

In early 2014, there was an epidemic brewing in West Africa. The presence of this epidemic had not been documented in this part of Africa. With an estimated case fatality rate of 40% and 11,310 reported deaths, the Ebola Virus Disease (EVD) epidemic in Guinea, Sierra Leone, and Liberia was the deadliest.¹ These are the official figures from the World Health Organization (WHO). However, many contend, this is likely to be a gross underestimation. Sub-Saharan Africa has seen its share of disease outbreaks—from infectious diseases to the now deluge of non-communicable diseases. But what remains to be understood is: Why is this region still a clinical care desert; while, other parts of the world are seeing improvements? Why is arguably the resource richest continent in the world, the setting for the most excruciating and

entrenched suffering known to humanity? These are questions that would have pricked the imagination of even the casual observer.

To begin to understand some of the reasons why the status quo of despair remains, one need only to look at the history of the global response to care delivery after an epidemic. This is a history filled with ad hoc interventions modeled after quarantine medicine. There have been little to no emphasis on capacity building. These have been reactive responses, lacking any articulated vision for the creation of the space, staffs, stuffs, and systems necessary to allow for descent care delivery.² Thus, the question that remains to be explored is how do we create capacity to develop responsive and resilient health systems to effectively manage health needs? To this end, the historical, institutional, structural, and economic barriers to development, the vestiges of colonialisms and the contributions, or the inaction, of multinational conglomerates operating in Sub-Saharan Africa need serious examination.

The EVD Epidemic: The Unmasking of Social and Political Dislocation

In 2014 to 2015, the West African EVD epidemic was inarguably a stark proof of the human cost of an inadequate and ineffective health system, and a demonstrably failed international response. If ever the international community needed evidence to promote investment in the building of a robust health care system, the unimaginable suffering endured by those afflicted by EVD had to be it. In what is believed to be a conservative estimate of 28,616 confirmed, probable and suspected Ebola cases reported in Guinea, Liberia and Sierra Leone, and with 11,310 documented deaths, this outbreak is recorded as the most devastating EVD epidemic in recorded human history.³

This episode, which unfortunately is just one of many, begs several important questions. ‘Why did so many West Africans have to die or be infected with Ebola Virus?’ and ‘Why was the international community response so sluggish, at best, and disingenuous at worst?’ A careful consideration of these questions bring to mind the theory of *social suffering* as espoused by Kleinman, Das, and Lock.⁴ In advancing this theory, the authors attempted to elucidate a salient question in global health study and delivery: ‘Who suffers the most and why?’ Why are the burdens of inequality so disproportional and yet predictably distributed? They argued that social suffering is, in many instances, facilitated by entrenched structural inequalities—underpinned by historical ‘processes’ and ‘forces’—that perpetuate violence.⁵ An example the authors used to illustrate social sufferings emanating from inequalities was an observation by the physician-anthropologist Dr. Paul Farmer, which I discuss below.

In Dr. Farmer’s intimate exposition of the underlining causes of the increase in the number of women living with HIV/AIDS in Haiti, he reframed the then prevailing discourse on the root causes from being one of promiscuity to one that took a very nuanced view on the factors that had exposed these women to the virus.⁶ In his analysis, he pointed out to hastily conclude that promiscuity was the primary reason these women had been exposed to HIV was in fact devoid of intellectual honesty. The distinguishing factor between those women that had HIV/AIDS and those that did not was the occupation of their primary sexual partners—those with HIV/AIDS having been drivers or soldiers. The occupations of these men made them mobile and allowed them a certain amount of social clout. Hence, while promiscuity might have played a role in disease exposure, it was that of their sexual partners and not the women. This observation is also pertinent to the discourse surrounding the dearth of clinical care in Sub-Saharan Africa. This question of the expression of agency by individuals also extends to the

national level. While the expression of agency was at question in the epidemiology of HIV/AIDS in the Haitian population, the expression of national autonomy need be interrogated in countries where care infrastructures are woefully lacking. If one were to argue that it is indeed within the purview of nation states to provide the necessary infrastructures for care delivery, the question of expression of autonomy needs further elucidation. I would submit that while it is indeed incumbent upon a nation state to provide for the wellbeing of its inhabitants, this is wholly contingent on the ability of said nation to assert its autonomy in regional and world affairs.

The unprecedented spread of the EVD epidemic through the Liberian population, for instance, from a rural township to the nation's capital city, is the result of having relatively no health system in place. Liberia's inability to surveil the populous for unusual disease outbreaks, to diagnose rapidly in the case of an outbreak, or to treat those affected has its roots in a woefully weak national health system. Indeed, Liberia is a country without a basic public health system that would guarantee, at minimum, decent public health surveillance. So why is Liberia's health system so weak? This question warrants a rigorous examination to understand the root causes and identify actions to address them, in order to develop a responsive and resilient health system that can withstand future infectious disease epidemics and the growing non-communicable disease (NCD) epidemic.

Moral Culpability, Neoliberal Economic Ethos, and Clinical Deserts in Sub-Saharan Africa

The historic presence of many predatory multinational companies operating at great profit in the Global South is well documented.⁷ In sub-Saharan Africa, the presence of the extractive industries goes back centuries. Since the initial interaction between Western powers and the continent of Africa, this relationship has been one undergirded by the interests of

businesses and empires. Consider for instance, the almost 100 year presence of the Firestone Tire and Rubber Company in Liberia. Since the mid-1920s, the Firestone Tire and Rubber Company have had a strong presence in Liberia, influencing economic and social policies. The Firestone Tire and Rubber Company moved into Liberia after obtaining a ninety-nine-year lease agreement for up to a million acres of fertile land for the establishment of the world's largest rubber plantations.⁸ The historical significance of this arrangement should not go unnoticed. This was during the dawn of the automobile era. Emerging from War World I, Americans possessed about three-quarters of the world's automobiles.⁹ To assert its independence from the British dominance of the latex industry, American industrialists were clamoring for American owned rubber plantations. This was also an era of mass colonization of the Global South. In Liberia, when individual agency and robust governance was just a mirage, the price-tag for the one million acreages of some of the most agriculturally productive land in Liberia was just 6 cents per acre.¹⁰

The renowned African-American intellectual Dr. W. E. B. Du Bois articulated this very fact during his 1931 visit to Liberia. Dr. Du Bois noted that despite the riches of Liberia, it was in a peculiar negotiating position. Despite their initial resistance to the terms of the contract, of the US State Department explicitly forced Liberian officials to accept said terms.¹¹ If ever an arrangement was made under duress, this was one. The first 'independent' nation in Africa was forced to mortgage out its land, at a loss, fearing the encroachment of European powers moving in to delegitimize its sovereignty. This was more a pay for protection arrangement than a regular business contract. Moreover, Liberia, at great protest, was compelled to take a large loan purportedly to invest in public infrastructure necessary for Firestone endeavors. What is even more telling, and undoubtedly a reason for the lack of consistent investment in clinical care

delivery in Liberia, is the fact that Firestone financed the loan under multiple disguises and at the expressed disagreement of the Liberian government. The Firestone bank served as the financial agent. The servicing of the loan included salaries of a posse of international financial experts. This in 1929 was 26 percent of total government revenue, 54.9 percent in 1931 and in 1932 it was reported to have absorbed the Liberian government's almost entire revenue. Liberia was only allowed, per the written agreement with the Firestone bank, to spend less than 0.006 percent of the initial loan disbursement on health and sanitation.¹² With the shackles of this debt, Liberia was in effect paying Firestone to do business in Liberia. Moreover, some have argued that in an attempt to intimidate the nascent Liberian government, the United States accused Liberia of a breach of the global anti-slavery agreement. An investigative team, made up of an expert group at the League of Nations, was convened to further investigate the claim that the Liberian government forcibly recruited and sold indigenous people as contract labor.¹² The League of Nations' report found that the Liberian government was indeed "systematically and for years fostering and encouraging a policy of gross intimidation and suppression" of the native population. However, the report also documented that Liberia was receiving one-fourth in profit from Firestone—the exact amount required to pay the American officials responsible for the servicing of the loan. In fact, the amount received by the government of Liberia from Firestone for doing business in Liberia was reported, by Dr. Du Bios and others, to be just 1 percent of the company's profit.¹³ Unfortunately, this exploitative business practice has remained a stubborn fact in the business arrangements between companies involved in the extractive industries and many sub-Saharan African nations. This is not just relegated to history.

The resource exploitation experienced by Liberia is also well documented in the Democratic Republic of Congo (DRC). The DRC should be amongst the world's richest

countries, thanks to the documented trillions of dollars' worth of copper, cobalt, gold, diamonds, tantalum, tin and tungsten and other natural resources beneath its ground.¹⁴ The persistent global demand for these resources—used in smart technologies—is projected to continue to rise in our increasingly technological world. However, unprecedented corruption and mismanagement of government has resulted in pronounced impoverishment of the people of the DRC. The business model by which international companies conduct business, in part, has resulted in unspeakable violence and armed conflict over the last two decades. The DRC has consistently ranked at or near the bottom of the United Nations Human Development Index.^{15,16,17,18} The breadth and enormity of corruption of those extracting the DRC's natural resources is proving to be beyond comparison. As a result there is little investment in the health system in DRC. Are leaders in global health delivery to turn a blind eye on one of the major contributors to this dearth of investment in health systems? Or should sub-Saharan Africa be doomed to continue to beg for its existence with its resources unscrupulously exploited? Needless to say, the DRC is and remains intimately connected to EVD outbreaks, both historically and as I write this paper.

This zero sum approach to conducting business need not be the only model for conducting business in sub-Saharan Africa.¹⁹ There are other business models that have proven to be profitable for both the businesses involved and the people whose resources are being extracted. Consider the Republic of Botswana. Botswana approach guarantees that the profits from its mining industries are shared and invested in infrastructure benefiting its populous. The creation of Debswana, while not perfect by any stretch of the imagination, is a model that need be replicated, or at least explored with the appropriate contextual considerations. Debswana Diamond Company Ltd, is purported to be the world's leading producer of diamonds by value. This company is a joint venture between the government—the people of Botswana—and the

diamond company De Beers. The company is evenly divided between both entities, contributing 50% of the government's revenues. This has been one of the reasons that today, unlike other sub-Saharan African countries, Botswana is now an upper middle-income country—one that enjoys many of the health benefits that prosperity provides.

Conclusion

Africa is known as the richest poor continent. This narrative must change. Businesses unscrupulously extracting Africa's riches should be held to account for conducting business in a fair and responsive way—to benefit the populous and not just their business interests.¹⁶ This is not a novel suggestion to ensure corporate and social responsibility. For instance, we expect multinational companies to do business in an environment that does not put at risks their employees in resource poor settings. If it were to be documented that their business practices were detrimental to these communities, they should be held to account, and rightly so. However, when the business practices, directly or indirectly, of companies involved in the extractive industries in sub-Saharan Africa leads to or promotes underinvestment in public health infrastructure and creates clinical deserts, the international community should wakeup and call them to account. The high case fatality rate of the EVD epidemic was not due to the virus virulence, but due to the dearth of a public health infrastructure. It is high time that this 'grab and run' business model be subjugated to the wellbeing and clinical care of those whose resources they extract: the African populous.

Moreover, the historical use of metrics such as GDP, GNP or even the GINI coefficient has failed to provide clarity on the depth of inequality and human suffering.²⁰ Instruments like the GDP and Gini coefficient are inherently limited in their assessment of inequality by not

incorporating the qualitative parts of living. Moreover, while tools like the Human Development Index (HDI) and the Multidimensional Poverty Index (MPI) account for the cost of living, literacy rate, and life expectancy. They too elucidate a limited scoop of the depth of inequality, with only three indicators. As such, one would argue for the combine utilization of these tools, quantitative and qualitative instruments, in efforts that seek to illuminate inequality and suffering.

As is said in Africa, “health is wealth.” Africans perceive health to be a guarantor of prosperity. If sub-Saharan Africa is to overcome the seemingly insurmountable burden of poverty, health must be an integral part of that equation. Sub-Saharan Africa has the natural resources in place to generate enough revenues to cater for its peoples and to transition away from dependence on overseas development assistance (ODA) and a predominantly donor-recipient relationship to a locally-led ownership of its care delivery system. As such, it is incumbent upon us, as practitioners of global health and as responsible human beings, to understand and, dare we say, articulate the historical and current juxtaposition of resource extraction and the dearth of care. We must not be seen as ignoring the scars and cries of those we have dedicated our lives to serve. Be it the ravages of EVD or sexual violence in the name of conflict resources, these voices of sub-Saharan Africans warrant careful consideration and action. The dearth of clinical care and public health infrastructure need not be a perpetual state. Sustained investment in building strong health systems from the rich resources of Africa will provide for accessible care for all maladies, and for all those in need, at every stage of the continuum of care, even when ODA declines.

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II. The Burden of History

A. A Brief History of The Republic of Liberia

The Republic of Liberia, “the land of the free,” was founded in 1847, or better said, it was recognized as an established entity by some Western nations. On July 26, 1847, recently repatriated emancipated Americans of African descent declared independence and the official formation of a “free state.” Emigration from enslavement and discrimination in North America to the Western shores of Africa begun in the early 1820s. These brothers and sisters, brutally uprooted from their ancestral homeland centuries earlier, were being encouraged to return to a place and a culture, though deeply rooted in their DNA, they had lost touch with. The American Colonization Society (ACS), established in 1816 to encourage the repatriation of African-Americans, enjoyed support from some of America’s most prominent politicians and slaveholders. Among those lending support to the ACS were Abraham Lincoln, James Monroe (one of the Founding Fathers and fifth president of the United States after whom the capital city of Liberia, Monrovia, was later named), and Secretary of State Henry Clay were of the conviction that it was much more preferred to facilitate the return of these free blacks to Africa in lieu of enforcing the legally required emancipation of African-American.¹⁴

The recently immigrated Americo-Liberian settlers chose not to identify with the indigenous peoples they had encountered. There was a mistrust between the natives, especially those in communities of the more isolated terrains, and the newly arrived Americo-Liberians. The newly arrived settlers had very limited appreciation of the cultures, languages, belief systems, and the contexts in which the longtime natives lived. Encounters with tribal Africans in the hinterland often resulted in violent confrontations, paralleling in earlier cruel encounters with

slave hunters and masters. This resulted, perhaps inadvertently, in a stratification in the Liberian society. Americo-Liberians projected an aura of superiority, in culture and education, over the indigenous peoples. The Americo-Liberians, as a small elite group comprising only 5% of the population, had a monopoly on political power and all the nation's decision-making systems. It excluded the indigenous tribesmen from birthright citizenship in their own lands until 1904, in a repetition of the United States' treatment of Native Americans.¹⁵ Because of [ethnocentrism](#) and the cultural gap, the Americo-Liberians envisioned creating a western-style state in which the tribesmen needed to be assimilated.

It is within this context that one observes an ethos of governance emerging. This view of governmentality allowed for the institutionalization of discrimination in this new society.¹⁶ This was a society where inequities and segregation were instruments the state used to advance its agenda. The obvious disregard of the indigenous population for the first 150 years of the republic was also evident in various governmental policies including health. Resources were geographically disproportionately distributed, and assets favored those of Americo-Liberian ancestry. The prevailing governing philosophy was one that favors the use of the state's fiduciary responsibilities—healthcare delivery, security, promotion of justice and equality under the law—as a means of coercion to pacify the populous. This resulted in Liberia being a society with pronounced inequities and inequalities.

In a resource limited setting, these documented perversions of governance had dire consequences. The distributions of disease burden among the urban, rural, and the often forgotten urban remote and rural remote inhabitants is a good barometer of the effects of this system of governance. This is also evident in the State's business agreements with international conglomerates working in the extractive industries. Historical business arrangements with

companies, such as Firestone, and others within the mineral extraction industry, have favored the elites and even more greatly their Western benefactors. Indigenous Liberians have profited little. Moreover, they have suffered from the adverse effects of unregulated resource extractions. There were no environmental regulations. There was no fiduciary responsibility of these conglomerates to their employees, or the inhabitants whose resources were being exploited. The inhumane conditions in which indigenous Liberians were forced to work, and the lack of healthcare delivery systems in the catchment area servicing these multi-billion-dollar enterprises is again evidence of the value, or the lack of value, placed on the lives of these Liberians. Now, this is not to absolve the western collaborators of this apathy like system of governance, but to demonstrate that at least 5% of the Liberian population were complacent in this pillaging and exploitation of their fellow citizens.

Another historically relevant factor that contributed to the observed lack of care delivery infrastructure in Liberia has been the adverse impact of the 14-year long civil war. The Liberian civil war was an attempt to unsettle the first Liberian president with indigenous ancestry. Samuel Doe had come to power through a bloody coup d'état in 1980. With the promising of promoting equality, and fairness, Mr. Doe had instead promoted ethnic tension and executed a brutal repression of anyone that would question his legitimacy and violation of human rights. Mr. Doe's governing philosophy was no different from his predecessors. He favored members of his tribe and disproportionately allocated resources to allow for their advancement and care. It is within this context that another Liberian tyrant and warlord was introduced.

On the eve of Christmas of 1989, Mr. Charles Taylor, a convict who 'broke' out of a maximal security prison in Plymouth, Massachusetts, led a rebel group comprised mostly of fighters from the Gio and Mano tribes—these tribal groups had suffered the brunt of Mr. Doe's

wrath—into Liberia. The ensuing years of unimaginable brutality and the complete destruction of infrastructures set Liberia back at least a century. The Liberian civil war came to an end in 2003, after an estimated 250,000 deaths and over 1million people exiled.

However, under the extraordinary leadership of the first freely elected female president of an African Nation, Her Excellency Madame Ellen Johnson Sirleaf, Liberia by all measures was beginning to enjoy a historical comeback. President Sirleaf’s election in 2006 had ushered in a new governing philosophy, one that promoted equality and the rule of law. Liberia’s dilapidated institutions were beginning to be rebuilt. Under this visionary, though not flawless, leader infant mortality and maternal mortality have seen some modest decrease. Moreover, a care delivery system was in its genesis. However, Liberia again received a devastating blow to its recovery efforts when the Ebola Virus Disease (EVD) epidemic uncovered the incredible fragilities within the nascent healthcare system.

B. An American Colony: “America’s Forgotten Step-Child”

The Story of Liberia is that of the United States of America. The birth of Liberia was in response to and because of America’s history of black oppression. For America to absolve herself of any responsibility in the affairs of Liberia is indeed an exercise in moral bankruptcy.

—AGM

At the dawn of the abolition of slavery in the United States, many whites comfortably took an indifferent stance on the exploitation of those they may had considered to be children of a ‘lesser god.’ While they might have appreciated and articulated the moral and economic contradictions of slavery (and dare I say the very contradiction to the ethos of the Declaration of

Independence and the US Constitution), many were unwilling to align with the abolitionists.¹ Having been indoctrinated as to the purported ‘violent’ nature of the black man, they were fearful of the consequence of unleashing and endowing with all the rights of state and humanity this ‘violent’ group of people. Furthermore, most indifferent Americans were of the conviction that these enslaved people had no chance of fully participating in the American life.¹ Even more interesting, academia at the time provided the necessary ‘intellectual covering’ for the advancement of this position. Prevailing social theory at the time asserted that peoples of different races should not mix, and in fact, integrating could not happen. They argued that there was no historical precedence. (Erroneously, I would add.)¹

It was in this atmosphere that some coalesced around the idea of segregation and the repatriation of Americans to Africa. They argued that Blacks would not be allowed to compete fairly in a white supremacist society.¹ It was envisioned that they would be separated and relocated to the land of their ancestries, where they would be allowed to self-govern and ascend to their truest potential. This was considered a pragmatic solution, a welcome compromise. Advocates for the colonization of Africa found support for their position in the near inhumane living conditions of black Americans.¹ These were, for the most part, uneducated slaves forced to work in the industrious farmlands of America. They were systematically relegated as being sub-human and denied legal rights that whites could avail themselves of. The inhumanity to which their captors subjected them to, through brute force, is unimaginable. This included the prohibition of participation in formal marriage. Their oppressors saw them as mere properties to be discharged by any point for any reason. It was in these conditions that a fundamentally flawed idea of a ‘solution’ was conceived: colonization.¹

Members and sympathizers of organizations like the ACS misinterpreted the logical effects of the gross abuse—by the state and individuals—toward the basic humanity of these black Americans. They presumed black Americans were inapt of participating in civil society.¹ As articulated by Hall in *On Africa's Shores*, “Rather than purge society of the injustices that had put black people in such straits, they chose rather to remove them.”¹ The ‘solution’ offered by the colonization movement was a blatant attempt to purify the state and its citizenry of any moral and criminal culpability. In fact, while the manifesto of the ACS was silent on a position on the exploitation of slavery, it suggested that America was disposed to be a “better place without slaves or blacks in general.”¹ The vast majority of the members of the ACS articulated the work to eliminate the threat of the growing population of ‘free blacks,’ in lieu of a deep moral concern for the wellbeing of their fellow human beings and a commitment to end the brute objectification and monetization of blacks. Emancipation was at best an afterthought. This was to the advantage of slave masters, who perceived ‘free blacks’ to be an affront and a threat to the maintenance of the status quo of keeping enslaved blacks. These ‘free blacks,’ if left to flourish in America, could serve as sources of inspiration for those still under the gauntlet of slavery. To this end, some slaves were offered their freedoms—or should I say offloaded from plantations by their oppressors—only if they agreed to emigrate from the US. Individuals and instruments of the State were also dispensed and committed to employing every conceivable—and dare I say inconceivable—tactics to keep these ‘free blacks’ under subjugation of white supremacists. Because of the ambiguity of their position, it could be argued that ‘free blacks’ occupied a perilous space in American society. Proponents of colonization made the most of this discordance by arguing to slaveholders: the best alternative to having ‘free blacks’ roaming around freely was to allow for their deportation to Africa. While persuading some ‘free blacks’

that their best hope for a fruitful existence was to quietly exit their homes in America and emigration to Africa.¹ The dubious cynicism with which most colonizers acted would not go unnoticed to many black Americans.¹

However precarious, the idea of deporting one's black citizens to Africa did not originate from the activities of the ACS or either of its sister organizations, the Maryland Colonization Society or the Virginia Colonization Society. As early as 1787, the British crown had established a resettlement colony on the western shores of Africa.² Sierra Leone served as the location for the favorable resettlement of London's 'Poor Blacks.' The perceived abolition of slavery in England came about when an influx of blacks, freed and enslaved, stepping onto English soil anticipating their emancipation. This was a gross misinterpretation of Lord Mansfield, the Lord Chief Justice's injunction of 1771 in the case of *Somerset vs. Stewart* which stated that "no master was ever allowed here [in England] to take a slave by force to be sold abroad because he deserted from his service...therefore the man must be discharged."³ The Lord Chief Justice's ruling simply argued that the forcible removal of slaves from Britain to be sold was illegal. With this influx of blacks into England seeking opportunity for gainful employment, the plight of 'black poor' presented Londoners, and those of urban locations, with a delicate social conundrum. To alleviate the Brits of this "potentially disruptive" influx of poor blacks, the somewhat utopian idea of a "Province of Freedom" where blacks could be repatriated was born.²

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C. Unequal at Inception: The Sociology of Inequity and the Underdevelopment of Liberia

Intricate underpinnings of sociological underdevelopment are evident through the analytical lens of historical texts such as Harvard University's 1926 *Expedition to Liberia* and the critical work documented in *Bitter Canaan: The Story of The Negro Republic*. In *Bitter Canaan* the renowned 20th century American sociologist and a giant in American race relation policy, Charles Spurgeon Johnson explored the reach of American colonization and its effects on the African nation of Liberia. In 1929, Dr. Johnson was invited by President Herbert Hoover to represent the United States on the International Commission of Inquiry into the Existence of Slavery and Forced Labor in the Republic of Liberia.^{1,2} As a commissioner, Johnson had a seven month long stay in Liberia from March to September of 1930. Informed by his observation, even the incrementalistic civil rights leader was appalled by the systematic approach to oppression of indigenous Liberians by the Americo-Liberians and the French and British European colonial powers. The culpability of the United States as the 'reluctant guardian of the nation state' in the gross mismanagement and exploitation of Liberia's resources, and intentional efforts to derail Liberia's development, did not escape him. In *Bitter Canaan*, Johnson stood apart from what was a dominant school of thought—the Chicago School of Sociology (now known to some as as Humanistic Sociology)—in repudiating, using abstract empiricism, the treatment of the people of Liberia by the super powers of the time and a minority group of the elite Americo-Liberians.

A question one ponders as an African intellectual, or anyone interested in exploring the continent's affairs, has been: Why has the continent seemingly been stuck in a "poverty trap" (as said by Jeffrey Sachs)?³ Why is it, at least it seems, that generations and their progenies are destined to experience such depths of deprivation? The answer or, in the least, the recognition of this question, is necessary in addressing the dearth of clinical care and public health one observes

on the continent. The absence of systems response to diseases and the wellbeing of so many must find its root in the answers to these questions.

The Republic of Liberia, founded in the 1820s and declaring its independence in 1847, was the first major American colonial excursion into Africa. Liberia, founded by freemen, freewomen, and ex-slaves and with the moral and financial support of the ACS. Notwithstanding the tepid support of the American government, and the fact that it took the American government many years before recognizing the sovereignty of the first black republic on the continent of Africa, within decades Liberia was recognized, in world opinion, as a protectorate of the American government. The historic disinclination of the United States government to involve proactively themselves in issues pertinent to Liberia's interests has been informed by the instinctive American foreign policy ethos of isolationism through World War I (leaving space for corporations and individual Americans to drive the American interests). However, this avoidance was occasionally breached due to heavy financial burdens or when European colonial powers were encroaching on the nascent nation's territorial sovereignty.²

Agents for the advancement of American interest also presented themselves as Missionary associations and American industry titans.² In many regards, American missionaries were instrumental in nudging the American political consciousness and its foreign policy agenda on the ramifications of maintaining a neutral stance on the Antislavery convention—one that had been ratified by many major nations.¹ The resulting US policy on the state of the international slave trade and slave labor was essentially written by the governing bodies of these missionary associations. However, although informed by their moral standards, the propositions advanced by these missionaries articulated economic and political ramifications of inaction. The US reluctance to take a stand on the continuation of the international slave trade was informed by a

trepidation that an increasing global pressure would embolden domestic labor unions. The emerging argument was not unlike current arguments made against multinational conglomerates. The essential argument pertained to the existing relationship between imported cheap goods and the forced, or exploited, labor system producing said goods.

Moreover, the role of American philanthropic organizations in advancing American interests, the perceived ramification of a neutral stance on the global slave labor, and the observed lack of developmental infrastructures should not go unnoticed. The Rockefeller International Education Board, Phelps-Stokes Fund, and the Carnegie Corporation were angling for an imminent participation in European colonial education ventures in Africa and coveted an America perceived to be engaged globally. The strategic positioning of these organizations, by their administrators, was propagating the Tuskegee model of southern black education in the African context.³ The logical underpinning of these initiatives was that similar to the U.S. south: technical education would make African “adaptive” to their ‘environments.’² Whether intentionally or not, the resulting creation of nations of passive colonial subjects was widely exploited in Africa.³ For instance, in Liberia in 1920, the Booker T. Washington Industrial School was established, funded by the Phelps-Stokes Fund and the international Education Board. The foundation had a total monopoly on the decision-making apparatus of the school and its programming. The school’s governing board included Jackson Davis of the Rockefeller General Education Board and the International Education Board, and Thomas Jesse Jones of the Phelps-Stokes Fund.⁴ This allowed these individuals and their respective organizations to be key policy drivers of sociocultural remedies to the existing underdevelopment and emboldened them to act as final arbiters on Liberian internal affairs.

Even more profoundly, between the 1918-1939 interwar period, the Phelps-Stokes Fund was seen as an institutional surrogate of the US State Department's African foreign policies. These organizations spearheaded and presented themselves as the duly regarded trustees of the education of Liberians; and, as such, the principle crafters of Liberia's developmental future. Through their widely received publications on African native educational policy, these foundations became the perceived guardians of the educational interests of Liberians.⁴

The combination of the efforts of missionary organizations and American foundations culminated in the creation of 'adaptive corporate forms of native African education. In Liberia, the convergence of these initiatives with the business interest of Harvey Firestone in developing a rubber plantation came to fruition in the 1920s. The increasing American demand for rubber goods, alongside the rise of the automobile industry, and the British stranglehold on rubber production, were impetuses in the search for territories and conducive populations for the establishment of rubber plantations.⁵

The depth of American interests (economic, political and militarily), the duration of these interests, and the resulting underdevelopment begs a more critical examination. The existence of this historic underdevelopment of Liberia and the prevailing state of inertia has been influenced by internal and external policies driven by the interests of large corporations and the US government, rather than indigenous Liberians, leading to the wide inequalities that are observed today.

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Health, Ecology and Economics: Health Systems in the Era of Environmental Degradation, Instability, and Persistent Inequalities

Health is a catalyst and a critical ingredient for achieving economic, social and environmental goals, including alleviating poverty and economic growth. Targeted investments can produce improvements in health outcomes, provide financial risk protection to citizens when they are ill, and produce substantial societal benefits beyond health to help achieve Sustainable Development Goals (SDGs). Conversely, ill health produces poverty and hinders economic growth, while poverty drives ill health in low-, middle- and high-income countries alike, creating a vicious cycle.

—Professor Rifat Atun, Harvard Forum for Finance Ministers 2016

Liberia is a country of approximately 4.7 million people with an area of 43,000 sq. mi, and 224 sq. mi of coastline.¹ Liberia is also a country rich in natural resources - iron ore, timber, diamond, gold, rare animal, and plant species, and the generation of hydroelectric power. Liberia is home to one of the world's major tropical rainforest ecosystems. However, there exists a history of poor management of these resources. Exploitation of these natural resources was amplified during the Liberian civil war of the 1990s and early 2000s. For instance, warlords entered illicit business relationships with foreign timber firms, to facilitate the exploitation and deforestation of occupied forests.² The unscrupulous extractions of Liberia's natural resources were even more evident when multinational conglomerates like the Oriental Timber Company (OTC) fostered an atmosphere of terrorism and unimaginable brutality when working with then warlord Charles Taylor.³ OTC, utilizing its private army, was responsible for creating a slave-plantation style of management where the abuse of 'employees' working in their concession

areas—including brutal floggings- was commonplace.³ Fearful of the OTC business practices, numerous towns and villages were disseminated. The impact of deforestation has been far reaching. While historically Liberia forests had served as a source of nourishment and a natural buffer between rural communities and wildlife, due to the unprecedented deforestation this dynamic changed. The pillaging of Liberia’s timber—where France and China were also huge beneficiaries⁴—might have increased the probability of exposure to zoonotic diseases. This massive deforestation of Liberia and the resulting weakening of its natural defenses to uncommon infectious agents were in direct contradiction to the promises of these conglomerates: to promote the reforestations of Liberia.⁵ The Ebola Virus Disease epidemic of 2014-2016, should be considered one of the long-term effects of this blatant exploitation of Liberia’s timber. It is within this context that a new approach to building and investing in an equitable health system should be envisioned. Even more important is the fact that the concern of deforestation is not just one relegated to the dustbin of history, it is indeed an ongoing affair.

Further, the distribution of the inhabitants of post-war Liberia has since been skewed towards urban communities. Liberia has an urbanization rate of 4.5% annually.⁶ The vast majority of these communities are along the coast. Monrovia, the largest city with roughly 30% of the Liberian population¹ and the political and commercial capital, sits along the Cape Mesurado peninsula, between the Atlantic Ocean and the Mesurado River. The Saint Paul River also borders it on the north. In short, the most populated city in Liberia is one surrounded by water. The adverse impact of global climate change on the health and well-being of the inhabitants of Liberia’s coastal communities is beginning to manifest. With a disproportional dependence on climate sensitive industries, for instance fisheries, and the predominance of climate vulnerable infrastructures, Liberia’s capacity to withstand climate related shocks is

nonexistent. There has been a marked increase in the degree of erosion of Liberia coastal areas. The ocean is increasingly infringing on the habitats of coastal dwellers as evidenced by an increase in the frequency and level of flooding in recent years.⁶ The impact of heavy rains, storm surges, increased erosion, and a rising sea level, poses a definite challenge to the health and wellbeing of both the rural and urban poor. There has been a documented increase in water-borne diseases, and a sense of uncertainty among many Liberians (Liberia Demographic and Health Survey 2018). For them, the danger of global climate change is no longer theoretical but rather one that is already taking its first victims.⁷ Further, it is estimated that by the middle of the 21st century, Liberia and most African coastlines, will see a rise in sea level of 0.5 meter, with a projected loss of more than 10% in GDP.⁷

With the impact of deforestation and raising ocean levels due to the global climate change, Liberia's economy, environment and the health of its citizens, are at a penurious and precarious place. The abiding link between health, economic growth or stagnation, and equity is one that should inform any discussion about the well-being of individuals and communities. A sustained investment in health results not only in better health outcomes, but one that has the potential of abolishing the vicious cycle of poverty and disease is warranted.⁸ Moreover, the link between health and the economy is without equivocation bidirectional (See Figure 1&2). One's health does impact one's economic viability, and one's economic status in life also influences one's health. This relationship, between health and economy, could also last throughout one's entire lifespan. What is even more sinister about the far-reaching impact of the health-economic chain reaction is that it is intergenerational. Over the first decade of the 21st century, health gains in low-and middle-income countries, resulted in approximately 2% yearly growth in full income.⁸ This is a staggering example of how a sustained and strategic investment in health has

led to reducing poverty. Thus, understanding and designing strategies to ameliorate the social determinants of illness must be included in all health endeavors targeting vulnerable populations, or populations in vulnerable circumstances. This is a viewpoint increasingly shared by many Global Health practitioners and thinkers.

Moreover, Professor Atun has pioneered a fundamental paradigm shift in how we think about paying for health. His approach is one that moves away from “paying for health,” to “investing in health.” Through an extensive global exploration of numerous countries’ approaches to establishing and enhancing a positive loop between health-economic growth-and equity, Professor Atun argues that there are five principle mechanisms that explain how health affects poverty and the economy:⁸

*(i) **Financial protection:** Removing financial barriers to access enables the use of health services when needed, and helps at-risk households avert impoverishing expenditures and poverty.*

*(ii) **Education:** The prospect of longer, healthier lives induce people to invest more in their human capital, as they are better able to realize future long-term gains in employment and income.*

*(iii) **Productivity:** Productivity is enhanced through contribution of better health to increased worker capacity, lower rates of absenteeism, and less workforce turnover.*

*(iv) **Capital investments:** Heightened longevity in lifespan and higher incomes mean people save more for retirement –boosting the economy-wide capital available for increased investments.*

(v) **The demographic dividend:** With the right conditions in place, changes in population age structure with growing and educated work force creates the opportunity for economic growth.

It is this framework and ethos that should inform how Liberia, and other LMICs, think about how they advance the wellbeing of their populations. This model allows for the development of innovative financial instruments aimed at building and strengthening their respective health systems.

Figures 1: The Bidirectionality of ill Health, and Poverty.

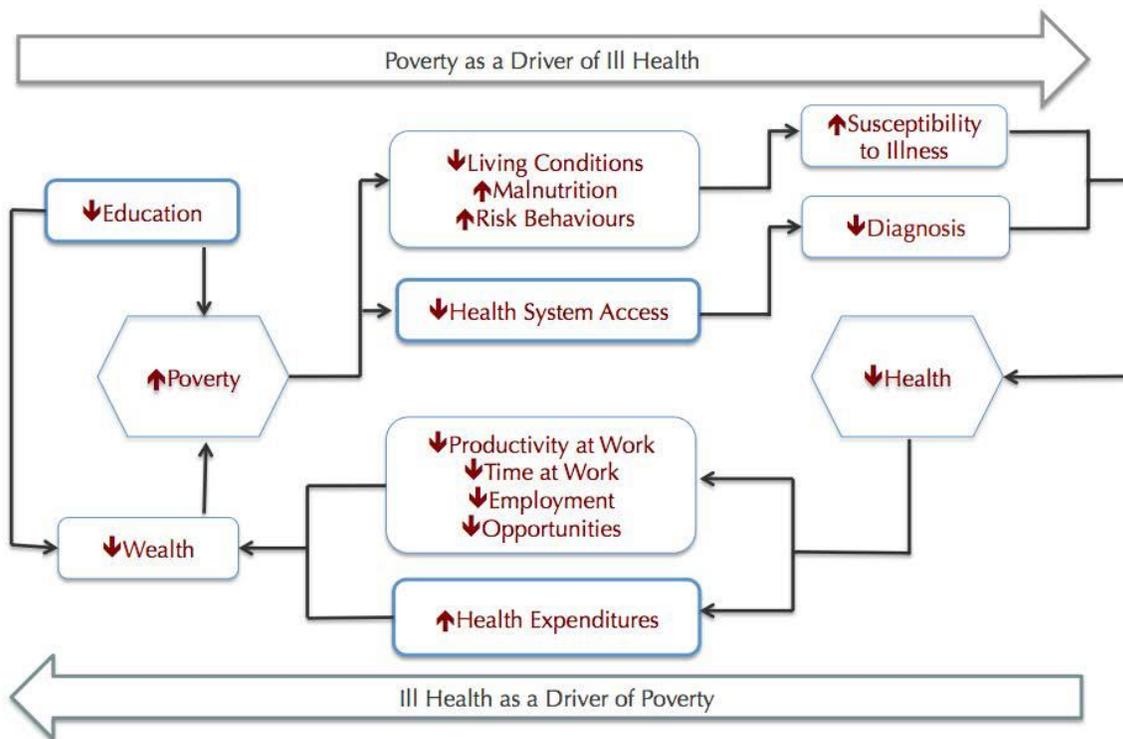


Figure 1. Source: (Atun, Chaumont, Fitchett, Haakenstad, and Kaberuk, 2016)

Figures 2: The Bidirectionality of Health, and Poverty Alleviation.

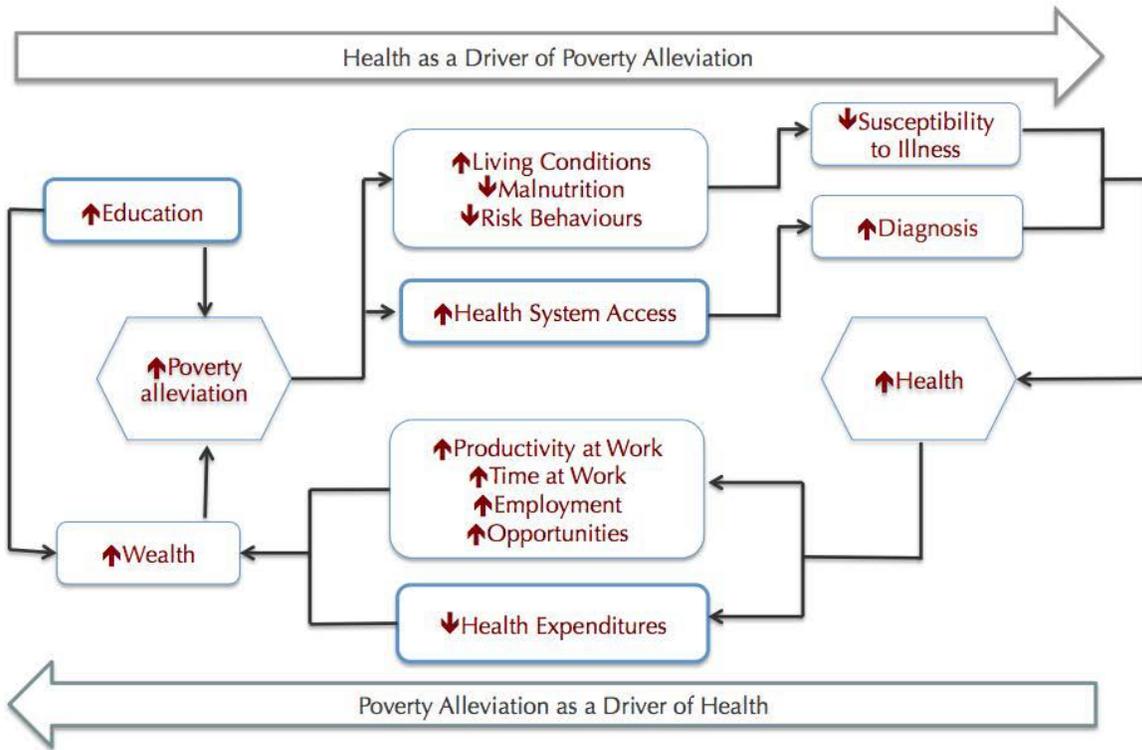


Figure 2. Source: (Atun, Chaumont, Fitchett, Haakenstad, and Kaberuk, 2016)

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Part 2. One publishable research paper

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1. Introduction

Between 2014-2015, the West African Ebola Virus Disease (EVD) epidemic in Liberia and two of its neighbors, Sierra Leone and Guinea, would be inarguably evidence of the human cost of an inadequate and ineffective health system, and a demonstrably delayed international response.^{1,2} If ever, the international community needed evidence to promote sustained investment in the building of a robust health system, the unconscious suffering endured by those afflicted by EVD had to have been it. In what is believed to be a conservative estimate of 28,616 confirmed, probable, and suspected cases to have been reported in Guinea, Liberia, and Sierra Leone, and with 11,310 documented deaths, this EVD outbreak is recorded as the most devastating Ebola Virus epidemic in recorded human history.

The lack of adequate health systems in many sub-Saharan African countries, and most LMICs, has resulted in the unabated spread of diseases and many unnecessary deaths. The Ebola Virus Disease (EVD) epidemic in these three West African countries should serve as a good barometer of the gravity of a weakened health system. The level of human suffering observed during this epidemic points to an absolute need for the development of a better health care system. The EVD outbreak and the ferocity with which it ravaged communities should serve as a diagnostic of the current care delivery apparatus; laying bare the many inabilities of the health systems and predicting what may lay ahead.

Health systems are integral to improving population health. The World Health Organization (WHO) estimates between 1952 and 1992, half the gains in global health resulted from application of new knowledge and technology in health systems, with the remaining gains due to income improvements and better education.³ However, despite the increasingly large proportions of national incomes and foreign investment in health care in low-and-middle income countries (LMICs), the performance of many health systems remains suboptimal in terms of the desired outcomes of higher and more equitable population health, protection from financial risk, and user satisfaction. Inadequacies of health systems to respond and adapt to emerging challenges also affects the delivery of communicable and non-communicable disease programs. The limitations encountered by these disease programs are due less to the technical content of the program but rather the shortcomings of health systems.⁴ Conversely, where these programs have proven to be successful, it is often because of the performance of health systems.⁵ Thus, health systems strengths more broadly increase the opportunities for success and sustainability of these disease-specific programs. The WHO and others have identified comprehensive engagement with and strengthening of health systems as necessary starting points for the successful scale-up of communicable and non-communicable disease programs.⁶ The responsiveness and resilience of a health system to internal and or external shocks is indispensable to the well-being of a population.

A responsive and resilient health system is one that is both predictive and inclusive. It is one that is strategically build for current and future shocks—be them internal and or external shocks. The 2014-2016 EVD epidemic illustrates the diversity of challenges health systems in Liberia and other regional and economic peers are or could be confronted with. With the rapid demographic and epidemiological transitions compounded with increasing ecological changes,

economic stagnation and tenuous socio-cultural environment, the health system in Liberia must be designed to respond and be resilient in the face of emerging challenges and shocks, while continuing to provide effective universal health coverage.

The sustained investment in health systems, particularly in resource constrained and fragile states, is critical to the building of responsive and resilient health systems. In the first decade of 21st century, Development Assistance for Health (DAH) had increased every year. This increase in DAH was mainly driven by investment in HIV/AIDS, tuberculosis, and malaria.⁷ There were also new investments by nation states that saw health as a means of improving the well-being of others while also advancing their national security interest amidst increasing radicalization. However, by 2011, this commitment began to wane. This was partly due to the economic crisis experienced by donor states, and a shift away from prioritizing investment in global health. The corresponding gap in health financing was largely left to states with limited resources to fill. Between 2008 and 2009, domestic spending on general health expenditure had increased precipitously.⁸ Low and middle-income countries increased their contribution by about \$50 billion during this time period.

In this paper, we seek to elucidate the structural deficiencies that may have predisposed the Liberian health system to the onslaught of the EVD epidemic. We will also explore the effect of underinvestment in the Liberian health system. We proposed policy option to effectively strengthen the Liberian Health system against current or future internal and external shocks. Moreover, some of the trends observed before the EVD epidemic could serve as predictors of future outbreaks in areas with similar context.

2. Methods

2.1. Setting and data sources

We used publicly available data from the Demographic Health Surveys, World Bank, WHO, UNICEF, and data from government sources. Data for a predetermined list of population, health systems, and outcome indicators were collected for Liberia. Our main source of data from the Ministry of Health and the World Bank Indicators website [databank.worldbank.org/data/reports.aspx]. These data are officially compiled and aggregated from national surveys and administrative registers by the Japanese government and made available at the website on a quarterly or annual basis. We confined our study to the time period 1968–2016 for economic data analysis, and all other metrics for which data were available for most indicators and to span the time before the EVD epidemic (before 2014) and during the EVD epidemic (2014–2016).

Population Indicators:

Demographic and socio-economic indicators, including: population size, population density, percentage of people between 0-14, and those between 15-64 years old, urban and rural populations, female population, fertility rate, refugee population, and real gross domestic product (GDP).

Health system indicators:

Health system indicators: number of hospitals, number of clinics, Hospital beds, number of physicians, number of nurses, number of outpatient visits, number of hospitalizations, number of ambulance calls, and health expenditure per capita.

Health outcome indicators in Liberia:

Our main health outcome indicators were all cause mortality rates, from the survey of vital statistics at Ministry of Health. The causes of death of greatest interest are all-cause mortality, immunization coverage, tuberculosis case detection rate, tuberculosis treatment success rate, and access to basic drinking water services.

2.2. Data analysis

All quantitative data were analyzed using Stata v.13 (StataCorp. 2013. Stata Statistical Software: Release 13. College Station, TX: StataCorp LP, USA). We analyzed all indicators before and during the EVD epidemic to produce descriptive statistics and to establish a time-trend line plot to examine changes over time (2005–2014) and to compare the trends before (2014) and during EVD epidemic in Liberia (2014–2016).

3. Results

3.1. Quantitative findings

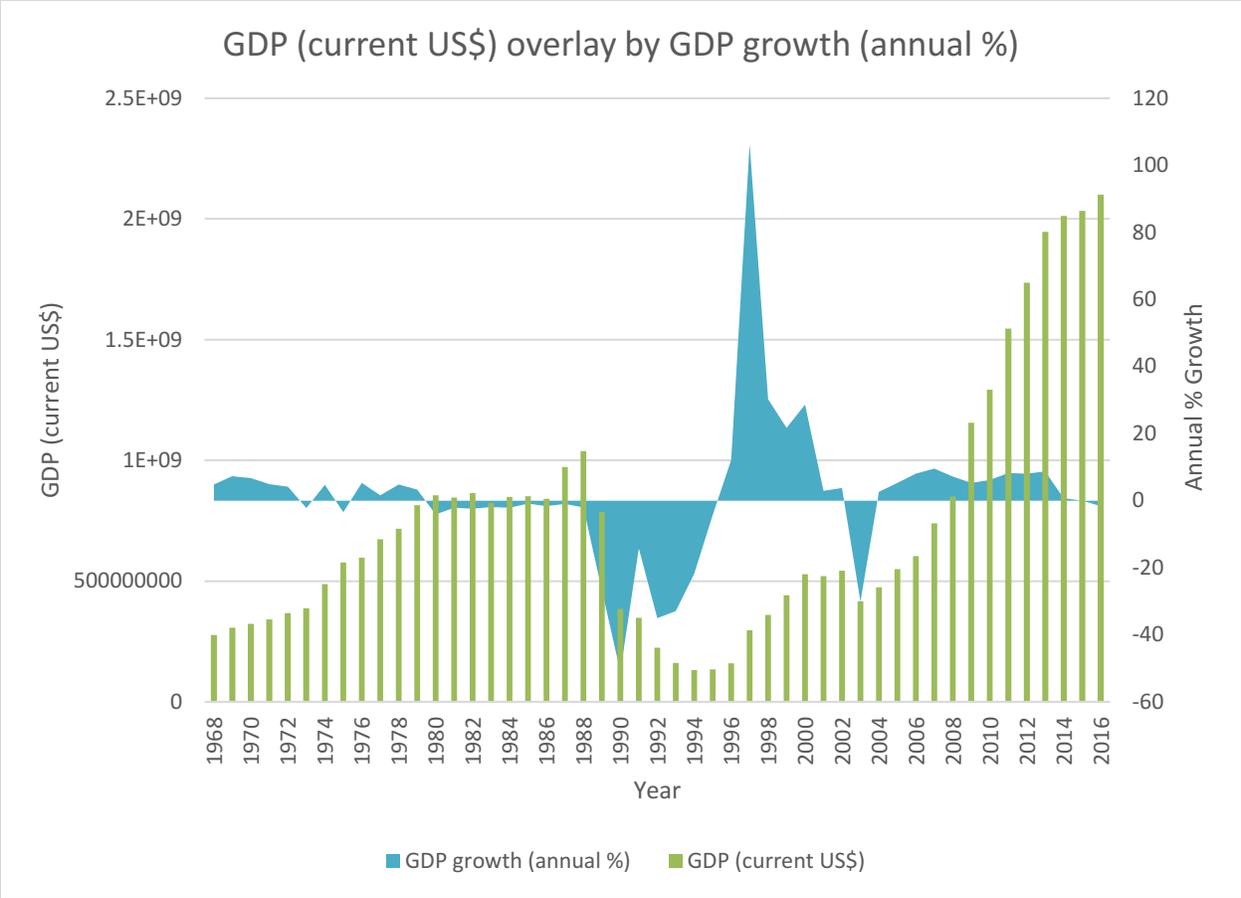
- Create tables and figures to describe your data, and then explain the key points of those tables and figured in the results.
- Include these tables and figures in line with the text
- Indicate any important trends that answer questions related to your research question.
- Demonstrate any relationships between data trends.

Economic Trends: The question of human development is indispensable in any attempt to understand better the context within which the Liberian health system exists. The Human Development Index (HDI) of the United Nations Development Program (UNDP) is an appropriate comparative analytical tool in this regard.⁷ The HDI interrogates three principle dimensions of human development. The first principle is life expectancy at birth as a means of

investigating one's ability to lead a long and healthy life. The second dimension is the Mean years of schooling, and expected years of schooling both are attempts at elucidating the population's ability to attain knowledge. The third element accounted for by the HDI is gross national income (GNI) per capita. This last element tries to document the ability to achieve a decent standard of living. Liberia compare to its neighbors and economic peers has one of the lowest GNI (See Supplemental figure 1a). The 2016 Human Development report from the UNDP, using the HDI, ranked Liberia 177th among the 188 countries assessed.¹ Liberia is near the bottom of countries considered to have low human development.

Moreover, a more granular examination of the report reveals that Liberia is fairing far worse than most of its economic peers (See Supplemental Figure 1b, 1c). The report also ranked Liberia 142nd among the 152 countries where inequality was accounted for using the Inequality-adjusted Human Development Index (IHDI). In addition, the Gender Development Index (GDI) compares female and male HDI values. GDI interrogates women's empowerment. 44.0% of women, between 2005-2015, were reported to be literate compare to 64.7% of males. The Multidimensional Poverty Index (MDPI) measures non-income dimensions of poverty. In Liberia, 68.6% of the population was reported as living below the global income poverty line of \$1.90 a day (PPP, purchasing power parity 2014), and 63.8% were living below the national poverty line. The growth in Gross Domestic Product (GDP) of Liberia has been anemic at best over the last decade after the civil war in 2004 (Figure 1).

Figure 1: Liberia Gross Domestic Product (GDP) growth and the GDP annual percentage growth (1968-2016)



Data Source: World Bank Data Indicators (<http://databank.worldbank.org/data/report>).

Since Liberia return to free democratic governance in 2004, by the election of its first female president, the Nobel Peace Prize Laureate Madame Ellen Johnson Sirleaf there has been an increase investment in health (Figure 2). However, this investment in health tapered off in 2009. Between the period of 2009 and before the EVD crisis of 2014, the level of total investment in Liberia health system, as defined by total per capita health expenditure, was below projected trend. Hence, for a period of four consecutive years there was a marked decrease in health care goods and services.

Figure 2: Total Health Expenditure per capita: 2004-2016

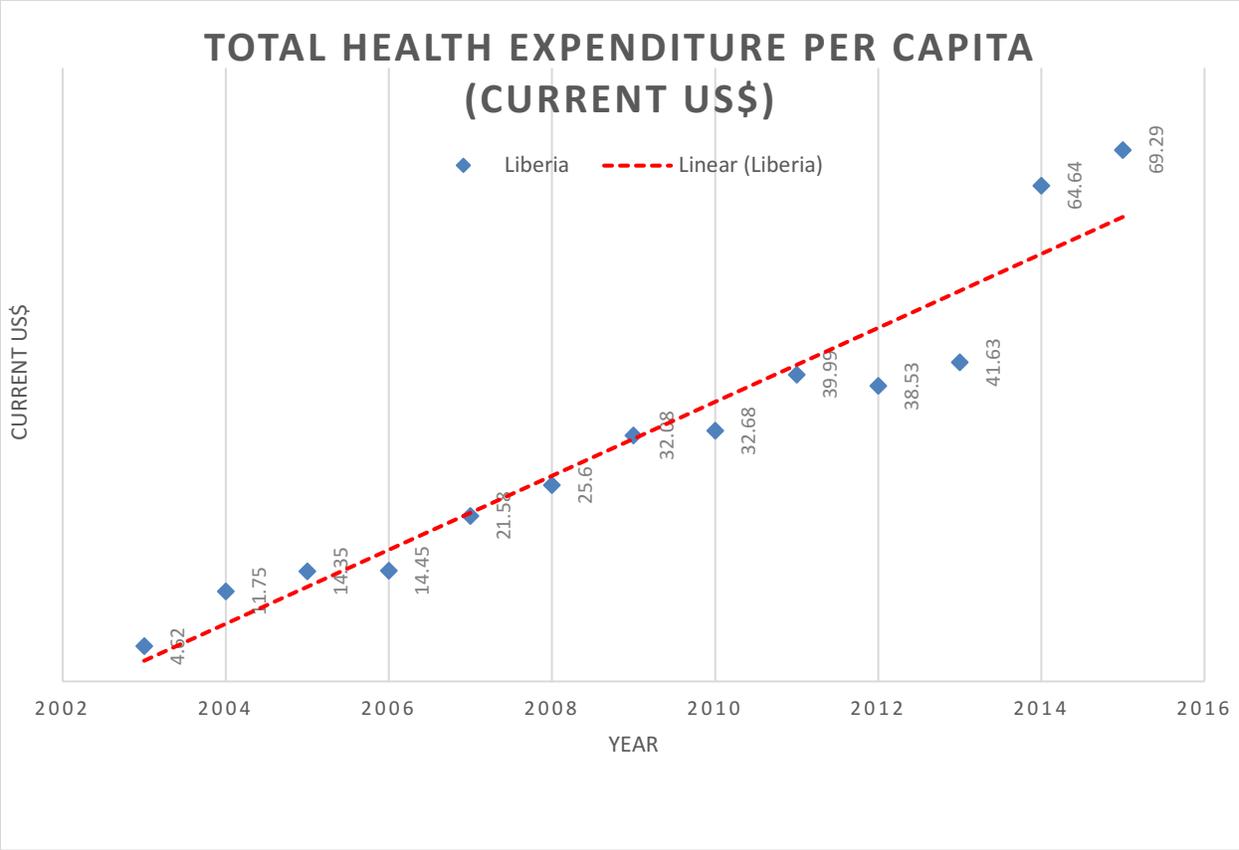


Figure Description: A few years prior to the Ebola Virus Disease epidemic, there was a marked decrease in Liberia per capita health expenditure. Dotted red line represents a linear forecast, while the blue bars are indicative of actual health expenditure. This was corrected during the Ebola Virus Disease epidemic. (WHO Definitions: Current expenditures on health per capita in current US dollars. Estimates of current health expenditures include healthcare goods and services consumed during each year.) Data Source: World Bank Data Indicators (<http://databank.worldbank.org/data/report>).

This decrease in Total health expenditure coincided with a decrease in external health expenditure (Figure 2). The observed decrease in the acquisition of external aid, either directly to the government for investment in its health delivery apparatus or through the presence of non-governmental agency extended up until the EVD epidemic.

Figure 3: External Health Expenditure as a percentage of Total Health Expenditure

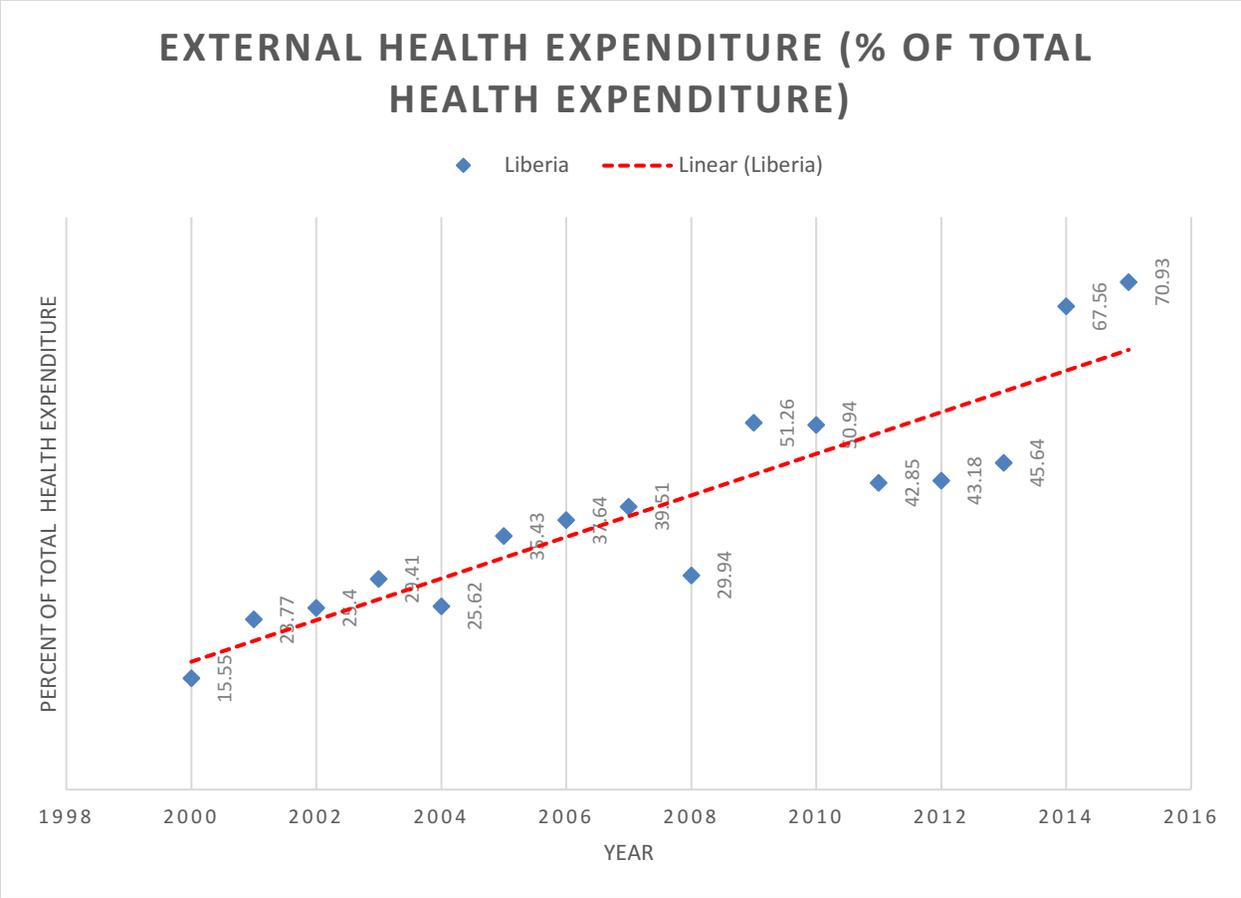
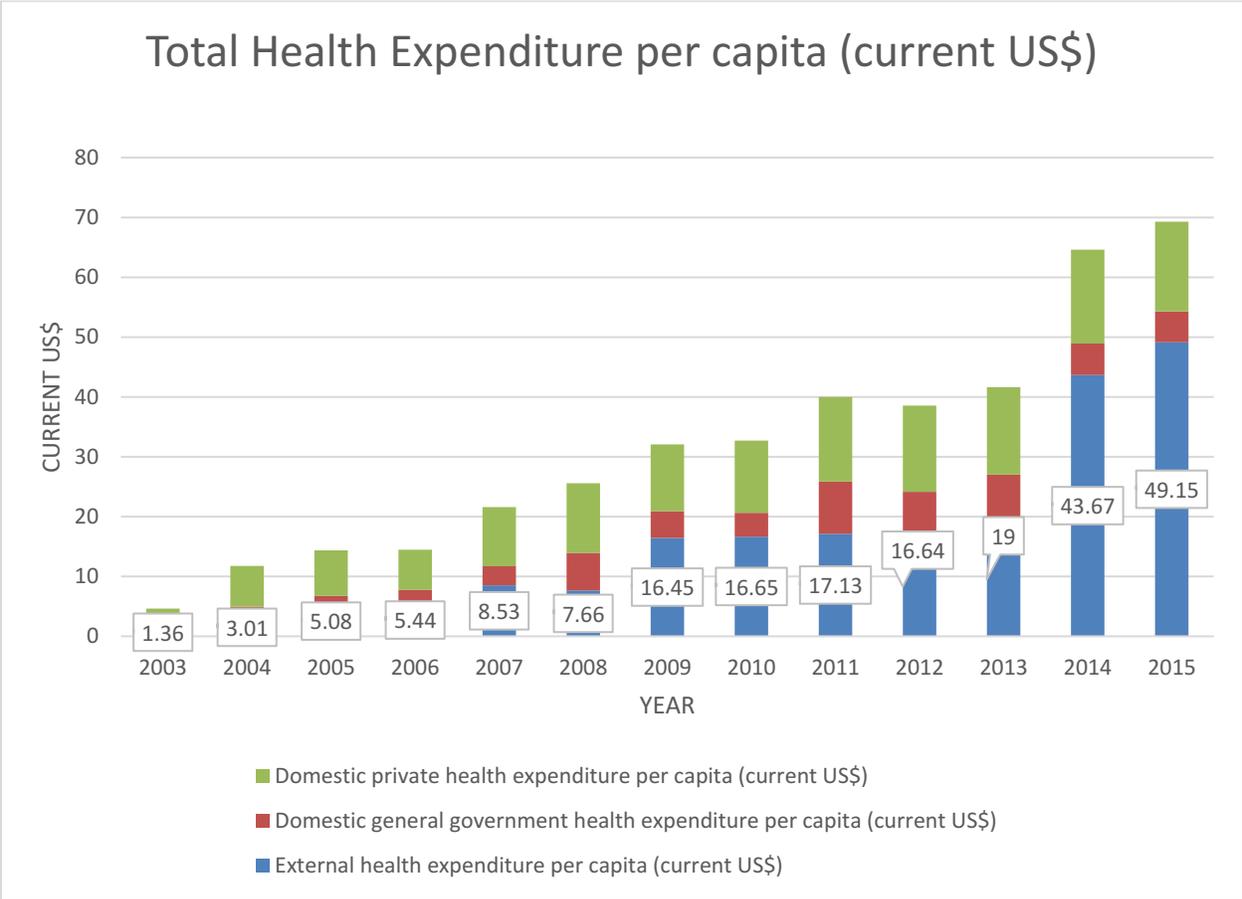


Figure Description: A few years prior to the Ebola Virus Disease epidemic, there was a 6-8% decrease in external contributions to Liberia health expenditure, under the linear forecast. Dotted red line represents a linear forecast, while the blue bars are indicative of actual health expenditure. (WHO Definitions: Share of current health expenditures funded from external sources. External sources compose of direct foreign transfers and foreign transfers distributed by government encompassing all financial inflows into the national health system from outside the country. External sources either flow through the government scheme or are channeled through non-governmental organizations or other schemes). Data Source: World Bank Data Indicators (<http://databank.worldbank.org/data/report>).

The World Bank and domestic agency have estimated that Liberia is investing 10-15% of its GDP in health (World Bank Indicator). However, during the four years preceding the EVD crisis, the total health expenditure remained stagnate, while the nation’s direct investment increase from around four per capita US \$ to 8.73 per capita US\$ in absolute amount. Over the same period government health expenditure and domestic private health expenditure accounted for between 45-60% of the total health expenditure.

Figure 4: Total Health Expenditure (2004-2016): Portion of contribution from Domestic government health expenditure, Domestic private expenditure, and external health expenditure.



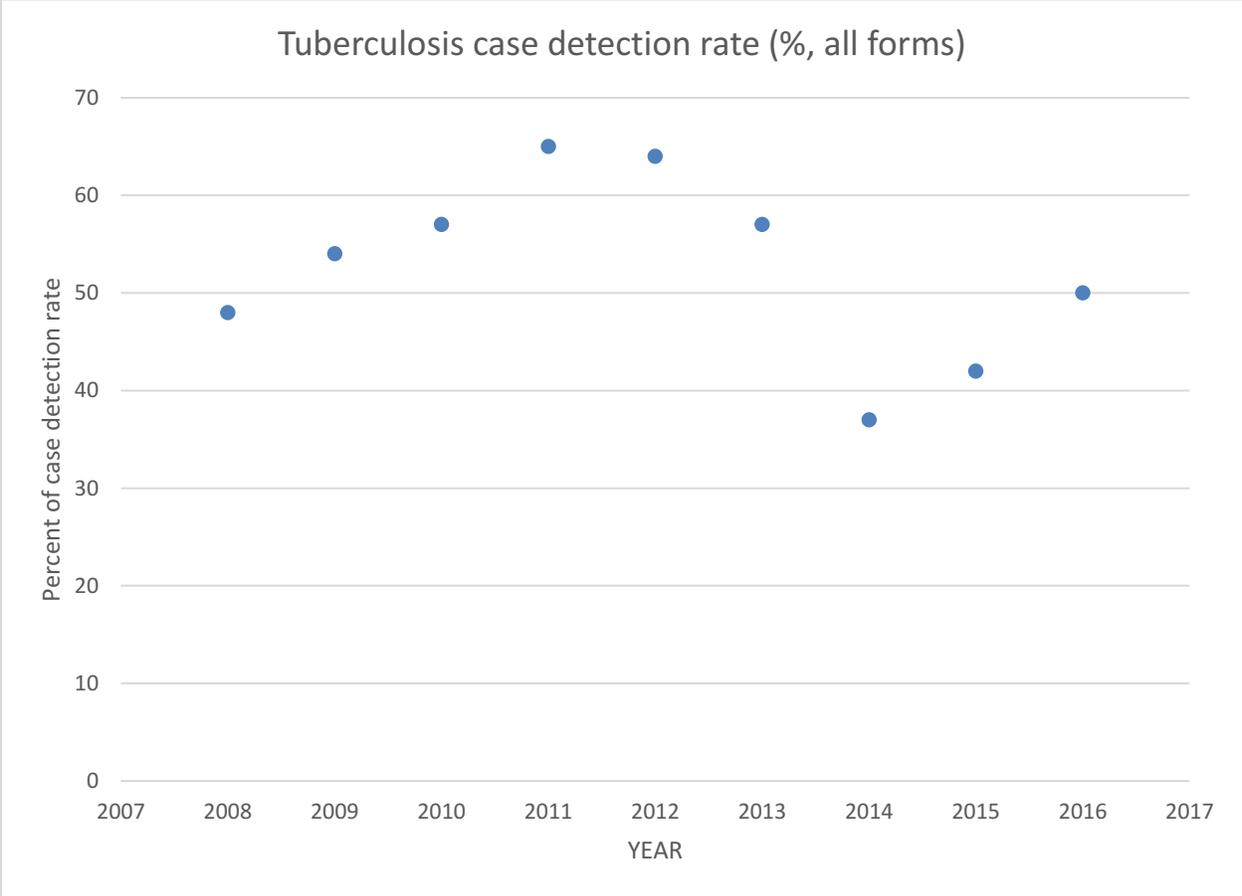
Data Source: World Bank Data Indicators (<http://databank.worldbank.org/data/report>).

The Link Between Investment in Health and Successful Care Delivery

Tuberculosis (TB) case detection is a good indicator of a health system ability to conduct disease surveillance. The protocols are well defined, and the therapeutics and disease course management have been proven to be effective in disease remission. Between 2007-2011, Liberia

saw an increase in the number of TB cases detected (Figure 5a). This previously sustained increase saw a sharp decline between 2012 and 2014.

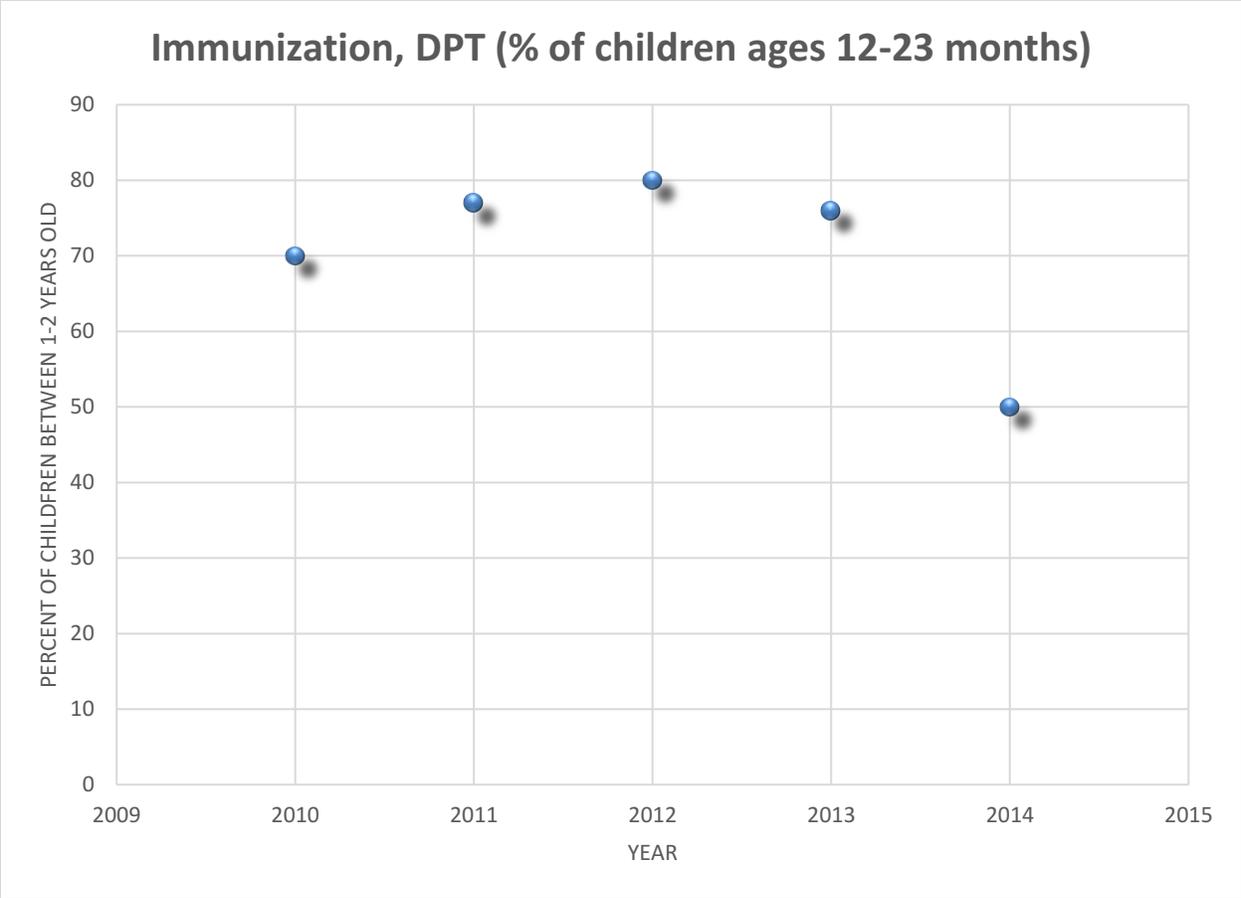
Figure 5a: Tuberculosis case detection rate (2008-2016): All forms



Data Source: World Bank Data Indicators (<http://databank.worldbank.org/data/report>).

Immunization of children between the ages of 12-23 months increased from 70%-80% between 2010 and 2012 (Figure 5b). However, the percentage of children under-2 years old immunized with DPT decrease from 80% to 50% in 2014.

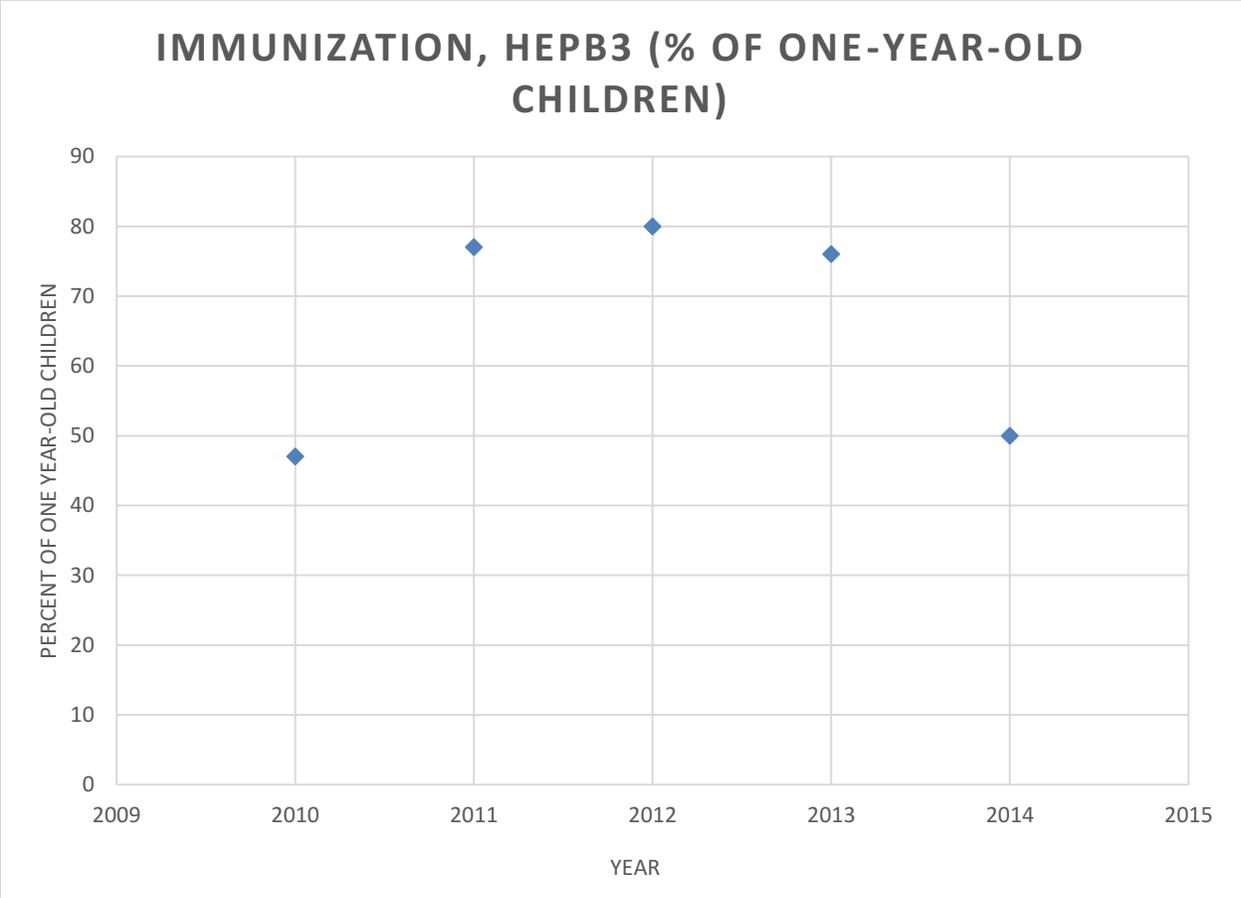
Figure 5b: Immunization coverage for children under-2 with Diphtheria and Pertussis vaccines (2010-2014)



Data Source: World Bank Data Indicators (<http://databank.worldbank.org/data/report>).

The immunization of one-year old children with the HepB3 vaccine increase from 47% in 2010 to 80% vaccine coverage in 2012 (figure 5c). However, there is an observed 30% decrease in vaccine coverage between 2012 and 2014.

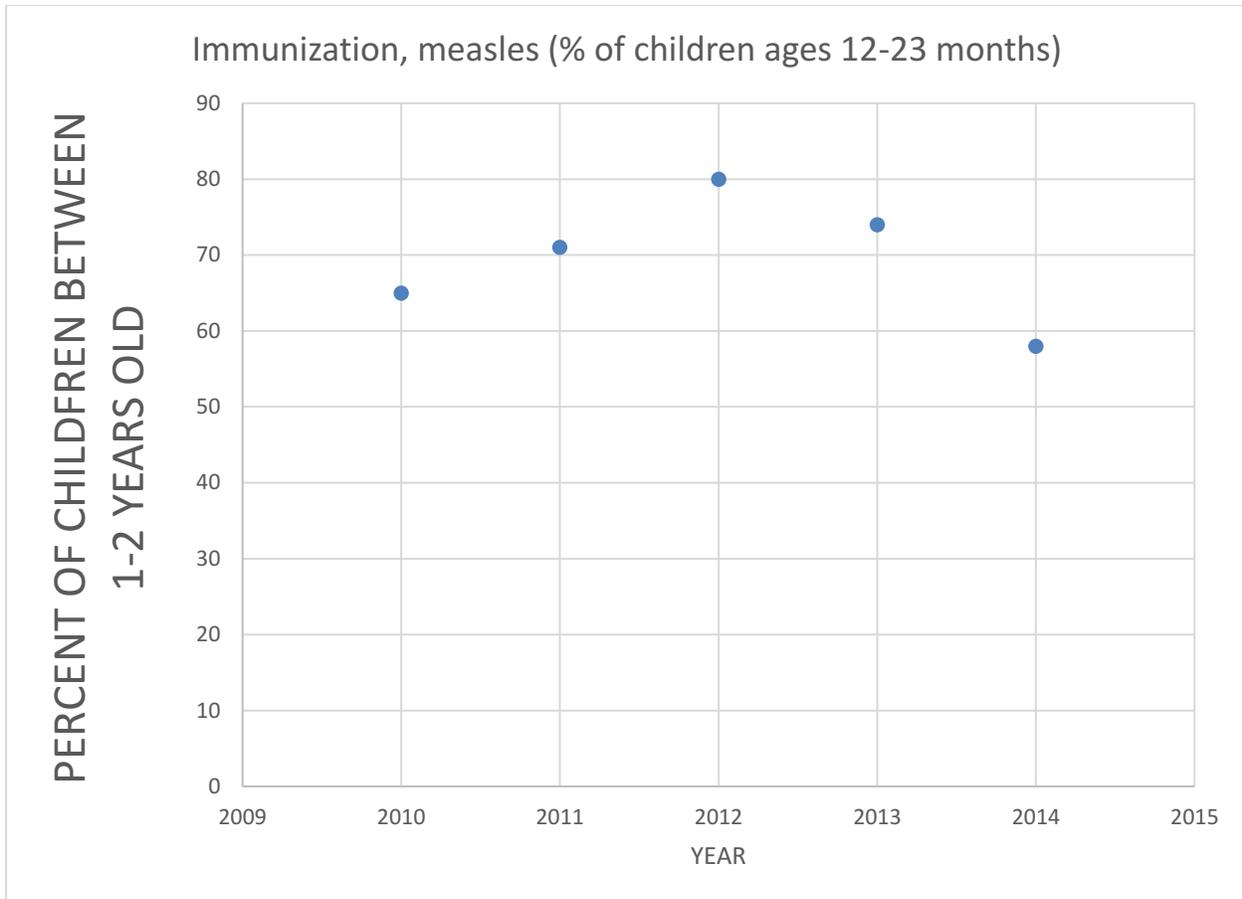
Figure 5c: Percent of children one-year old receiving the HepB3 immunization (2010-2014)



Data Source: World Bank Data Indicators (<http://databank.worldbank.org/data/report>).

The level of measles immunization coverage of children under-2 years of age reached 80% before seeing a decline towards 47% by 2014.

Figure 5d: Measles Immunization of Children under-2 years of age (2010-2014)



Data Source: World Bank Data Indicators (<http://databank.worldbank.org/data/report>).

3.2.

4. Discussion

To explore the lack of responsiveness and resilience in the Liberia health system to the spread of EVD epidemic we conducted ethnographic observations and quantitative data analysis of several health system outputs, health outcomes, and investment in health prior to the EVD outbreak. We employ the DEPLESET framework to explore the contextual factors, outside of the health system, that had influenced the system prior to EVD outbreak. While many of argued that EVD outbreak did indeed break a recovering health system, and still others have argued that the health system was already fragile at best before the stress imposed by the EVD.¹⁰ Ours is one of

the first work that have examined the state of affairs of the health system before EVD and develop a plausible association between reduction in DAH and the human cost of the EVD outbreak.

While the 2008-2010 global economic crisis has been associated with increased unemployment and reduced public-sector expenditure on health care (PEH), and an increased in cancer related deaths in Organization for Economic Co-operation (OECD) countries, the ramifications from the resulting decrease in DAH on the health systems in resource constrained states have not been fully explore.¹¹ The documented decrease in TB case detection, and the TB cascade of care, immunization for young children, and observed uptake in mortality (data not included) in the years prior to the EVD outbreak in Liberia demonstrate the weakening of the health system.

This study provides evidence that a combination of external shocks, the global economic downturn and the reduction in DAH, and micro-internal shocks documented by the decrease in disease surveillance, reversed earlier progress that could have enable the Liberian health system to better response to the EVD outbreak. Our study provide evidence that fragmented funding from donors for fragile states clearly produces an environment that undermines responsiveness and resilience of health systems—for which this paper tries to provide plausible evidence. This work frames and presents a new and fresh perspective that warrants detailed analysis.

Limitations

One of the major limitations of this study is the paucity of reliable data on the health system in Liberia. However, this work would add immense value to the currently available

dataset, and analytical tools in advancing the argument for a sustained investment in health and in Liberia and countries in similar context. Furthermore, we are continuing data collection and analysis to add to the newly emerging compendium of data on Liberia.

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<https://doi.org/10.1371/journal.pmed.1002508>

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Appendices

Supplemental Table 1: Changes in Liberia Population Indicators (2008-2016)

	2008	2009	2010	2011	2012	2013	2014	2015	2016
Population, total	3662993	3811528	3948125	4070167	4181563	4286291	4390737	4499621	4613823
Population, female (% of total)	49.7685	49.74033	49.71331	49.687	49.66129	49.63627	49.61225	49.58934	49.56791
Population in largest city	980861	1017688	1055952	1095654	1136906	1179592	1223881	1263800	1305451
Population in the largest city (% of urban population)	56.86711	56.28099	55.9521	55.88594	56.01151	56.2542	56.53069	56.51155	56.47575
Population density (people per sq. km of land area)	38.02941	39.57151	40.98967	42.25672	43.41324	44.50053	45.58489	46.71533	47.90099
Population growth (annual %)	4.182956	3.974959	3.521062	3.044325	2.700107	2.473669	2.40753	2.449608	2.506363
Population living in slums (% of urban population)	..	68.3	..	..	..	..	65.7	..	..
Population ages 0-14 (% of total)	43.46831	43.45389	43.34769	43.25181	43.11201	42.9157	42.6683	42.38513	42.11146
Population ages 15-64 (% of total)	53.46636	53.4738	53.58065	53.67517	53.82686	54.04017	54.30132	54.59133	54.849
Rural population (% of total population)	52.912	52.559	52.199	51.832	51.459	51.079	50.692	50.299	49.9
Refugee population by country or territory of origin	75213	71599	70129	66780	23428	17558	13572	9991	6513
Rural population growth (annual %)	3.531193	3.30557	2.833773	2.338754	1.977894	1.732473	1.646959	1.671318	1.709974
Urban population	1724830	1808227	1887243	1960518	2029772	2096896	2164985	2236357	2311525
Urban population (% of total)	47.088	47.441	47.801	48.168	48.541	48.921	49.308	49.701	50.1

Urban population growth (annual %)	4.920435	4.721831	4.277023	3.809169	3.471475	3.253468	3.195528	3.243477	3.305928
Fertility rate, total (births per woman)	5.19	5.105	5.023	4.944	4.868	4.794	4.721	4.65	4.581
GDP (current US\$)	8.5E+08	1.16E+09	1.29E+09	1.55E+09	1.74E+09	1.95E+09	2.01E+09	2.03E+09	2.1E+09

Data Source: UNICEF, State of the World's Children, Childinfo, and Demographic and Health Surveys. WHO and UNICEF (http://www.who.int/immunization/monitoring_surveillance/en/). Demographic and Health Surveys, and UNAIDS. World Health Organization, Global Tuberculosis Report.

Supplemental Table 2: Human Resources for Health

	2004	2008	2009/2010
Dentistry personnel density (per 1,000 people)	...	0.04	...
Physician density (per 1,000 people)	0.032	0.014	0.023
Nursing and midwifery density (per 1,000 people)	0.325	0.266	0.456
Pharmaceutical personnel density (per 1,000 people)	0.010	0.0750	
Health management and support workers density (per 1,000 people)	0.149	0.0140	...
Community health worker density (per 1,000 people)	...	...	0.061
Hospital beds (per 1,000 people)	...	...	0.7/0.8
Specialist surgical workforce (per 100,000 population)	...	...	0.6

Data Source: WHO 2015 and World, World Health Organization's Global Health Workforce Statistics, OECD, supplemented by country data. The Lancet Commission on Global Surgery (www.lancetglobalsurgery.org).

Supplemental Table 3: Disease Prevention outcomes (2006-2016)

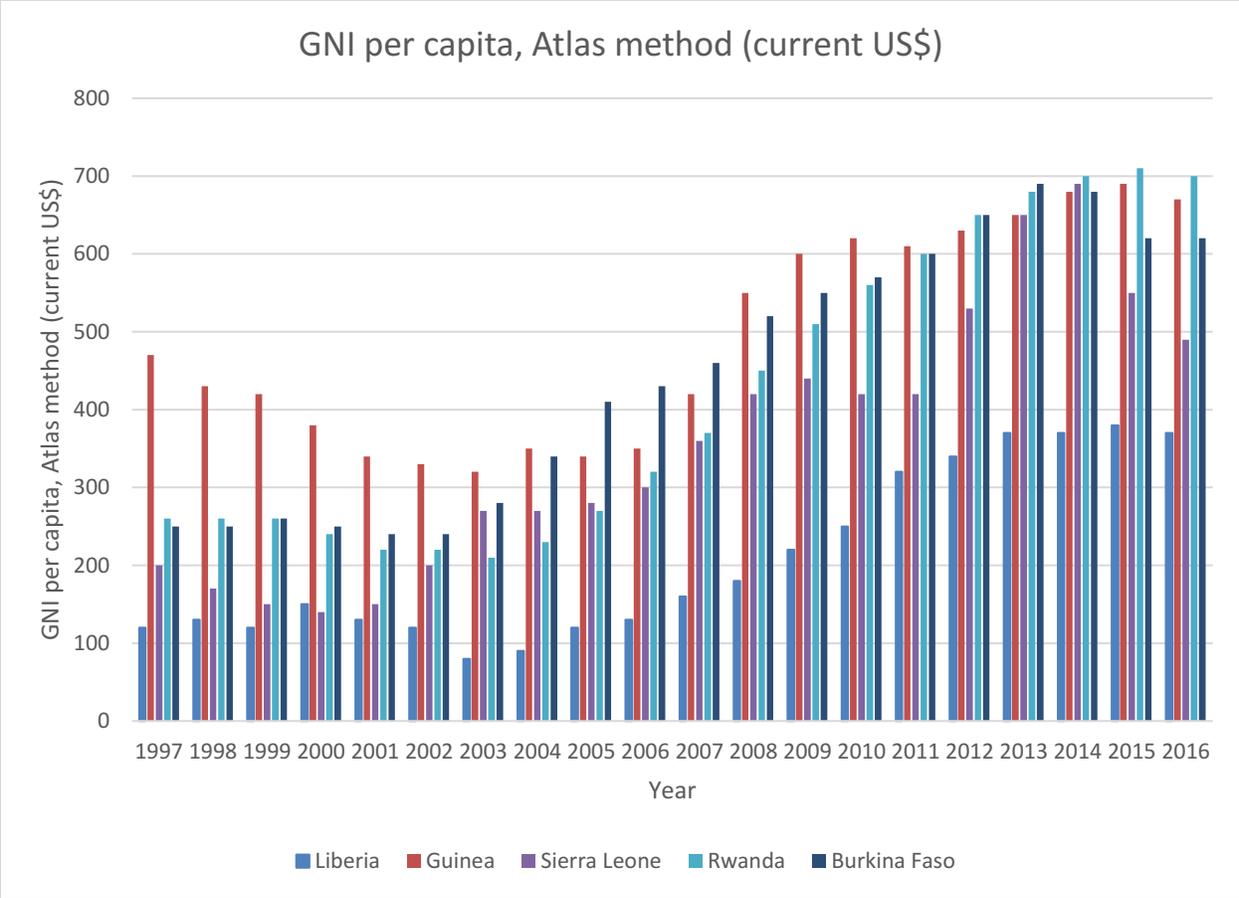
	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Immunization, DPT (% of children ages 12-23 months)	60	65	75	81	70	77	80	76	50	52	79
Diarrhea treatment (% of children under 5 who received ORS packet)	..	53.1	..	..	..	..	..	60.4	..	..	..

Diarrhea treatment (% of children under 5 receiving oral rehydration and continued feeding)	..	47	..	..	..	..	..	46.4	..	..	..
Condom use, population ages 15-24, male (% of males ages 15-24)	..	18.6	..	..	..	..	..	39.3	..	..	..
Immunization, HepB3 (% of one-year-old children)	..	..	64	64	47	77	80	76	50	52	79
Condom use, population ages 15-24, female (% of females ages 15-24)	..	9.2	..	..	..	..	..	15.9	..	..	..
ARI treatment (% of children under 5 taken to a health provider)	..	62	..	..	..	..	..	50.7	..	..	..
People using at least basic drinking water services, rural (% of rural population)	53.31703	54.02361	54.73019	55.43677	56.14335	56.84992	57.5565	58.26308	58.96966	59.67624	..
People with basic handwashing facilities including soap and water (% of population)	..	..	..	1.15062	1.15481	1.15908	1.16341	1.16783	1.17233	1.1769	..
Tuberculosis case detection rate (% , all forms)	48	..	48	54	57	65	64	57	37	42	50
People with basic handwashing facilities including soap and water, urban (% of urban population)	..	..	..	1.7617	1.7617	1.7617	1.7617	1.7617	1.7617	1.7617	..
People using at least basic sanitation services (% of population)	14.59096	14.8395	15.08858	15.33972	15.59292	15.84822	16.10539	16.36469	16.62612	16.88948	..
People using at least basic sanitation services, rural (% of rural population)	4.661374	4.799406	4.937437	5.075469	5.213501	5.351532	5.489564	5.627596	5.765627	5.903659	..
Use of insecticide-treated bed nets (%)	..	..	..	26.4	..	37.1	..	38.1	..	..	43.7

of under-5 population)											
Tuberculosis treatment success rate (% of new cases)	..	71	84	86	..	87	79	40	74	77	..
People using at least basic drinking water services (% of population)	65.06762	65.61487	66.15845	66.70005	67.23953	67.7768	68.31153	68.84382	69.37358	69.90048	..
Immunization, measles (% of children ages 12-23 months)	63	71	76	83	65	71	80	74	58	64	80
Children with fever receiving antimalarial drugs (% of children under age 5 with fever)	..	59	..	67	..	57.1	..	55.7	..	..	..
People using at least basic drinking water services, urban (% of urban population)	78.64377	78.82198	79.0002	79.17842	79.35664	79.53486	79.71308	79.8913	80.06951	80.24773	..
People using at least basic sanitation services, urban (% of urban population)	26.06319	26.27923	26.49526	26.71129	26.92732	27.14335	27.35938	27.57541	27.79145	28.00748	..

Data Source: UNICEF, State of the World's Children, Childinfo, and Demographic and Health Surveys. WHO and UNICEF (http://www.who.int/immunization/monitoring_surveillance/en/). Demographic and Health Surveys, and UNAIDS. World Health Organization, Global Tuberculosis Report.

Supplemental Figure 1a: Comparison of Liberia Gross National Income with its neighbors and economic peers (1999-2016)



Data Source: World Bank Data Indicators. (<http://databank.worldbank.org/data/report>).

Supplemental Figure 1b: Perception of Individual well-being as ascertained by the 2016 Human Development Report.

HUMAN DEVELOPMENT REPORT 2016
Human Development for Everyone

HDI rank	Perceptions of individual well-being								Perceptions about community			Perceptions about government			
	Education quality	Health care quality	Standard of living	Ideal job	Feeling safe	Freedom of choice		Overall life satisfaction, index	Local labour market	Volunteered time	Community	Confidence in judicial system	Actions to preserve the environment	Trust in national government	
	(% satisfied)	(% satisfied)	(% satisfied)	(% answering yes)	(% answering yes)	(% satisfied)		(0, least satisfied, to 10, most satisfied)	(% answering good)	(% answering yes)	(% answering yes)	(% answering yes)	(% satisfied)	(% answering yes)	
	2014-2015 ^a	2014-2015 ^a	2014-2015 ^a	2014-2015 ^a	2014-2015 ^a	2014-2015 ^a	2014-2015 ^a	2014-2015 ^a	2014-2015 ^a	2014-2015 ^a	2014-2015 ^a	2014-2015 ^a	2014-2015 ^a	2014-2015 ^a	
177	Liberia	36	40	29	31	48	58	65	2.7	39	34	48	47	21	47
178	Guinea-Bissau	..	..	..	..	..	..	..	..	..	..	..	..	..	..
179	Eritrea	..	..	..	..	..	..	..	..	..	..	..	..	..	..
179	Sierra Leone	40	37	46	49	55	59	60	4.9	33	28	69	54	38	65

Supplemental Figure 1c: Comparative assessment of the current Trade deficits, financial flow, human mobility, and access to technology of Liberians as determined by the Human Development.

HUMAN DEVELOPMENT REPORT **2016**
Human Development for Everyone

	Trade		Financial flows				Human mobility				Communication	
	Exports and imports	Foreign direct investment, net inflows	Private capital flows	Net official development assistance received*	Remittances, inflows	Net migration rate	Stock of immigrants	International student mobility	International inbound tourists	Internet users	Mobile phone subscriptions	
	(% of GDP)	(% of GDP)	(% of GDP)	(% of GNI)	(% of GDP)	(per 1,000 people)	(% of population)	(% of total tertiary enrolment)	(thousands)	(% of population)	(per 100 people)	(% change)
HDI rank	2015 ^b	2015 ^b	2015 ^b	2014 ^c	2015 ^b	2010/2015 ^d	2015	2013 ^e	2014 ^e	2015	2015	2010–2015
177 Liberia	112.4	35.1	..	44.3	31.21	-0.9	2.5	..	..	5.9	81.1	104.3
178 Guinea-Bissau	36.8	1.7	-0.3	9.8	6.04	-1.2	1.2	..	..	3.5	69.3	62.3
179 Eritrea	37.5	1.5	..	5.1	..	-6.5	0.3	..	107	1.1	7.0	118.5
179 Sierra Leone	59.2	11.6	-9.1	18.9	1.48	-0.7	1.4	..	44	2.5	89.5	157.5