



Opposing Observations and the Political-Economy of Malaria Vulnerability A Community-Based Study in Bududa, Uganda¹

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Abstract

Malaria is a parasitic infection that remains a leading threat to health and development in many communities, especially in Sub-Saharan Africa. In Bududa, Uganda, malaria represents a key threat to health and well-being. However, whether or not malaria rates are improving in the district over time represents a conundrum. By using structural fieldwork and drawing on multiple data sources that include more- and less- powerful actors, I uncover opposing observations: while community members perceive marked increases in malaria rates over time, official district-level data depict the opposite. World-systems analysis illuminates the reasons behind this discrepancy, along with the factors that community members use to explain the rise in malaria suffering, including environmental changes and decreased healthcare access. This research demonstrates how global economic policies and structures create unequal health impacts, placing those in Bududa at disproportionate and elevated vulnerability to malaria.

Keywords: Malaria, Political-Economy, Environment, Climate Change, Privatization, Uganda

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Malaria, a parasitic infection transferred to humans by the bite of an infected female *Anopheles* mosquito, represents a major threat to health and well-being. In 2017, there were over 219 million cases of malaria globally, including nearly 500,000 deaths (WHO 2019). Infants, children, and pregnant women are especially vulnerable to malaria. In fact, a child under the age of 5 years dies from malaria every two minutes (WHO 2019). Most malaria cases and deaths occur in Sub-Saharan Africa, and five countries alone account for nearly half of all malaria cases worldwide (WHO 2019). Uganda represents one of these nations (WHO 2019).

Malaria is a leading cause of mortality and illness in Bududa, Uganda (Uganda Bureau of Statistics 2014); however, whether or not malaria vulnerabilities are increasing or decreasing over time in this region is contested. While government officials report declines in malaria, local community members perceive marked increases, and furthermore, connect heightened malaria prevalence to changes in their local environments and social conditions. In this paper, I utilize world-systems analysis to better understand the upstream causes of malaria in the Bududa community and explain opposing observations that are uncovered between government data and public perceptions of the disease.

I will first explore the puzzling patterns that emerge in comparing data from community members and official district-level estimates, then I will explore the reasons community members perceive malaria to be increasing. A major contribution of this research is in demonstrating that perceived malaria vulnerabilities by community members in Bududa, Uganda are tied to deep and historically-embedded international inequalities in trade, production, and macro-economic policy that shape land use, climate change, and healthcare privatization and access. While a number of individual-level malaria studies in various locations across the Global South demonstrate the significance of environmental changes and inadequate healthcare access, they fail to acknowledge the larger structural power dynamics facilitating privatization and the unfair use of environmental space between nations that reflect and reinforce core-periphery relationships.

Indeed, in drawing on a world-systems approach, I undertake methods of “structural fieldwork” (e.g. Gellert and Shefner 2009). As such, my fieldwork and interviews were guided by questions and considerations from macro-level theory, which served to illuminate systems of power and elucidate the role of larger structural forces in conditioning local responses and vulnerabilities to malaria. By using some basic principles of structural fieldwork (Gellert and Shefner 2009), such as working in the community for an extended period of time, using a diversity of data sources, and engaging with a range of actors, including the more- and less-powerful, I am able to gain a more complete understanding of the challenges to treating and preventing malaria in the community and uncover and explain discrepancies between reported cases and the burden of suffering shared by community members.

Bududa is distinct for its mountainous terrain undergoing massive transformation, high levels of population density and growth, and contribution to the global economy in exporting Arabica coffee. Uganda has embraced neoliberal ideologies and undergone extensive austerity reform, especially in the area of privatization (Okuonzi 2004). The context of Bududa, Uganda, as an extremely poor, large rural community with clear links to global economic policies and trade flows that faces environmental pressures and inadequate public healthcare, presents a uniquely appropriate case through which to examine these themes. The unequal exchanges that are reflected in global economic policies and structures create unequal health impacts, placing those in Bududa at disproportionate and elevated vulnerability to malaria.

Specifics of the Research Area: The Bududa District

The Bududa District is located in the eastern region of Uganda, which is in eastern Africa. This district borders the southwestern side of the Mount Elgon volcano. The Bududa District has a population of approximately 211,683 people (Uganda Bureau of Statistics 2014), with relatively high population density, and over 56% of the population is under the age of 18. The area is very poor, with the average household in Bududa earning around \$100-150 USD per year. In fact Bududa is often referred to as the “forgotten district,” as the region typically ranks last or near-bottom among all districts in Uganda for measures of literacy, health, and economic well-being (Uganda Bureau of Statistics 2014).

Bududa has an average precipitation of over 1500 millimeters of rainfall per year and is located at a high altitude of 1250-2850 meters (Watira 2011). The area is rich in natural resources, including ample rainfall and fertile volcanic soils, which facilitates intense subsistence farming and the cultivation of Arabica coffee for export markets (Kitutu et al. 2011; Watira 2011). Additionally, the relatively mild temperatures and ample rainfall create appropriate conditions for the *Anopheles gambiae* mosquito, the key vector for *Plasmodium falciparum*. Transmission of malaria tends to rise around May and June with the slow onset of the rainy season, and remains high through November. December through March often represent dryer months, where malaria cases are low. This seasonal nature of malaria is common in many Sub-Saharan African nations. Most dwellings in Bududa are made of mud, dung, or bricks, with open air “windows” and ventilation near the ceilings to allow for airflow. However, such construction, while necessary to regulate indoor temperatures and allow for ventilation of solid fuel cooking, allows for easy access of mosquitoes into dwellings at night when biting rates of the *Anopheles* mosquito are most active.

These characteristics make Bududa distinctly situated to contribute to knowledge and understanding on how people perceive vulnerabilities to disease and how these vulnerabilities reflect larger dynamics that foster global health inequalities.

Research Methods

This study is exploratory in nature, and focuses on examining government data on malaria, and comparing these with community members' perceptions of malaria in the district, including if malaria rates are increasing or decreasing, and causes of such change over time. As previously mentioned, this research engages a "structural fieldwork approach" (Gellert and Shefner 2009), and as such I utilized triangulated data, employed multiple methods, and obtained data from a range of actors from the powerful to the less powerful. I based my interviews and field sessions on theoretically-driven research questions surrounding perceptions of malaria prevalence among the more and less powerful, including observing factors leading to vulnerability that included land transformation for coffee, climate changes, and limited healthcare access.

In particular, this research includes months of fieldwork, including hanging out in drug shops, public clinics, coffee farms, and community settings, as well as data from 35 semi-structured interviews, three of which were with more powerful actors in the community, "senior level" district health officers. The bulk of participants include community members such as farmers, elders, and community leaders who all live in the Bududa District and have lived there for their entire lives, as well as some lower-level health workers. The interviews were conducted over several weeks across two periods in June/July 2015 and June/July 2016. All interviews were audio-recorded and lasted typically around 40 minutes to 1 hour.

During the interviews, I was able to gain detailed information about participants' thoughts and perceptions, which broadened understanding of the causes of perceived changes in malaria over time. I gained insight into the health concerns of the community, thus obtaining a more complete picture of malaria and the perceived causes of vulnerability. I've maintained an ongoing relationship with the community over a period of 7 years, thus I was able to garner trust among my participants and collect data that is rich in information.

Although the national language is English and many community members speak English, I used a local male translator for interview sessions so that I could conduct interviews in the local language, Lugisu. This encouraged longer and more detailed responses and helped participants to feel more comfortable. The local interpreter/translator assisted in refining the interview guide to phrase questions in ways that local community members could easily understand. The question about whether or not community members perceive that rates of malaria are increasing, decreasing, or remaining relatively stable over time required careful wording, and at times, significant probing to ensure that respondents were not reflecting on the seasonal nature of malaria, but instead were thinking about changes taking place over several years, or even decades. I used probing such as "Do you think malaria rates are increasing/decreasing/remaining fairly stable in comparison to when you were younger..." to help ensure that respondents were not commenting on the seasonal

patterns of malaria vulnerability. Once a non-seasonal take was established, I probed as needed to have respondents comment on perceived changes in prevalence specifically over the most recent years, in addition to a longer timeframe.

I employed a mix of snowball sampling and availability in order to connect with a diverse range of community members in the Bududa District. Snowball sampling was particularly important in speaking to the district health officers. All interviews were transcribed using the transcription software Express Scribe. The transcriptions were organized and carefully coded using the software ATLAS.ti. Although many of the initial codes produced were based on themes and ideas from memos, the majority of the codes emerged from the data and were refined over the multiple rounds of coding. The memo and coding processes highlighted themes and quotes necessary in demonstrating the perceptions of community members on malaria vulnerabilities and changes in malaria over time. Quotes were identified based on the sets of codes and themes they corresponded with. The quotes were examined and certain quotes were appropriately chosen to demonstrate key themes of the research.

As emphasized previously, I also utilize data obtained through the District Health Profile or Annual Report. This is official health data compiled across all official 14 health facilities (public and private clinics and Bududa Hospital) in the district on disease prevalence and deaths that is reported to the government. From this report, I utilize data on “Estimated Malaria Cases.” These include new malaria cases across all age groups determined mainly through rapid diagnostic tests or microcopy laboratory testing. However, the number of “reported” malaria cases in the District Health Profile was just a little lower than the number of estimated cases (less than 5%), suggesting that very few of the registered clinics failed to properly diagnose malaria with an official test. This may be due to power outages or infrastructure challenges making microscopy testing difficult in certain circumstances. The data reported here utilizes official malaria cases from 2012 through 2017.

Results

I will first present the results from the interviews and interactions with community members, then more closely examine the official district health data.

Key Health Concerns & the Changing Burden of Malaria

The interviews conducted clearly reveal that malaria is the key health concern in the community. Although participants were not asked to order or give a certain number of health concerns, for 28 respondents malaria was the first condition named when asked, “What, in your opinion, are the main health concerns or leading threats to death in Bududa?” Of particular

relevance, all 35 respondents noted malaria as a key health issue in response to this question. For example, one community member commented that,

Malaria is the most common condition that is disturbing [the community], and it is one of the killer diseases. Malaria infects so many people.

While the results regarding the salience of malaria were overwhelming, some of the other health concerns mentioned by the participants included diarrhea, pneumonia, HIV/AIDS, and non-communicable diseases. Additional concerns mentioned were more contextual in nature, such as a lack of clean water, poor access to health centers, few properly trained health workers, limited education, and poverty.

Of crucial relevance to the key research questions, the respondents generally provided a consistent response to questions about whether malaria rates are increasing, decreasing, or remaining the same over time. Out of the 35 respondents, 31 respondents articulated that malaria rates are increasing over time, while 3 respondents conveyed that malaria rates were decreasing, and 1 subject responded that there was no significant change in malaria rates over time. For example, one interview subject conveyed:

Yes, malaria is increasing...most of the time, when you go to the hospital, you find everybody complaining about malaria...It just started being like that in recent times.

Other community member responses include:

When I was young, they used to not fall sick of malaria. Now the young fall sick all the time.

When you go to the hospital you find many people [with malaria], more than in the past.

It's becoming more, so often you fall sick, your kids fall sick. When I was young it was not like that.... They seem to get malaria again so fast.

There seems to be consensus among community members around the observation that there is more malaria now than in the past. Many interviewees commented that they see much more malaria currently in their children or grandchildren than when they were younger, as well as conveying

that malaria rates seemed higher in more recent years than in the past.² For those that articulated a decrease or no change in malaria rates, typically these respondents noted greater sensitization or bed net usage in community as the rationale.

Climate Changes & Deforestation

When community members accounted for the increase in malaria rates over time, two distinct lines of explanation emerged. One concerns environmental changes, and the second involves use of drug shops which facilitates improper use of medications. First, I will discuss the results related to environmental changes, which tend to center on discussions of climate change and deforestation. Although “climate change” is not a phrase that community members use or understand, the observations made about changes in temperature and rainfall could be considered under broader trends of climate change dynamics noted by environmental researchers in East Africa, including more extreme temperature fluctuations and a lengthening of the rainy season (e.g. Postigo 2008; WHO 2013). For example, community members made comments such as, “The weather. A lot of coldness at night and rain” in response to probing on why malaria rates are increasing in the community over time. Another community member noted that:

It rains a lot now. The rainy season is a long time. There is less time when it is dry. It is warm during [the] day and cold at night.

In fact, the many responses reflected on increasing rain and colder temperatures at night. “A lot of coldness increases mosquitos. And a lot more rain.” At first, the idea of increased coldness at night presented a conundrum, as mosquitoes generally prefer and reproduce more quickly in warmer weather. However, additional probing led to relevant explanations that when it is colder outside at night, the mosquitoes come into the warmth of dwellings, putting household members at risk during prime biting times in the evening and bedtime hours.

Temperature increases during the day were also a common theme. Many mentioned that the temperatures are also rising at higher altitudes in the mountains, where generally in the past the temperatures were much cooler than in the valleys. For example, one responded said,

² As the ages of the respondents varied considerably, this suggests a long and consistent pattern of perceived malaria increase, for some taking place over the last 5-10 years, and others over several decades.

They are living at higher places in the mountains. When I was a boy, there was no malaria up there. Now, up there, there is malaria all the time. It is warmer now.

Another common explanation for increasing rates of malaria over time concerned deforestation. For example, one community member noted that,

Cutting trees around the compound, and, uh, removing the tall trees because, there we find that [the] mosquito[es] like to produce because the garden is very green and the trenches keep water. A lot of time people plant like beans, cassava, coffee... So, it's that they create holes and trenches and especially when the weather is wet for growing. So, we say that they must keep the trees. But that they will remove the trees for firewood and to grow crops and coffee, then they will sit outside for all of them [the mosquitoes] to congregate to them. Then malaria.

This quote captures many important themes that were discussed by a variety of community members. Many subjects discussed that mosquitoes are most often seen in bushy areas, particularly areas that have been recently deforested for crops. Also, working in the gardens in the early morning and evenings when temperatures are milder places community members in areas of mosquito habitats during their most active biting hours. Additionally, many compounds in Uganda are set up with a central outdoor space where people gather to socialize and prepare food. Again, this often happens at the end of the day in the evening hours when mosquitoes are most active.

A number of interviews made connections between deforestation, coffee gardens, and malaria specifically. Coffee is the only cash crop grown in the region, and the overwhelming majority of households have coffee gardens in combination with gardens for subsistence crops in order to make money for out-of-pocket expenses, like medications and school fees. Many observe that there are more mosquitoes in their coffee gardens than in the gardens for subsistence crops.

There are very many mosquitoes. Like more mosquitoes in the coffee gardens. The plants make dark areas that breed the mosquitoes.

In addition, expanding coffee gardens is often a key motivation for forest felling. As one community member notes,

So, the reason the people are cutting the trees, they claim that the trees spoil the coffee plantation. The trees compete with nutrients in the ground. That's why they cut them. When they cut the trees, the coffee gets enough sunshine.

Overall, around half of the subjects who noted an increase in malaria rates pointed to environmental factors as explanations for the rise. The environmental factors identified included both climate change and deforestation, and pressures to deforest centered on expansions of coffee cultivation. Thus, these themes reflect the world-systems arguments concerning the international division of labor, neoliberal pressures to increase exports, and inequalities in vulnerabilities to climate change, which I explore in detail below.

Privatization and “Treating from Home”

A second major theme in the interviews concerning a rise of malaria in the community regards poor accessibility and availability of medications at government clinics. In Bududa, there are 14 clinics in total, including one level-4 facility, Bududa Hospital, 2 private clinics, and 11 public “outpatient” clinics. The public outpatient clinics and Bududa Hospital regularly suffer from shortages of staff and medicine and a lack of basic infrastructure. The majority of these clinics are located right on the main “Bududa loop” or central road. However, with population pressures, families are living further and further away from this main road, with the typical household being miles away from a registered health clinic. In contrast, there are hundreds of pharmacies or drug shops in Bududa. The true number of these is unknown, as they represent a largely unregulated sector of the health infrastructure in Uganda. But every trading center, even those located far from the “Bududa loop” road, has several drug shops, making them much more accessible and significantly closer in distance than a proper clinic. Indeed, a lack of medicine at the public clinics is a major factor explaining why many in the community go directly to a drug shop instead. As one community member comments,

I usually just come straight here [to a private drug shop] because most times in [the public] health center there is no medicine.

Even health workers at the government clinics acknowledge this systemic issue. As one health worker noted,

When we have them [medicines] ...they come and get from here [a public clinic], getting a test. When we have stock out, they go and do what? They go and buy themselves.

Bypassing a clinic and getting malaria drugs, most commonly Coartem, directly from a pharmacy or drug shop, is frequently referred to as “treating from home.” There is no incentive to walk the extra distance to get an official malaria test from a public clinic when you will ultimately end up having to go to a pharmacy and pay out-of-pocket for the medication. As one community member notes,

Malaria is increasing because when I was young, people did not die from malaria like now. They're not going to the clinics. They are treating from home. That's why the malaria has increased.

The drug shops in Bududa do not provide any form malaria testing and they typically are not staffed by people with medical training. They essentially represent businesses, and business owners are willing to sell drugs to anyone that has money to pay, regardless of a proper diagnosis. This could lead to the treatment of malaria even when a patient has another illness with similar symptoms, such as the flu. Also, subjects explained that when community members cannot pay for a full dose, half-doses or single tablets are sold. Given the out-of-pocket costs for medications and the extreme poverty in the region, many community members stop anti-malaria medications early, immediately after symptoms improve to “save” doses for when they or another family member falls ill again in a few weeks or months. Such inconsistent and incorrect use of medications leads to a number of complications, and perhaps, drug-resistance. Two community health workers comment,

Probably, most of our community before they come to the hospital or clinic, they first go to those roadside units and drug shops. Some of them mishandle the patients. And the patients end up at the main facility [Bududa Hospital] having complications.

And somehow, as soon as the child starts improving, they discontinue the use. And that is why we are having problems with resistance, malaria. Why, Western drugs come and 2 years later we're resisting? So that is the main problem. People take half doses.

Interestingly, district health officers seem to be aware of the limitations with drug shops in terms of unqualified personnel, a lack of proper malaria testing, and the prescribing or taking of incomplete doses. But conversations with an officer of health inspections reveals why this is the case, “A blind eye is turned. Why? Where are people going to find medications?” In other words, if the public hospital and government clinics fail to have ample supplies of basic medications, then these private drug shops become a necessary part of the healthcare system, as without them there would be no medications available to the community. One hospital worker noted that they typically only have Coartem in stock for 4 days out of the month.

In fact, a news article published in a leading Ugandan newspaper, *New Visions*, reports on a study presented at the Annual Science Conference in Kampala in 2014 which estimates that 81% of Ugandans “treat from home” for malaria, rather than seeking a proper diagnosis from a registered clinic (Agaba 2014). Even aside from these issues with improper dosing, community members are perceiving that the malaria drugs do not work as well as they did in the past. For example, some community members make comments like those below:

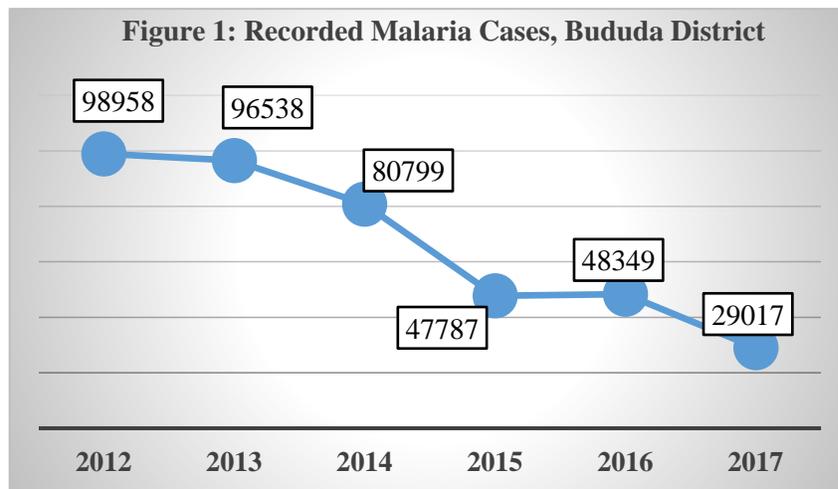
You can even go ahead and treat and treat, but you still die of it. Many people died from it, even with medicines.

The medication or drugs have reduced in like how well they work...they are low, low in effectiveness.

Obtaining malaria medications from drug shops and potential observations of resistance thus represent key factors community members and some health workers use to explain the rise in malaria rates in the community. These issues are deeply connected to the failures of the public health sector to provide adequate and reliable healthcare to the people, which reflects political-economy critiques of austerity approaches in poor nations, as I will demonstrate below.

Opposing Observations

I also obtained data from the District Health Profile on malaria cases and compare these with community perceptions. Figure 1 displays the malaria rates compiled across the 14 registered clinics (including Bududa Hospital). Notably, the official data on malaria cases for the Bududa district displays an overall trend of significant declines in malaria rates since 2012.



Of particular relevance, the three subjects in the sample who articulated opinions that malaria rates were decreasing in the district are “senior level” health officers for the Bududa District. Indeed, in such an interview, a respondent stated that while malaria still represents the key cause of death in Bududa, malaria rates are decreasing in the district over time. They contend that the noted decrease in malaria rates is due to improved education and sensitization in the community, as well as better provisions for bed nets. They comment, “We, for every mother bringing a child for immunization, we are, we are giving a what, a net and education.”

However, the interviews with community members once again present a contrasting view, that there has not been sufficient provision for bed nets or malaria prevention education. For example, over two third of subjects who had bed nets expressed that they had to buy the nets using personal money as they had never received a net from the government. The overwhelming majority of those interviewed did not have enough nets for beds or all members of the household, and many did not have bed nets in use in the home at all due to a lack of access and affordability.

Further, many expressed skepticisms on the effectiveness of bed nets, saying comments like, “You get sick even when you sleep under the mosquito net.” Another community member commented that, “The net will protect you when you sleep, but not when you’re out or in the home during the evening hours.” Others also critique the idea that there has been increased education and sensitization in the community surrounding proper malaria prevention and treatment. As one community comments, “No, we have gotten no lessons on preventing or treating malaria.” It is clear that, at least from the views of the community, the provisions for bed nets and malaria education from the government have not be adequate, and that significant vulnerability remains even when bed nets are properly used.

Certainly, a comparison of the data from community members and official sources illustrates opposing observations on whether malaria vulnerabilities are increasing or decreasing in Bududa.

In order to understand why the government data diverge so markedly from the perceptions of malaria in the community, I turn to a detailed engagement of world-systems perspectives on austerity and development.

The Political Economy of Healthcare, Austerity, and Environmental Degradation

Global trends in malaria mirror patterns in international inequality, with poor nations like Uganda experiencing high rates of malaria. Political economy explanations of health emphasize that most infectious disease are “diseases of the poor,” and that poverty has long-standing roots in the organization of the global economy (e.g. Farmer 1999). According to world-systems scholars, the capitalist world economy has origins in the 16th century during which time colonial relationships emerged and development in Europe was enabled through the direct plundering of environmental and human resources (Emmanuel 1972; Wallerstein 1974). Coffee, timber, precious metals, iron, tobacco, sugar, and cotton represent some of the key products of colonial trade, and remain some of the leading exports from poor nations today. With industrialization in Europe fueled by the resources flowing from the colonies, an international division of labor was cemented.

The international division of labor describes that the world-system is stratified with the highest skill and profit-making industries concentrated in nations positioned at the top of the international hierarchy, and with low-skill, low-wage, environmentally demanding production processes chiefly concentrated in periphery nations (e.g. McMichael 2017; Rice 2007; Wallerstein 1974). Even with post-WWII development, peripheral industrialization, and decolonization taking place through the 1960s, structural power imbalances persist and reinforce global inequalities through neocolonial relationships upheld by core governments’ influence in international financial institutions (IFIs), such as the World Bank and International Monetary Fund (IMF) (e.g. Babb and Kentikelenis 2017; Chorev and Babb 2009; McMichael 2017).

Dominant economic policy rooted in modernization perspectives focus on privatization and liberalization as the fundamental means to increase economic growth and encourage development in poor nations (e.g. Rostow 1960); however, world-systems scholars are cautious of such approaches, as these reinforce the unfair international division of labor and therefore persistent poverty in poor nations. Rather than poverty eradication, critical scholars argue that the policies promoted by major international development agencies, such as the World Bank and IMF, encouraging neoliberal restructuring or “austerity measures,” have only further deepened international inequalities between nations (e.g., Kingston 2011; McMichael 2017; Navarro 2007; Stiglitz 2002). Neoliberal approaches include currency devaluation, trade liberalization, privatization, and limited government spending or restrictions on corporate practices (e.g. Babb and Kentikelenis 2017; Chorev and Babb 2009; Kentikelenis 2017; McMichael 2017) while these

are undertaken with the aim of generating economic growth and activity, there are a number of potential negative consequences (e.g. Okuonzi 2004; Navarro 2007).

In the early 1980s, the influence of the World Bank and IMF became increasingly prominent in Africa due to intense economic crises (Kingston 2011). At this time, rising oil prices, increasing interest rates, and falling prices for primary commodities left many poor African countries unable to repay foreign debts. In order for countries to qualify for World Bank and IMF loan rescheduling and grants, a standard policy package of structural adjustment policies (SAPs) is required. SAPs largely require market liberalization and reductions or limitations in public spending as a means to generate revenues to pay back foreign loans (e.g., McMichael 2017; Okuonzi 2004; Stiglitz 2002).

Uganda represents a country where the adoption of SAPs and neoliberal measures has been “constant and pervasive” (Muhunuza 2007; Okuonzi 2004). Uganda first came under structural adjustment with the World Bank and IMF in 1987, which coincided closely with the presidential election of Museveni, who came to power following nearly a decade of corrupt dictatorship post-independence under Idi Amin and several years of civil war. In the mid-1980s, the country was left in shambles, including a complete lack of health infrastructure and plundered or unmanaged environmental resources. Often referred to as a “neoliberal darling” by the international community, Museveni welcomed the influence of IFIs and core governments in Uganda, and given the initial condition the country, made some notable gains. The early “success” of foreign aid and neoliberal restructuring garnered external legitimacy of such programs and has enabled Museveni to maintain his influence (Okuonzi 2004). Although Museveni is an elected official, he has used his power to stay in office for over 30 years. Despite some developmental gains, Uganda still ranks among the lowest globally in terms of per capita GDP and other developmental indicators, including health outcomes (e.g. WHO 2019; Okuonzi 2004).

Critics raise a number of concerns over austerity and neoliberal restructuring models, including their impacts on people’s health and the environment in developing nations (e.g., Kentikelenis 2017; Maclean 2011; Navarro et al. 2006; Navarro 2007; Shandra et al. 2011a; Turshen 1999). For example, the implementation of SAPs in Uganda has heavily relied on privatization of public enterprises, including healthcare (Kingston 2011; Muhunuza 2007; Okuonzi 2004; Turshen 1999). In fact, the Structural Adjustment Participatory Review International Network reported that the privatization process in Uganda was deeply flawed in that it benefited debt repayment to and corporate interests in developed nations at the expense of the Ugandan people. During the 1990s and 2000s, Uganda received debt relief under the IMF and World Bank Highly Indebted Poorer Countries Initiative (Kingston 2011). However, the process of implementation of “forgiveness” was delayed. According to Ugandan government estimates,

the cost of a single-year delay was \$193 million. This amount is more than six times total government spending on health. With the delay, public funds were diverted from public healthcare services into debt repayments (Kingston 2011). Although public spending on healthcare has increased nominally over time, healthcare spending overall is decreasing as a share of the recurrent budget. The price of healthcare services is rising much faster than the rate of inflation, and in recent years, currency devaluations have attenuated these trends (Kingston 2011). Public healthcare in Uganda is lacking in a variety of ways, including poor infrastructure, high health worker to patient ratios, improperly trained staff, and pervasive medicine “stock outs” (e.g. Chandler et al. 2011; Okuonzi 2004).

Even the World Health Organization has been forced to adapt goals and structures to the neoliberal regime, including adopting market-based reasoning and solutions, prioritizing cost-effective interventions, and creating pro-business relationships (e.g. Chorev 2012, 2013; Navarro 2008), and the unequal structure of the pharmaceutical sector limits access to needed drugs, including those for malaria. Biomedicine itself manifests world-system inequalities and has been shaped by neoliberal capitalist philosophy; even colonialism has been justified on humanitarian grounds of health delivery to Africans (Baronov 2008). The political economy of biomedicine is also reflected in aspects such as the commodification of medicine and the concentration of power among Western practitioners, core-based health NGOs, and pharmaceutical companies (Baronov 2009; Lakoff 2006; Watkins and Swidler 2013).

To this point, pharmaceutical markets for malaria medications in Uganda were dominated by Western suppliers from colonial times through the 1990s, and more recently the majority of pharmaceutical imports are from Indian manufactures (Chorev 2019). Developing nations have largely failed to be able to produce needed pharmaceuticals because of the regulations of IFIs, where specifically the World Trade Organization upholds strict intellectual property rights policies that protect drugs created by large pharmaceutical companies based in the West (Chorev 2012, 2019). With the expiring of patents and push-back from developing nations on intellectual property rights and patent policies in recent years, pharmaceutical production has spread to many areas of the Global South. However, such industry has not been successful in Uganda for a combination of reasons, including the destruction of health and education infrastructure that occurred prior to the 1990s and a lack of entrepreneurial ties to pharmaceutical manufactures in other areas of the Global South (Chorev 2019).

Reflective of the arguments above, a number of studies make links between austerity measures and negative health outcomes in developing nations. Neoliberal restructuring and high levels of foreign debt are often associated with decreases in healthcare spending, public healthcare access, or other forms of health provision, such as reduced access to clean water and sanitation

(e.g., Austin 2015; Forster et al 2019; McMichael 2017; Navarro et al. 2006; Navarro 2007; Okuonzi 2004; Shandra et al. 2011a; Stubbs et al. 2017; Turshen 1999). Other studies point to neoliberal economic policies in slowing down the pace of life expectancy improvements or increasing disease and mortality rates in poor nations, including in Uganda (e.g., Austin et al. 2016; Forster et al. 2019; Maynard et al. 2012; Navarro et al. 2006; Okuonzi 2004).

In addition to impacts on health, neoliberal development approaches also have major impacts on the environment in poor nations. Free trade doctrines included in SAPs and other neoliberal mandates are based on ideas of comparative advantage, which describes that less-developed nations should specialize in producing primary sector commodities, as these products are in great demand on the global market and oftentimes cannot be cultivated in the core zones in which they are consumed. While poor nations were forced to specialize in exporting natural resources and tropical commodities during colonial times, such patterns are largely upheld today through the adoption of austerity reforms that liberalize trade barriers and promote export orientation towards highly desired global commodities, such as coffee (e.g. McMichael 2017). Currency devaluation, another common tactic in SAPs, spurs demand for a nation's exports and therefore can hasten environmental impacts from enhanced production (Mohan 2001). As emphasized above, SAPs also require deep cuts in government spending, and this often includes reductions in the budgets and capacity of environment and conservation agencies. These cuts thus can limit the enforcement of environmental regulations and the protection of conserved areas (McMichael 2017; Mohan 2001).

Based on these ideas, a number of world-systems scholars make empirical links between SAPs and environmental outcomes in less-developed nations, such as deforestation (e.g. Pacheco 2006; Shandra et al. 2008; Shandra et al. 2011b). The association between austerity and environmental degradation reinforces global production patterns established from the colonial international division of labor. World-systems researchers explore the persistent concentration of the effects of environmental degradation in poorer nations using the concept of "ecologically unequal exchange" (e.g. Bunker 1985; Rice 2007). Ecologically unequal exchange asserts that more-developed nations are able to externalize their consumption-based costs to less-developed nations through unequal trade relationships (Rice 2007). The phrase "unequal exchange" was originally used to explain that the exchange of core products for peripheral products necessitates transfers in surplus value up the world-system from less-developed nations to more-developed nations (Emmanuel 1972), as core nations retain the most profitable phases of production, including the command, control, and coordination of commodity chains (e.g. Gereffi and Korzeniewicz 1994; Gereffi, Humphrey and Sturgeon 2005). This was later expanded upon to

include an ecological dimension, recognizing that peripheral production processes also entail disproportionate environmental costs (e.g. Bunker 1985; Rice 2007).

A wide body of empirical scholarship demonstrates that the vertical flow of primary sector exports up the world system, from less-developed nations to more-developed nations, causes increased environmental degradation and risk in poorer countries (e.g. Austin 2012; Jorgenson et al. 2009; Shandra et al. 2009). Indeed, critical scholars note that poorer nations tend to have much higher rates of forest loss, despite that the consumption of forest resources largely takes place in affluent nations (e.g. Rice 2007). Patterns for forests also mirror climate change dynamics; poor nations suffer the most deleterious effects of climate change despite that core nations have the most responsibility for global greenhouse gas emissions, considering historical and current levels of pollution (e.g. Parks and Roberts 2007).

The persistent patterns in trade inequalities between nations can be seen in a number of major global products today, like coffee. Most coffee-producing nations such as Uganda do not consume coffee themselves, essentially all coffee produced in the country is exported to developed nations in North America and Europe (e.g. Austin 2017). Neoliberal trade policies have intensified coffee demand from Uganda while at the same time reducing profits for coffee farmers. For example, the coffee industry was liberalized in Uganda in the late 1980s, and since then the prices for coffee have fallen dramatically, with farmers earning far less today for a kilo of coffee than they did decades ago (Ahmed 2012). As global demand expands and climatic changes alter international coffee supplies and production patterns, coffee exports continue to be heavily promoted in Uganda, despite diminishing returns (Kamoga 2018). Indeed, this latter point demonstrates that fundamental ideas about unequal exchange and the international division of labor explain why poor nations have remained poor, despite increasing integration into the world economy (e.g. McMichael 2017).

Although the research cited above critiques the impact of neoliberal approaches on health and the environment in developing nations, it is important to acknowledge that there is debate on the nature and consequences of SAPs in less-developed nations. For example, some argue that there are multiple ways that austerity programs strengthen of health systems, such as by improving economic growth that can be used to fund public health programs and encouraging foreign aid and investment (Clements et al. 2013; Crivelli and Gupta 2016). However, critics maintain that governments are unable to sufficiently invest in health because of pressure to meet rigid fiscal deficit targets, and some also identify that organizations like the IMF divert revenues and aid earmarked for the health sector to repay debt (Kentikelenis 2017; Stubbs et al. 2019; 2016; Ooms and Schrecker 2005). Additional evidence suggests that SAPs decrease economic growth (Dreher, 2006; Przeworski and Vreeland 2000), and fail to spur health aid (Stubbs et al., 2016).

Due to the criticisms of World Bank and IMF programs, these organizations have come under increasing scrutiny in recent years. In response, the World Bank and IMF have argued that they are now focusing on a more “pro-poor” orientation; however, many scholars note that there has not been substantial change to their approach, and that free-market policies still dominate (e.g. Babb and Kentikelenis 2017; Stubbs et al. 2019). For example, the World Bank continues to offer access to loans contingent on the degree of countries’ market liberalization (Babb and Kentikelenis 2017). I now turn to a discussion on how these themes on austerity and the political economy of health and the environment relate to malaria vulnerabilities, with a specific focus on the Ugandan context that support themes found in the community member interviews.

Privatization, Drug Shops, and Malaria in Uganda

As discussed above, privatization generally reduces poor and vulnerable populations’ access to healthcare, as user fees deter ill people from seeking care or adhering to treatments (e.g. Basu et al. 2012; Navarro et al. 2006; Okuonzi 2004; Turshen 1999). In contrast, public clinics are typically subsidized by the government and charge little or no cost to patients (e.g., Basu et al. 2012; Blumenthal and Hsiao 2005); for example, in Uganda, public or government clinics typically offer free healthcare and medications. However, inadequate public funding for health means public clinics are lacking, making drug shops an important option for those that are ill with malaria.

Indeed, drug shops represent an important part of the privatized healthcare landscape in many developing nations, including Uganda (e.g. Chandler et al. 2011; Espino and Manderson 2000; Mbonye et al. 2007; Wiseman et al. 2008). Although drug shops in Uganda must go through licensing, in practice, the requirements of licensing are often not upheld, and thus there many unlicensed drug shops. For example, licensed drug shops must be registered under the name of a trained health worker, such as a nurse, however, the person working the drug shop is rarely the one to whom it is licensed. Rather, drug shops typically represent business ventures and are commonly staffed with people who lack formal health training (Chandler et al. 2011).

Overwhelmingly, drug shops in areas such as Uganda “diagnose” malaria without any official testing (Chandler et al. 2011; Mbonye et al. 2007). Staff typically diagnose malaria based on reported symptoms, or may not ask any questions at all if the patient or customer simply self-reports that they think they have malaria. Some drug shops in Uganda have introduced rapid diagnostic malaria testing; however, customers typically have to pay more for such testing and thus do not do so (Chandler et al. 2011). Drug shops are notorious for selling partial doses of malaria medications based on what customers can afford, or expired or counterfeit medications (e.g. Chandler et al. 2011; Chorev 2019; Mbonye et al. 2007).

The entrance of European models of healthcare during colonial times alongside the preservation of traditional healing methods has partially contributed to a wide range of health options and approaches in countries like Uganda, and today pluralistic medicine and biomedicine continue to survive side-by-side, in part due to the lack of resources for public health systems in developing nations (Baronov 2009). However, there is some perception of backwardness among those that use traditional healers in Uganda (Baronov 2009), and as anti-malaria medications have become mainstream over a number of decades, most seek some sort of formal care when they suspect they have malaria (Chandler et al. 2011). An overwhelming amount of research reports that drug shops typically represent the first step in seeking treatment for malaria in Uganda and other low-income nations (e.g. Chandler et al. 2011; Espino and Manderson 2000; Mbonye et al. 2007; Wiseman et al. 2008). This is due to the fact that there are very many drug shops as they are typically closer in proximity to households and trading centers than public clinics. Also, drug shops offer speedy “diagnosis,” and treatment and community members often prefer the social proximity of knowing and trusting the drug shop worker. Public clinics are not preferred in rural Uganda, as they are few and thus further away from households, suffer from frequent “stock outs” of medicines, and foster poor provider-patient relationships (e.g. Chandler et al. 2011). Full-scale private clinics are also not commonly used, as the user fees are very high and most cannot afford the out-of-pocket expense (e.g. Basu et al. 2012; Blumenthal and Hsiao 2005; Okuonzi 2004).

Neoliberal development approaches and structural adjustment policies contribute to budget shortfalls, understaffing, and low supplies of medicine at public clinics in developing nations like Uganda (e.g. Navarro et al. 2006). Partially as a reaction to the failures of the public health system, especially in having adequate supplies of basic medications, the popularity of informal drug shops in Uganda has risen (e.g. Chandler et al. 2011), as reflected in the interviews above. Given that these outlets rarely provide proper diagnosis of malaria and may sell partial doses or expired drugs, there is certainly great potential for exacerbating problems in malaria vulnerability and treatment.

Environmental Change and Malaria Potential

In addition to access to proper healthcare, previous malaria research emphasizes that environmental conditions are crucial in determining malaria vulnerabilities, as mosquitoes play the fundamental role in transmission. Epidemiological and entomology research identifies that climate change and land use changes associated with agriculture, such as deforestation, can change local habitats and conditions in ways that lead to surges in mosquito populations and therefore malaria prevalence (e.g. Barros et al. 2015; Hahn et al. 2014; Postigo 2008; Vittor et al. 2006; Yanoviak et al. 2006).

There are many processes by which forest loss can enhance malaria vulnerabilities, but a common mechanism concerns deforestation’s influence on outdoor and indoor temperatures (e.g.

Afrane et al. 2012; Kweka et al 2016; Patz et al. 2006). Forest cover loss can lead to an increase in temperatures both inside and outside of dwellings, thus accelerating the speed of mosquito larvae development and the incubation period of malaria parasites (e.g. Afrane et al. 2012; Patz et al, 2006). Also, a rise in indoor temperatures attracts more mosquitos into dwellings at night during prime biting hours, and also can increase the biting rates of mosquitoes (Afrane et al., 2012; Kweka et al. 2016). For example, Vittor and colleagues (2006) find that *Anopheles* mosquitoes are captured in the greatest quantities at sites with little remaining forest and, notably, deforested sites had biting rates that were more than 278 times greater than for areas that were predominantly forested.

Felling trees also impacts standing water, which is extremely important for mosquito proliferation. Puddles, ponds, and slow-moving streams under thick forest canopy are typically too heavily shaded for mosquito larvae development and these waters tend to be highly acidic, as much debris, such as falling leaves, lands in such pools. But ponds and slow-moving streams in deforested areas have greater exposure to sunlight and a lower level of acidity, which further mosquito larvae growth (e.g. Norris 2004). Also, fallen trees create micro dams, which slow or stop water flow, making prime mosquito habitats (e.g. Barros et al. 2015).

Agricultural development represents a key motivation for deforestation in most areas, and many studies find an abundance of mosquito larvae in export agricultural areas (e.g. Basurko, et al. 2013; Yanoviak 2006; Vittor et al. 2006). Additionally, agricultural development leads to the creation of dams, irrigation systems, ditches, and road-building, all of which greatly expand the availability of standing water, thereby proliferating mosquito breeding sites (e.g. Basurko, et al. 2013; Hahn et al. 2014; Yanoviak et al. 2006). Remarkably, mosquito eggs and larvae can develop in just a few millimeters of water, thus fallen plant parts, tree-holes (left-behind rotted out stumps), and irrigation trenches can easily harbor mosquitos (e.g. Norris 2004; Yanoviak et al. 2006).

As emphasized previously, coffee represents a key agricultural commodity in Uganda, and Bududa is well known for the cultivation of Arabica coffee. Other research from Bududa confirms the increased practice of forest clearing for coffee production and expanded production on previously unfarmed hillsides (Austin 2017; Mugagga et al. 2010). Some reports even document encroachment of farmers onto protected Mt Elgon land. Thus, expanding coffee cultivation is putting pressure on forests and creating land use changes that spur mosquito habitats in similar ways to those described in the entomological case studies above. Although deforestation rates have been high in Bududa over a number of years due to population growth and a long-standing focus on agricultural production, some reports suggest an intensification of land degradation in recent years as populations are forced to expand into previously unused areas (Mugagga et al. 2010; Kitutu et al. 2001). These themes are also reflected in the interview data presented here. A lack of

capacity for environmental regulation, a completely unregulated coffee economy, and increased international demand for Ugandan coffee means that there is increased pressure on farmers to expand levels of production (Ahmed 2012).

In addition to agriculture and deforestation, links between climate change and malaria are salient. While many acknowledge that the impacts of climate change are uneven, there is growing consensus that warming temperatures in East Africa as a result of climate change are likely to exacerbate malaria vulnerabilities (e.g. Endo, Yamana, and Eltahir 2017; Postigo 2008). Malaria modelling shows that small temperature increases greatly affect transmission potential; a mere half-degree centigrade increase in temperature can translate into a 30% to 100% increase in mosquito abundance (Pascaul et al. 2006). Further, the seasonal duration of malaria is likely to increase in many currently endemic areas, such as Uganda, due to expansions in the length of the rainy season (Postigo 2008; WHO 2013). Changes in weather, including more rain, were a consistent theme in the community member interviews.

Conclusion

A central question in this research is why government data on malaria in Bududa diverge so markedly from the reported increased suffering malaria experienced by the community. In adopting a world-systems framework, I argue that the perceptions of the community are likely to be accurate, that malaria rates are increasing in Bududa. The numbers reported in the government data are underreported or hiding the true burden of malaria in the district, given the preponderance of treatment from drug shops, where malaria cases are not officially counted. Not only do larger-scale forces lead to inaccurate reporting, but community members also connected increased prevalence of malaria over time to structural dynamics that reinforce global inequalities, such as the offshoring of environmental degradation from core nations and structural adjustment policies facilitating increased privatization and limited public healthcare access.

Indeed, while the reasons behind increased malaria vulnerabilities, including inadequate treatment from drug shops and environmental changes, have been examined before in different contexts, a main contribution of this research is the connection of these phenomena to larger-scale patterns and processes. While researchers commonly study global health outcomes utilizing comparative approaches cross-nationally, here I somewhat uniquely utilize structural fieldwork to connect community members' perceptions to upstream, systemic causes. Engaging a world-systems perspective illuminates why government reports would say malaria is declining while other evidence suggests it is actually on the rise.

Specifically, the rapid emergence and overwhelming use of drug shops is keenly tied to neoliberal development initiatives and structural adjustment measures undertaken in poor nations like Uganda, which facilitate increased privatization and decreased or limited support for

government health services. Current individual-level studies of drug shops or treatment paths among populations in Sub-Saharan Africa fail to make a broader connection to the structural dynamics that facilitate these trends. When austerity measures are undertaken in the name of debt repayment and GDP growth, it is the poor and vulnerable that feel the deepest effects. The underreporting of malaria that occurs as a result of failed public healthcare and surveillance systems is thus a structural issue deriving in large part from neoliberal development measures undertaken in poor nations that are rooted in and reflective of world-system hierarchies.

In this way, neoliberal policies help account for the observed discrepancy between data from the community and the official district-level data on reported cases. Because of inadequate public health resources and the use of drug shops, a significant proportion of malaria cases in the community are likely not being counted by official government sources. Thus, the results of this study call into question the standard assumption that government reports are accurate. This research speaks to the politics of data collection and measurement, and the need for researchers and public health practitioners to be more skeptical about government health statistics, especially when these reports do not conform to broader expectations that consider larger structures of power and inequality.

Furthermore, the neoliberal order creates incentives for government officials to misrepresent statistics and make it look like malaria is being managed appropriately. As mentioned previously, evidence of gains is often needed in order to secure foreign investment, garner additional aid, attract tourism, or boost the country's status or reputation in other ways. With market liberalization and reductions in public funding creating high unemployment and a lack of opportunities, government officials themselves may feel pressure to ensure reappointment to their positions by portraying improvements in the district-level statistics to which they are assigned.

A lack of attention to broader structural forces also characterizes prior research on environmental change and malaria. Many entomology studies contend that climate change and deforestation are yielding new patterns that expand the habitat range of the *Anopheles* mosquito in East Africa. However, to my knowledge, none of these studies have used interviews or perspectives from local community members themselves to assess these linkages. The people of Bududa largely represent coffee farmers and agricultural producers, given Uganda's location in the periphery of the world-system. They have a keen knowledge and awareness of weather patterns, natural cycles, and particulars of the local flora and fauna despite very low levels of formal education. They are deeply connected to and impacted by their local physical environment and thus are astute observers of changes in climatic conditions and the impacts this has on their crops and livelihoods. Despite a lack of a rhetoric of "climate change" they are able to make keen

observations of local environmental conditions and their impacts on malaria risk, and this should not be overlooked by the scientific community.

Existing research on the connections between deforestation and mosquitoes or climate change and malaria is incomplete for failing to acknowledge the larger world-systemic relationships that facilitate the unfair use of environmental space and increased vulnerability to climate change dynamics in poor nations. The interviews emphasize that land-use changes are partially induced by international demand for coffee, a commodity that has been liberalized in trade reform in recent decades and heavily promoted along the lines of comparative advantage since colonial times. Just as coffee manifests ecologically unequal exchanges, and a wide body of research emphasizes that core nations are most responsible for global climate change due to production processes and consumption habits embodied in the international division of labor (Roberts and Parks 2007). The observed relationships between tree felling, climate changes, and disease is not something that just “happens” in poor nations; consumption levels in affluent nations on one end of the spectrum, and persistent poverty in periphery nations at the other end—which are supported through deep and historically-embedded international inequalities in trade, production, and macro-economic policy—profoundly contribute to malaria risks and deaths in societies like Bududa.

Thus, current macro-economic policies centered on privatization, “free trade,” and the promotion of primary sector exports from poorer nations under the facade of facilitating economic development must be carefully reconsidered against the long-term ecological and human well-being consequences. Inadequate public sector health spending and emphasis on agricultural exports leads to persistent poverty, insufficient access to health resources, and the destruction of natural resources, ultimately creating vulnerabilities that spur infectious disease. GDP growth that includes human suffering, illness, death and devastation to the environment are ultimately not developmental gains, but losses.

Although the application of themes from political economy help to illuminate the inaccuracies of the official malaria data, it is important to acknowledge other interpretations of the opposing observations between community members and the official district-level data. For example, it could be that community perceptions are inaccurate; community members could be self-treating from drug shops when they don’t actually have malaria. However, I argue that even if false-positives with self-treatment are likely, there is still a significant degree of systemic underreporting due to the challenges with accessing proper clinics documented in the interviews here and in prior research.³ Another interpretation of the data is that, confirming the official reports, malaria

³ Furthermore, recent studies on the validity of self-reports and self-treatment conducted in East Africa find that overwhelmingly, community members are accurate in self-diagnosing malaria when these are compared to laboratory tests (e.g. Maheu-Giroux et al. 2011).

incidence, or new cases are decreasing, but people have malaria longer or in seemingly intermittent periods due to increased antimicrobial resistance and improper dosing from drug shops. Nonetheless, these outcomes still result from “a lack of adherence,” which is tied to neoliberal development approaches that limit poor people’s ability to access proper diagnosis and treatment.⁴

This research makes important contributions to world-systems scholarship by engaging “structural fieldwork,” which led to a number of insights. At the forefront, extended structural fieldwork provided the ability to critically compare patterns and explanations, and prompted the use of multiple data sources from those with varying degrees of power within the community. Importantly, the use of structural fieldwork and considerations of power are crucial to explaining the differences in the data between community members and official government sources. I was driven to look past the official statistics to identify areas where malaria vulnerabilities were being overlooked and systemically underreported. On a larger scale, practices such as privatization and trade specialization are a reflection of the power of the affluent who design neoliberal organizations like the World Bank and IMF to their own benefit. These institutions also define the metrics of disease surveillance and hire researchers who align with their approaches to manage and publish data, reinforcing world-systemic hierarchies (e.g. Broad 2006). Community members in Bududa, in contrast, are among the powerless, and they lack few other options to creating and experiencing environmental changes and receiving improper malaria surveillance and treatments at drug shops. Overall, drawing on the principles of structural fieldwork allowed for more critical engagement with theories of political economy regarding privatization and environmental change from the perspectives and observations of people experiencing these transformations.

It is important to acknowledge that conducting semi-structured interviews has some limitations. The interviews could have been affected because I am an outsider. However, my long-standing relationship with this community likely reduces these influences. Additionally, as noted, I employed a male interpreter who is native to Bududa in order to overcome remaining cultural, language, and gender norms that would have otherwise limited my interactions. Working with a translator also poses unique challenges. For instance, there is no written dialect or dictionary for Lugisu, so some words or phrases may be imperfectly translated or lack a direct translation. At times, working with a translator can disrupt the flow or ease of the conversation. However, I have a long history of working with my translator and our exchanges are relatively smooth and

⁴ While there are likely to be additional explanations that could account for the opposing observations of changes in malaria cases over time between community members and the official district-level data, these are some of the most salient given the context and factors considered. Although certainly, more research should focus on the existence and reasons behind discrepancies between community members’ perceptions of disease and official data sources.

unencumbered. I also have basic mastery of much of the local language, which aids in communications and trust with community members.

Despite significant improvements in malaria prevention, diagnosis, and treatment over the last several decades, this disease remains a leading cause of death in many areas of the Global South, including Uganda (WHO 2019). Heightened environmental change, coupled with increasing misuse of malaria medications and resistance, likely mean that concerns over malaria and other mosquito-borne diseases are only going to magnify in the coming decades. Undoubtedly, examining how community perceptions and experiences connect to large-scale global inequalities and structures that unfairly facilitate vulnerabilities to populations in the global South deserves increased attention.

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References

- Afrane, Yaw A., Andrew K. Githeko, and Guiyun Yan. 2012. "The Ecology of Anopheles Mosquitoes under Climate Change: Case Studies from the Effects of Deforestation in East African Highlands." *Annals of the New York Academy of Sciences* 1249: 204-210.
- Agaba, John. 2014. "81% of Malaria Patients Self-Medicare." *New Vision*. Retrieved on May 15 2016. (https://www.newvision.co.ug/new_vision/news/1310812/81-malaria-patients-self-medicate).
- Ahmed, M. 2012. "Analysis of Incentives and Disincentives for Coffee in Uganda." Technical notes series, MAFAP, FAO, Rome. Retrieved on August 10, 2015. (<http://www.fao.org/3/a-at590e.pdf>).

- Austin, Kelly F. 2012. "Coffee Exports as Ecological, Social, and Physical Unequal Exchange: A Cross-National Investigation of the Java Trade." *International Journal of Comparative Sociology* 53(3): 153-173.
- Austin, Kelly F. 2015. "Dependency, Urban Slums, and the Forgotten Plagues: A Cross-National Analysis of Tuberculosis and Malaria in Less-Developed Nations." *Sociological Perspectives* 58(2): 286-310.
- Austin, Kelly F. 2017. "Brewing Unequal Exchanges in Coffee: A Qualitative Investigation into the Consequences of the Java Trade in Rural Uganda." *Journal of World-Systems Research* 23(2): 326-352.
- Austin, Kelly F., Christina DeScisciolo, and Lene Samuelsen. 2016. "The Failures of Privatization: A Cross-National Investigation of the Tuberculosis and the Structure of Healthcare in Less-Developed Nations." *World Development* 78: 450-460.
- Babb, Sarah and Alexander Kentikelenis. 2017. "International Financial Institutions as Agents of Neoliberalism." Pp 16-27 in *The SAGE Handbook of Neoliberalism*, edited by Damien Cahill, Melinda Cooper, Martjin Konings, and David Primrose. Thousand Oaks, CA: SAGE Publications.
- Barros, Fábio S.M. and Nildimar A. Honório. 2015. "Deforestation and Malaria on the Amazon Frontier: Larval Clustering of *Anopheles darlingi* Determines Focal Distribution of Malaria." *American Journal of Tropical Medicine* 93(5): 939-953.
- Basu, Sanjay, Jason Andrews, Sandeep Kishore, Rajesh Panjabi, and David Stuckler. 2012. "Comparative Performance of Private and Public Healthcare in Low and Middle Income Countries: A Systematic Review." *PLoS Medicine* 9(6): 1-13.
- Baronov, David. 2008. *The African Transformation of Western Medicine and the Dynamics of Global Cultural Exchange*. Philadelphia, PA: Temple University Press.
- Baronov, David. 2009. "The Role of Historical-Cultural Formations within World-Systems Analysis: Reframing the Analysis of Biomedicine and East Africa." *Journal of World-Systems Research* 15(2): 147-166.
- Basurko, Célia, Christophe Demattei, René Han-Sze, Claire Grenier, Michel Joubert, Mathieu Nacher and Bernard Carme. 2013. "Deforestation, Agriculture and Farm Jobs: A Good Recipe for *Plasmodium vivax* in French Guiana." *Malaria Journal* 12(90): 1-6.
- Blumenthal, David, and William Hsiao. 2005. "Privatization and its Discontents — The Evolving Chinese Health Care System." *The New England Journal of Medicine* 353(11): 1165-1170.

- Broad, Robin. 2006. "Research, Knowledge, and the Art of 'Paradigm Maintenance': The World Bank's Development Economics Vice-Presidency (DEC)." *Review of International Political Economy* 13(3): 387-419.
- Bunker, Stephen. 1985. *Underdeveloping the Amazon: Extraction, Unequal Exchange, and the Failure of the Modern State*. Urbana, IL: University of Illinois Press.
- Chandler, Clare I.R., Rachel Hall Clifford, Turinde Asaph, Magnussen Pascal, Siân Clark, and Anthony K. Mbonye. 2011. "Introducing Malaria Rapid Diagnostic Tests at Registered Drug Shops in Uganda: Limitations of Diagnostic Testing in the Reality of Diagnosis." *Social Science & Medicine*. 72: 937-944.
- Chorev, Nitsan. 2012. *The World Health Organization Between North and South*. New York, NY: Cornell University Press.
- Chorev, Nitsan. 2013. "Restructuring Neoliberalism at the World Health Organization." *Review of International Political Economy* 20(4): 627-666.
- Chorev, Nitsan. 2019. *Give and Take: Developmental Foreign Aid and the Pharmaceutical Industry in East Africa*. Princeton, NJ: Princeton University Press.
- Chorev, Nitsan and Sarah Babb. 2009. "The Crisis of Neoliberalism and the Future of International Institutions: A Comparison of the IMF and WTO." *Theory and Society* 38: 459-484.
- Clements, Benedict, Sanjeev Gupta and Masahiro Nozaki. 2013. "What Happens to Social Spending in IMF-Supported Programmes?" *Applied Economics* 45(28): 4022-4033.
- Crivelli, Ernesto and Sanjeev Gupta. 2016. "Does Conditionality in IMF-Supported Programs Promote Revenue Reform?" *International Tax and Public Finance* 23(3): 550-579.
- Deressa, Wakgari, Ahmed Ali, and Damen Hailemariam. 2008. "Malaria-Related Health-Seeking Behaviour and Challenges for Care Providers in Rural Ethiopia: Implications for Control." *Journal of Biosocial Science* 40: 115-135.
- Dreher, Axel and Stefanie Walter. 2010. "Does the IMF Help or Hurt? The Effect of IMF Programs on the Likelihood and Outcome of Currency Crises." *World Development* 38(1): 1-18.
- Emmanuel, Amin. 1972. *Unequal Exchange*. New York, NY: Monthly Review Press.
- Endo, Noriko, Teresa Yamana and Elfatih A. B. Eltahir. 2017. "Impact of Climate Change on Malaria in Africa: A Combined Modelling and Observational Study." *The Lancet* 389(2): S7.
- Espino, Fe and Lenore Manderson. 2000. "Treatment Seeking for Malaria in Morong, Bataan, The Philippines." *Social Science & Medicine* 50(9): 1309-1316.

- Farmer, Paul. 1999. *Infections and Inequalities: The Modern Plagues*. Berkeley, CA: Pine Forge Press.
- Forster, Timon, Alexander E. Kentikelenis, Thomas H. Stubbs, and Lawrence P. King. 2019. "Globalization and Health Equity: The Impact of Structural Adjustment Programs on Developing Countries." *Social Science & Medicine*. Retrieved November 5, 2019. (<https://doi.org/10.1016/j.socscimed.2019.112496>).
- Gellert, Paul K. and Jon Shefner. 2009. "People, Place and Time: How Structural Fieldwork Helps World-Systems Analysis" *Journal of World-Systems Research* 15(2):193- 218.
- Gereffi, Gary, John Humphrey, and Timothy Sturgeon. 2005. "The Governance of Global Value Chains." *Review of International Political Economy* 12(1): 78-104.
- Gereffi, Gary and Miguel Korzeniewicz. 1994. *Commodity Chains and Global Capitalism*. Westport, CT: Praeger Publishers.
- Hahn, Micah B., Ronald E. Gangnon, Christovam Barcellos, Gregory P. Asner, and Jonathan A. Patz. 2014. "Influence of Deforestation, Logging, and Fire on Malaria in the Brazilian Amazon." *PLOS ONE* 9(1): 85725.
- Jorgenson, Andrew, Kelly Austin, and Christopher Dick. 2009. "Ecologically Unequal Exchange and the Resource Consumption/Environmental Degradation Paradox: A Panel Study of Less-Developed Countries, 1970-2000." *International Journal of Comparative Sociology* 50(3-4): 263-284.
- Kamoga, Jonathan. 2018. "Uganda: Coffee Export Volumes Rise Amid Falling Prices." *The Monitor*. Retrieved December 20, 2019. (<https://allafrica.com/stories/201810260463.html>).
- Kentikelenis, Alexander E. 2017. "Structural Adjustment and Health: A Conceptual Framework and Evidence on Pathways." *Social Science & Medicine* 187: 296-305.
- Kingston, Kato Gogo. 2011. "The impacts of the World Bank and IMF Structural Adjustment programmes on Africa: The Case Study of Cote D'Ivoire, Senegal, Uganda, and Zimbabwe." *Journal of Policy and Strategic Studies* 1(2): 110-130.
- Kitutu, M.G., Andrew Muwanga, J. Poesen, and J.A. Deckers. 2011. "Farmer's Perception on Landslide Occurrences in Bududa District, Eastern Uganda." *African Journal of Agricultural Research* 6(1): 7-18.
- Kweka, Eliningaya J., Epiphania E. Kimaro, and Stephen Munga. 2016. "Effect of Deforestation and Land Use Changes on Mosquito Productivity and Development in Western Kenya Highlands: Implication for Malaria Risk." *Frontiers in Public Health* 4(1): 1-9.
- Lakoff, Andrew. 2006. *Pharmaceutical Reason: Knowledge and Value in Global Psychiatry*. New York, NY: Cambridge University Press.

- Maclean, Lauren M. 2011. "The Paradox of State Retrenchment in Sub-Saharan Africa: The Micro-Level Experience of Public Social Service Provision." *World Development* 39(7): 1155–1165.
- Maheu-Giroux, Mathieu, Martín Casapía, and Theresa W. Gyorkos. 2011. "On the Validity of Self-Reports and Indirect Reports to Ascertain Malaria Prevalence in Settings of Hypoendemicity." *Social Science & Medicine* 72: 635-640.
- Mbonye, A.K., Christian Bygbjerg, and Pascal Mangussen. 2007. "Prevention and Treatment Practices and Implications for Malaria Control in Mukono District Uganda." *Journal of Biosocial Science* 40: 283-296.
- Maynard, Gary, Eric Shircliff, and Michael Restivo. 2012. "IMF Structural Adjustment, Public Health Spending, and Tuberculosis: A Longitudinal Analysis of Prevalence Rates in Poor Countries." *International Journal of Sociology* 42(2): 5-27.
- McMichael, Philip. 2017. *Development and Social Change: A Global Perspective, 6th Edition*. Thousand Oaks, CA: Pine Forge Press.
- Mohan, Giles. 2001. "The Environmental Impacts of Adjustment." Pp.95-117 in *Structural Adjustment: Theory, Practice, and Impacts* edited by Giles Mohan, Ed Brown, Bob Milward, and Aldred B. Zack-Williams. New York, NY: Routledge.
- Muhumuza, William. 2007. *Credit and Reduction of Poverty in Uganda. Structural Adjustment Reforms in Context*. Kampala, Uganda: Fountain Publishers.
- Mugagga, Frank Mukadasi Buyinza, and Vincent Kakembo. 2010. "Livelihood Diversification Strategies and Soil Erosion on Mount Elgon, Eastern Uganda: A Socio-Economic Perspective." *Environmental Research Journal* 4(4): 272-280.
- Navarro, Vicente. 2007. *Neoliberalism, Globalization, and Inequalities: Consequences for Health and Quality of Life*. New York, NY: Baywood Publishing.
- Navarro, Vicente. 2008. "Neoliberalism and its Consequences: The World Health Situation Since Alma Ata." *Global Social Policy* 8(2): 152-155.
- Navarro, Vicente, Carles Muntaner, Carme Borrell, Joan Benach, Águeda Quiroga, Maica Rodríguez-Sanz, Núria Vergés, and M. Isabel Pasarín. 2006. "Politics and Health Outcomes." *Lancet* 368: 1033-1037.
- Norris, Douglas E. 2004. "Mosquito-borne Diseases as a Consequence of Land Use Change." *EcoHealth* 1: 19-24.
- Okunzi, Sam Agatre. 2004. "Dying for Economic Growth? Evidence of a Flawed Economic Policy in Uganda." *Lancet* 354: 1632-1637.
- Ooms, Gorik and Ted Schrecker. 2005. "Expenditure Ceilings, Multilateral Financial Institutions, and the Health of Poor Populations." *Lancet* 365(9473): 1821-2823.

- Pacheco, Pablo. 2006. "Agricultural Expansion and Deforestation in Lowland Bolivia: The Import Substitution versus the Structural Adjustment Model." *Land Use Policy* 23: 205-225.
- Pascual, M., J. A. Ahumada, L. F. Chaves, X. Rodo, and M. Bouma. 2006. "Malaria Resurgence in the East African Highlands: Temperature Trends Revisited." *Proceedings of the National Academy of Sciences of the United States of America* 103: 5829-5834.
- Patz, Jonathan A. and Sarah H. Olson. 2006. "Malaria Risk and Temperature: Influences from Global Climate Change and Local Land Use Practices." *Proceedings of the National Academy of Sciences of the United States of America* 103(15): 5635-5636.
- Postigo, Antonio. 2008. "Vulnerability and Adaptation to the Health Impacts of Climate Change." *Development* 51: 403-408.
- Przeworski, Adam and James Vreeland. 2000. "The Effect of IMF Programs on Economic Growth." *Journal of Development Economics* 62(2): 385-421.
- Rice, James. 2007. "Ecological Unequal Exchange: International Trade and Uneven Utilization of Environmental Space in the World System." *Social Forces* 85: 1369-1392.
- Roberts, J. Timmons. and Bradley C. Parks. 2007. *A Climate of Injustice: Global Inequality, North-South Politics, and Climate Policy*. Cambridge, MA: MIT Press.
- Rostow, Walt W. 1960. *The Stages of Economic Growth: A Non-Communist Manifesto (3rd ed.)*. London, England: Cambridge University Press.
- Shandra, John M., Eran Shor, Gary Maynard, and Bruce London. 2008. "Debt, Structural Adjustment, and Deforestation: A Cross-National Analysis." *Journal of World-Systems Research* 14(1): 1-21.
- Shandra, John M., Christopher Leckband, and Bruce London. 2009. "Ecologically Unequal Exchange and Deforestation: A Cross-National Analysis of Forestry Export Flows." *Organization & Environment* 22(3): 293-310.
- Shandra, Carrie L., John M. Shandra, and Bruce London. 2011a. "World Bank Structural Adjustment, Water, and Sanitation: A Cross-National Analysis of Child Mortality in Sub-Saharan Africa." *Organization & Environment* 24(2): 107-129.
- Shandra, John M., Eric Shircliff, and Bruce London. 2011b. "World Bank Lending and Deforestation: A Cross-National Analysis." *International Sociology* 26(3): 292-314.
- Stiglitz, Joseph. 2002. *Globalization and its Discontents*. New York, NY: Norton Press.
- Stubbs, Thomas, Alexander Kentikelenis, David Stuckler, Martin McKee, and Lawrence King. 2017. "The Impact of IMF Conditionality on Government Health Expenditure: A Cross-National Analysis of 16 West African Nations." *Social Science & Medicine* 174: 220-227.

- Stubbs, Thomas, Alexander Kentikelenis, Lawrence King. 2016. "Catalyzing Aid? The IMF and Donor Behavior in Aid Allocation." *World Development* 78, 511-528.
- Turshen, Meredith. 1999. *Privatizing Health Services in Africa*. New Brunswick, NJ: Rutgers University Press.
- Uganda Bureau of Statistics. 2014. "National Population and Housing Census 2014." Accessed on April 17, 2014. (http://www.unstats.un.org/unsd/demographic/sources/census/2010_PHC/Uganda/UGA-2014-11.pdf).
- Vittor, Amy Yomiko, Robert H. Gilman, James M. Tielsch, Gregory Glass, Tim Shields, Wagner Sánchez Lozano, Viviana Pinedo-Cancino, and Jonathan A. Patz. 2006. "The Effect of Deforestation on the Human-Biting Rate of *Anopheles darlingi*, the Primary Vector of *Falciparum* Malaria in the Peruvian Amazon." *American Journal of Tropical Medicine and Hygiene* 74(1): 3–11.
- Wallerstein, Immanuel. 1974. *The Modern World-System, Volume I: Capitalist Agriculture and the Origins of the European World-Economy in the 16th Century*. New York, NY: Academic Press.
- Watira, W. 2011. *Bududa District Local Government Five-Year District Development Plan*. Retrieved April 4 2015. (<http://www.npa.ug/wp-content/themes/npatheme/documents/East/Bududa%20DDP.pdf>).
- Watkins, Susan Cotts and Ann Swidler. 2013. "Working Misunderstandings: Donors, Brokers, and Villagers in Africa's AIDS Industry." *Population and Development Review* 38(1): 197-218.
- Wiseman, Virginia, Anthony Scott, Lesong Conteh, Brendan McElroy, Warren Stevens. 2008. "Determinants of Provider Choice for Malaria Treatment: Experiences from The Gambia." *Social Science & Medicine* 67: 487-496.
- World Health Organization (WHO). (2019). "Malaria." Retrieved June 9 2019. (<https://www.who.int/news-room/fact-sheets/detail/malaria>).
- World Health Organization (WHO). 2013. "Climate Change and Infectious Diseases." Retrieved July 10 2017. (<https://www.who.int/globalchange/climate/en/chapter6.pdf>).
- Yanoviak, Stephen P., J. E. Ramírez Paredes, L. Philip Lounibos, and Scott Weaver. 2006. "Deforestation Alters Phytotelm Habitat Availability and Mosquito Production in the Peruvian Amazon." *Ecological Applications* 16(5): 1954-1864.