

Following Misdirection and Multiple Malarias in Santo Domingo, Dominican Republic

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Abstract

Misdirection can be understood as a social process of pursuing certain kinds of evidence while drawing attention away from others. This paper explores misdirection in the context of malaria elimination in the Dominican Republic. Malaria has recently exploded in impoverished spaces of the capital, Santo Domingo. Using ethnographic material collected from 2018-19, three perspectives trace the social co-production of misdirection. First, a young man afflicted with fever and weakness understands his ailment as “stress sickness” brought on by poverty and structural violence. Second, clinicians focus on the results of hemograms to diagnose febrile patients, creating a pattern of misdiagnosis. Lastly, malaria policies and financing demand more indicator data, creating the appearance of a neutral reality separate from local histories and political tensions. In the end, misdirection obscures malaria’s multiplicity, or the alternative realities that arise among the social actors who live with and respond to the problem of malaria in the capital. Attention to social-material practices breaks out of the narrow conceptualization of malaria as only a parasitic disease and reveals its other, multiple manifestations that require more than techno-biomedical solutions alone.

Keywords: Malaria multiple, misdirection, elimination, ethnography, Dominican Republic, Hispaniola

Introduction

Malaria on the rise in Dominican Republic

In September, 2018, an article appeared in a popular Santo Domingo newspaper, noting that:

The malaria outbreak affecting residents in *barrios* of Santo Domingo-West was not a surprise to community members, whose leaders have, for a long time, been warning about and demanding definitive solutions for the small ravines that surround them, but their voices went unheard amidst the water-logged streets and thick brush that encircle their homes (Pantaleón, 2018: author’s trans.).

Ultimately, more cases were reported that month (87 cases) than any other in the year, as malaria surged in a part of the city nicknamed *La Ciénaga*, or “the swamp.” *El nombre se lo dice* one resident said—“the name says it all.”

The Dominican Republic and Haiti share the last malaria-endemic island in the Caribbean, the site of Europe’s first landfall in an imagined New World and where shipments of enslaved human cargo brought along malaria parasites (Rodrigues et al., 2018). All local cases on the island are due to *Plasmodium falciparum* parasites, which remain chloroquine-sensitive and are transmitted by



Anopheles albimanus mosquitos. In 2006, the International Task Force for Disease Eradication declared elimination “technically feasible, medically desirable, and economically beneficial” in both countries on the island (WHO, 2007: 28).

At the time of the Task Force meeting, malaria in the Dominican Republic was a mostly rural disease. Bilateral cooperation with Haiti and improvements in surveillance, medical management, and vector-control had substantially reduced disease burden (Roberts, 2010). In late 2012, both countries agreed to work towards complete malaria elimination on the island by the year 2020 with support from the Global Fund for AIDS, Tuberculosis and Malaria (GFATM) (WHO, 2013). By 2013, that goal seemed tantalizingly close in the Dominican Republic: that year, malaria incidence had never been lower, both nationally (579 total cases) and in the capital region (40 total cases), than at any point in the previous 20 years.

But in late 2014, cases began sky-rocketing in Santo Domingo. By 2018, nearly 80% of all cases nationwide were in the capital. The outbreaks were not confined to one part of the city but shifted across different municipalities, where entrenched poverty, poor surface water drainage, and a weak health system were the norm. To note, virtually all cases in these outbreaks have been autochthonous, rather than imported from Haiti, where malaria is far more prevalent.

Similar to other areas of Santo Domingo, malaria was already present in La Ciénaga before this outbreak, but in low numbers. As the population grew, so too did cases. Poor people from outlying provinces had come, in their words, to *buscar su peso*, find any work they could. In La Ciénaga, they settled on land once declared *inhospitable*, or uninhabitable, given poor drainage that led to frequent flooding (Figure 1). Once vacant, state-owned land, parcels in La Ciénaga were now sold to these new arrivals as patronage gifts in exchange for votes, since the crowded masses of La Ciénaga symbolized a larger voting bloc.

Concurrent to rapid urbanization and the unexpected rise of malaria in the capital, the country’s health system began to decentralize the national malaria program to local-level health districts. Long a vertical, stand-alone program within the Ministry of Health, the national malaria program was instructed to transfer its technical competencies for all aspects of malaria control and elimination—from clinical management to outbreak response—to local districts and health-care centres, where staff were less familiar with the disease and where resources were limited. From then on, the national program assumed an advisory role. These changes were consistent with the wave of structural reforms that have swept over Latin American health systems since the 1970s in order to cut costs and meet demands of



Figure 1. Flooded home in La Ciénaga. Photo by Hunter Keys, 2018.

international funders (Bossert et al., 2000; Mitchell and Bossert, 2010).

The decision to decentralize the malaria program may have also been influenced by recent developments in malaria financing on the island. Prior to decentralization, the country received over \$7 million USD in malaria funding from the Global Fund. As time went by, the Dominican Republic found itself in the paradoxical position of being 'too rich' to qualify for continued Global Fund support to fight malaria. Global Fund money was instead disbursed through performance-based mechanisms, among them Cash on Delivery (CoD), which required countries to meet specific targets in reducing autochthonous cases before receiving funds (Herrera et al., 2015). The CoD funding system posed a dilemma when, for example, outbreaks of malaria effectively disqualified the Ministry of Health from receiving financial support to respond. This is not the first time that the country has faced a rise in malaria concurrent with a decline in funding: after years of DDT spraying and investing in rural sanitation programs, the country came close to complete elimination by 1968, reporting only 21 cases that year (Boncy et al., 2015). The gains were short-lived: by the early 1980s, malaria once again resurged across the country due to declines in public spending and re-seeding of transmission by an infected Haitian migrant workforce (PAHO, 1983), which the Dominican government had contracted to harvest sugar cane under deplorable conditions (Martinez, 1999).

Thus, as malaria outbreaks grew in the capital in the early 2010s, the institutional landscape became marked by changes in the health system, the influence of international organizations such as the Global Fund, and complex public-private financing schemes. In the months leading up to this study, malaria funders unrolled a new financial plan. In early 2018, the Regional Malaria Elimination Initiative (RMEI), a multi-million-dollar, five-year project kicked off across seven countries in Central America, Mexico, Colombia, and the Dominican Republic. Financing for RMEI flowed from national governments and a mix of loans and grants from the Inter-American Development Bank, Bill and Melinda Gates Foundation, Global Fund, and Carlos Slim Foundation. In effect, years

of declining public spending for the Dominican health system and the intractable nature of malaria had created an opportunity for 'philanthro-capitalism,' or the use of performance-based financing to solve health problems in countries with a hollowed-out public sector (Erikson, 2015). By late 2018, representatives from well-known international health and development organizations were busy in Santo Domingo planning a new community engagement project for malaria in the capital.

Malaria multiple and misdirection

It was against this backdrop that my ethnographic work on malaria took place. I asked simply how people understood the illness, how they were dealing with it, and what should be done about it. This included not only those who traditionally fall under the gaze of medical anthropology—the 'local community'—but also the field-level staff, program planners, and executive leadership. I 'studied up' the scale of social and scientific power by interviewing and observing experts, visiting consultants and others who do not actually live in poor places where there is malaria but who still pursue the disease with a "relentless ethos of optimism" (Brown, 2017: 483). The personal and professional lives of these social actors intersected because of malaria, but how did they understand it, learn to live with it, or try to eliminate it?

But I also sought to go further. Rather than 'see' malaria as a disease (a passive, isolatable object), why not consider the practices that handle it (Mol, 2002)? This approach considers the social-material practices that delineate, manipulate, and represent malaria. Malaria does not wait patiently 'out there' to be diagnosed (or eliminated); there are 'multiple malaras' that emerge from the myriad ways in which people, technologies, and the non-human world interact (Chandler and Beisel, 2017). By foregrounding malaria *practices* rather than malaria the *disease*, we come to appreciate how malaria multiplies (Mol, 2002).

Just consider, for example, the difference in 'seeing' malaria as an ordinary part of everyday life—as many people do in many poor parts of the world—and as the singular focus of powerful global health philanthropies. Or at an interpersonal scale, how diagnostic decision-making,

patient preferences, and availability of material resources come together to enact a particular 'kind' of malaria. For example, the process of diagnosing malaria in under-resourced settings can depend less on the detection of malaria parasites (one definition of the disease) and more on a negotiation between patient and clinician (a different kind of understanding altogether) (Beisel et al., 2016; Umlauf, 2017; Chandler et al., 2012). These realities contrast with presumptions of globally-accepted medical guidelines, which declare that malaria diagnosis depends solely on the presence of malaria parasites detected by rapid diagnostic test (RDT) or microscopy (WHO, 2021). On the one hand, we appreciate malaria as a parasitic disease that becomes real through blood samples and laboratory technology; on the other, we find that it is a social process in which clinicians and patients make do with what is available and respond to different pressures and preferences. In this way, malaria multiplies through acts of coordination among clinicians and patients, laboratories and medical supplies, criteria and data, and bureaucracies and organizations (Berg, 1997; Mol, 2002; Engel et al., 2017). Malaria becomes something different to different people. Attention to practices reveals malaria's multiplicity and breaks out of the narrow framing of malaria as only a biomedical disease.

Here, I link the idea of malaria multiple to the concept of *misdirection* to show how an adherence to the biomedical paradigm, which works hand-in-glove with malaria financing schemes, obscures malaria's multiplicity. In magic, misdirection refers to the magician's sleight-of-hand to draw attention towards an intended outcome and away from the technique used to achieve it (Kuhn, 2019). In this instance, misdirection is intentional. In the domain of global health, however, misdirection can be less obvious and more difficult to pin down. Responsibility for misdirection is distributed across individuals, institutions, bureaucracies, research practices, and histories. It can be embedded in epistemic traditions that allow for global health policies and systems to 'work.'

One of the best examples of misdirection in malaria practices is the trend of biomedical technologies coming to be seen as *the* solution to the problem of malaria. RDTs, anti-malarial combination drug therapies, fumigation, and insecti-

cide-treated bed nets remain the cornerstone of global malaria control and elimination strategies, and they have certainly reduced morbidity and mortality (O'Meara et al., 2010). However, the appearance of unanimous support among malaria experts and funding institutions for these technobiomedical solutions creates the impression that such technologies are "consensual, universally applicable, technically feasible, and morally desirable—in short, irresistible" (Eckl, 2017: 424). A study of the social lives of global malaria policies reveals how internal conflicts among experts about the problem of malaria, its techno-solutions, and who provides those solutions are ultimately downplayed in order to preserve political power (Eckl, 2017).

That power is usually tied to the ability to secure more funding from a core group of donors promoting corporate-based, managerial approaches to measure malaria program success (Tichenor, 2017). In this way, misdirection draws attention away from malaria's socio-political determinants, such as rising inequalities, land-use patterns, and access to healthcare (Brown, 1997; Packard, 2007) and towards indicators and 'performance metrics,' de-contextualized evidence that further reinforces the idea of universally-applicable solutions (Peeters Grietens et al., 2019). In effect, technologies become even more appealing for governments and vested interests since they make malaria appear to be a solvable, depoliticized problem rather than one that requires change to the status quo (Kamat, 2013; Packard and Brown, 1997).

Building on this literature in medical anthropology and science and technology studies (STS), I continue the argument that contemporary social-material practices for malaria create the illusion of certainty, validity, data quality, and so forth. This suite of scientific practices comprises the bedrock of the malaria elimination paradigm in Haiti and Dominican Republic (Boncy et al., 2015), a geographic region that has largely escaped the analytical lens of misdirection and malaria multiple. Rather than accept this paradigm as 'right,' I draw on the ideas of misdirection and malaria multiple to reveal what it misses. Fidelity to standardized scientific practices directs attention towards one, commonly accepted

construction of malaria as a parasitic disease and away from other co-constructions of malaria.

To illustrate this, I follow the social practices involved at three crucial stages: from the onset of illness and its interpretation; to the moment of diagnosis; and finally, to the collection of metric data to support malaria programs and financing. While previous literature richly describes the relationship between malaria's illness experience and structural vulnerability (for example, see Muela Ribera and Hausmann-Muela, 2011); the ambiguity of a clear diagnosis (Hausmann-Muela et al., 1998; Umlauf, 2017); the allure of simple technologies for diagnosis (Beisel et al., 2016); the disconnect between standardized treatment guidelines and local realities (Chandler et al., 2008; Chandler et al., 2012); the problematic collection of indicator data (Gerrets, 2015; Kingori and Gerrets, 2016; Tichenor, 2017); the role of indicator data in 'global health business' (Erikson, 2012); and the framing of the malaria problem within expert cultures (Brown, 1997; Eckl, 2017; Eckl, 2014; Packard, 2007), few studies have sought to explicitly connect these strands together in the same context using the concepts of misdirection (Peeters Grietens et al., 2019) and malaria multiple (Chandler and Beisel, 2017). The nexus of misdirection and malaria multiple constitutes a new contribution to social studies of malaria and the STS community more broadly.

Following these two theoretical strands led me into conflicted spaces, where, for example, a malaria diagnosis led to two, seemingly opposite conclusions about the nature of the illness; where an unreliable blood test functioned as a sort of divining rod amidst uncertainty; and where an audit culture, touted by experts as "what should be," left little room to consider "what really is." These findings expose "the gap between assumed clarity and actual ambiguity" (Eckl, 2017: 424).

The goal of this paper is not to heap criticism on the social actors struggling against malaria in Santo Domingo. If *misdirection* diverts attention away from social-political complexities to create the illusion of only one 'kind' of malaria (a 'natural' biomedical disease to be eliminated), then its alternative—a reimagined *direction* for the elimination paradigm—is one flexible enough for malaria's multiple realities. Why is this necessary?

Because, as I explore below, malaria is not the same thing, nor highest priority, for everyone involved; the stakes are different. A reimagined direction for elimination on the island should certainly keep trying to find and cure the sick and prevent malaria's reintroduction, but it should also go further by asking whether the practices involved in that process are good for the people (Mol, 2002).

Methodology and context

This work draws from multiple ethnographic site visits to Santo Domingo that began in early October, 2018 and continue at the time of this writing. The accounts below draw on data collected from October, 2018 – March, 2019. During this time period, total time spent 'in the field' was approximately six months.

Data collection was based on semi-structured interviews, personal observations and field notes, and shadowing key informants in their daily lives. Key informants included malaria patients, clinicians in public hospitals and clinics, residents and community health volunteers in La Ciénaga, field-level staff employed in the malaria program and public health system, and epidemiologists, malaria experts, and visiting consultants from external agencies. A total of 49 key informants were interviewed.

From 2010-2020, the highest weekly caseload in La Ciénaga occurred in week 39 of 2018 (n=28 cases; Figure 2). This ethnographic study began the following week. By then, cumulative incidence from week 1-40 of 2018 was 6 per 10,000 people, double the incidence over the same time period in 2016 and 2017. One death was reported in 2018 and three deaths in 2019.

In 2020, the total population size of the La Ciénaga focus was estimated to be around 430,000 people. Given their economic circumstances, most residents of La Ciénaga sought care at publicly-subsidized hospitals and clinics or were diagnosed and treated through active surveillance (home visits) by public health system field staff. For ease and clarity, the term 'malaria program' encompasses all planning, coordination, and field activities implemented by the central agency undergoing decentralization, and 'district

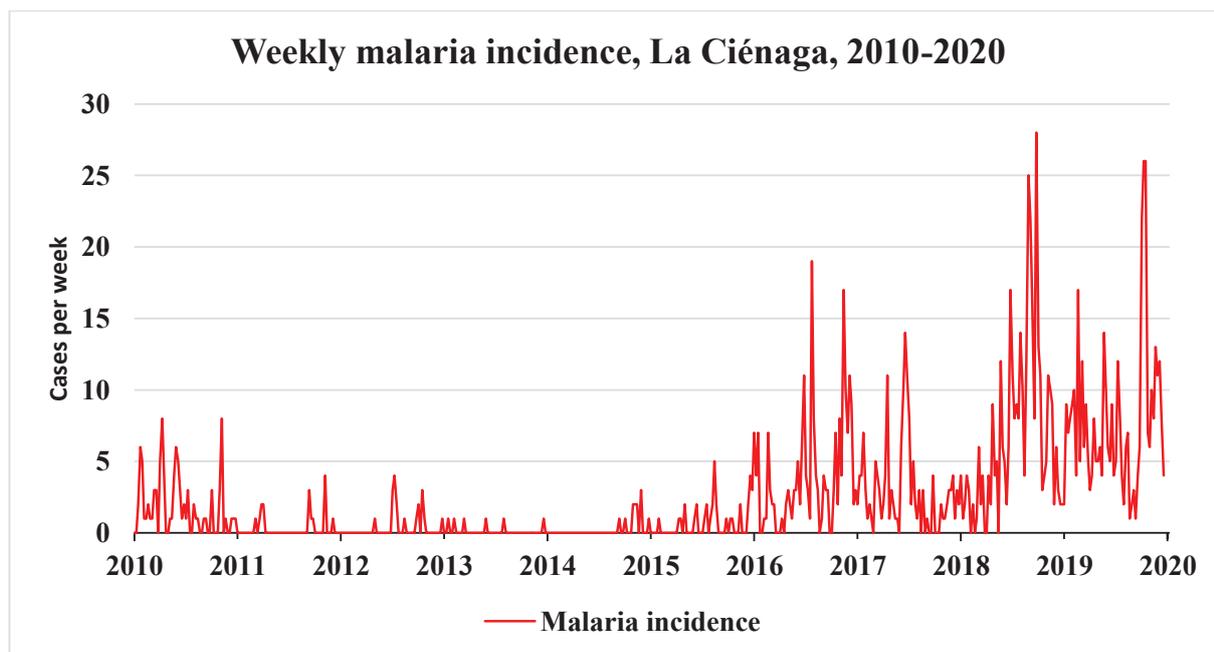


Figure 2. Weekly malaria cases in La Ciénaga transmission focus, 2010-2020.

office' refers to the publicly-funded, district-level Health Area Directorate with jurisdiction in La Ciénaga. The staff at this district office were tasked with new responsibilities for malaria under decentralization.

The district office was headed by a director and an epidemiologist who used surveillance data to dispatch a field team of roughly a dozen paid technicians to conduct home visits for surveillance, fumigation, mosquito net distributions, and education campaigns. Throughout the epidemic, the Ministry of Health ordered the district office to implement a '60-Day Plan,' in which field staff worked seven-day work-weeks for 60 consecutive days before reassessment and determination to continue for another 60 days. During this time, advisors from the central agency made regular visits to the district office to assess the quality and effectiveness of interventions and provide training and guidance. The central agency also deployed its own field teams (drastically reduced through decentralization) as trainers alongside district field staff.

Already, subtle signs of misdirection are discernible in this foreshadowing. Numerical case data appear to guide a scientific, rational response to malaria, but underneath each of the data points in Figure 2 are transformations: first,

an individual passes from a state of wellness to sickness; second, the individual's blood sample is interpreted as either positive or negative for malaria; and third, the individual's experience is reduced to a case count, a neutral metric. This description entails a sense of movement among people, materials, techniques, and objects. Along this 'chain of translation' social-material practices make certain phenomena knowable and comparable (Latour, 2005).

But they also do more: practices not only produce something (such as a graph of malaria incidence); they also *generate* a reality that fits with those methods and systems of knowledge (Law, 2009). Figure 2 does not exist 'naturally' but results from a large network of people and things: mosquitos and parasites, sick patients, clinicians, diagnostic tools, epidemiologists, spreadsheets, and scientific and analytical techniques. The result—a graph of case counts—*performs* for certain audiences, especially those with an interest in eliminating malaria. The challenge when viewing such a stable representation of reality is to remind ourselves of the multiple occasions for misunderstanding as people fall ill, seek care, are (or not) diagnosed, and are (or not) included in a database. Even from there, data are transformed

yet again as they are ‘cleaned,’ analysed, and presented to make claims or demand action.

Misdirection keeps us from seeing how Figure 2 is less a mirror of reality and more a performative artifact calling for a willingness to believe in its power to show what it purports to show (Holtrop, 2018). To unsettle common assumptions about malaria in Santo Domingo, I follow the perspectives of a patient suffering from malaria, clinicians struggling to make the diagnosis, community health workers going door-to-door to find more cases, and visiting malaria experts proposing a new intervention to slow the spread. Each ethnographic vignette reveals different ways in which misdirection ‘invisibilizes’ alternative realities: first, by suggesting that only one aetiology (and therefore only one form of treatment) exists; second, by diverting attention away from structural conditions in the health system to make diagnosis easier; and lastly, by drawing on a suite of scientific and technical practices to frame malaria as a de-politicized, biomedical problem.

Suffering from malaria: “stress sickness”

Wilson was a young Haitian man whom I met at Hospital Gonzalvo, a crowded public hospital where many residents of La Ciénaga sought care during the outbreak. When I met him, Wilson was

quite sick, lying on an emergency room stretcher with his hand on his forehead, nauseated and fatigued. This, it would later turn out, was his second visit to Gonzalvo for the same illness episode.

That day, his rapid diagnostic test (RDT) for malaria was positive, so his attending physician alerted a field technician at the central agency. At the time, I was accompanying this technician in his daily work, much of which involved criss-crossing the city in a government pick-up truck to initiate medical treatment for malaria to patients in clinics and hospitals.

I struggled to understand why clinicians did not begin treatment themselves once the diagnosis was made. As I came to discover, a mix of issues, from over-burdened public hospitals and recent changes to malaria policies all figured into the seemingly straightforward process of diagnosing and initiating treatment for malaria. Under these conditions, a malaria diagnosis could actually lead to two, seemingly opposite interpretations of the same illness.

At Wilson’s bedside, the doctor explained the need for treatment (Figure 3). Wilson sat up. Although he understood and spoke Spanish, another young man at his bedside spoke briefly in Haitian Kreyòl to him. Realizing that Wilson was Haitian, I chatted with him in Kreyòl, which seemed to put him more at ease. He took his first dose of chloroquine and primaquine under the



Figure 3. Wilson’s second visit to hospital emergency room, where I met him. On the hospital bed are bottles of chloroquine and primaquine, medicine that he began taking that day. Photo by Hunter Keys, 2019.

watchful eye of my companion from the central agency. Before we parted, Wilson agreed to meet later at his home for a series of interviews. What follows is his account, shared over the course of three interviews at his little home in La Ciénaga after we met that day at the hospital.

Wilson lived on a small dirt path a few hundred meters off a busy, paved road. He lived in a one-room, wooden house in which a thin curtain hung from the ceiling to divide the cooking and sleeping areas.

He recounted how he moved to the Dominican Republic from Haiti. He was originally from Gonaïves, a large city on Haiti's coast decimated by Hurricane Jeanne in 2004. Wilson was unable to support his children in the aftermath of the hurricane, so he left for the Dominican Republic, crossing the border *anba fil*, or "under the wire," a colloquial expression to say without legal documents. He settled in a community of other undocumented Haitians on the outskirts of Santiago, a large city in the Cibao Valley. Unable to afford a visa, he spent his days as a carpenter, trying to avoid run-ins with the police. After being robbed by immigration authorities during a night-time raid, he left for the capital, Santo Domingo, where, he figured, there may be more work and social support.

The illness that led Wilson to Hospital Gonzalvo began a few weeks before his first visit to the emergency room. At first, Wilson felt tired and feverish, symptoms that he attributed, in his words, to *maladi strès*—"stress sickness." Malaria *the disease* never crossed his mind; in his understanding, a series of hardships had accumulated to such effect as to cause weakness (*pa gen fòs*) and "heavy head," or headache (*tèt fe mal, tèt lou*). As he put it, "Stress can make someone sick," making "you think about your life." I asked him what kind of stress does this, and he enumerated a litany of causes: lack of food; inability to send your kids to school; menial, low-paying work; and lack of money to send family in Haiti. "You wake up every day thinking about this," he said. In Haitian ethnopsychology, complaints such as headache and "heavy head" can signal mental distress (Keys et al., 2012). Wilson said that *maladi strès* was similar to *reflechi twòp*, or "thinking too much," another syndrome in Haiti associated with

worse depression and anxiety (Kaiser et al., 2014). Thinking too much about life's problems can even render someone *fou* (crazy).

For Wilson, stress sickness could not be cured at a hospital or clinic. Doctors, he explained, could treat only 'natural illnesses,' or *maladi Bondye*, such as fever (*fyèv*), hypertension (*tansyon*), diabetes (*maladi sik*, or 'sugar disease'), or the common cold (*grip*). I tried to understand how Wilson differentiated this recent fever caused by *maladi strès* from other fevers caused by 'natural illnesses.'

As he explained, *maladi strès* arose "between us, as people," rather than 'naturally.' In his telling, *maladi strès* resulted from discrimination, violence, economic insecurity, and living without legal documents. Wilson even said that *maladi strès* could contribute to natural illnesses like high blood pressure and diabetes—thereby requiring the intervention of doctors—but this would not resolve the underlying cause: that of *maladi strès*. All one could do was pray, continue looking for work, and hope to receive some kind of support or financial help.

Wilson's first visit at Hospital Gonzalvo seemed to confirm his suspicion that medical doctors could not cure this illness. As his symptoms worsened, his friends and neighbours convinced him to seek care at the emergency room. His medical record of that first visit stated simply, "Bronchospasm crisis," with nebulizers and steroids as treatment. "They did a blood test [presumably a hemogram], and said that everything was normal." After getting intravenous fluids, Wilson was sent home, feeling more confident that his illness was *maladi strès*, since, "the hospital did not give me the solution."

As his condition worsened, he went back to Gonzalvo a few days later. The decision to return to the hospital seemed to turn on a few key issues. First, he was disqualified from the public health insurance system because he was undocumented. This, in effect, left Wilson with few options anyway. As the closest publicly-subsidized hospital, Gonzalvo provided care almost free-of-charge, regardless of documentation or insurance status. Although he thought *maladi strès* arose from problems "between us, as people," Wilson did not think the illness was "sent" by another person with some nefarious intent. Such a scenario would require the intervention of a Vodou priest

or other healer (Khoury et al., 2012). Despite feeling that hospital doctors could not definitively cure him, Wilson still returned to Gonzalvo after taking the advice of friends and neighbours. Ultimately, this decision to return to Gonzalvo was based on parameters that were both flexible and constraining: a flexible understanding of the illness that granted doctors another chance to make a diagnosis (in their terms); openness to advice from others in the community; and lack of legal status and health insurance that left him with few alternatives.

Once back at Hospital Gonzalvo, Wilson was tested for malaria by RDT and found to be positive. Clinical notes listed the diagnosis as “febrile syndrome” with the plan to notify the central agency and collect a thick smear and another hemogram. Upon hearing this diagnosis, Wilson praised God “for leading me on the path to get the medicine.” He completed the remaining doses of chloroquine at home and made a full recovery.

I asked him if he had ever heard of malaria prior to his diagnosis. “It’s something the Ministry of Health is talking about,” he replied matter-of-factly. Aside from suggesting that malaria was linked to trash, he could not describe what it was, how it was transmitted, or how one could prevent it. He still maintained that stress had caused his illness despite what appeared to dispel such ideas: the formal biomedical diagnosis, his compliance in taking anti-malaria medicine, and gratitude to the doctors and others who cared for him at Gonzalvo.

We (along with Wilson) appreciate malaria as both a biomedical diagnosis requiring specific treatment and as *maladi strès* brought on by social exclusion and structural violence. However, misdirection supports the assumption that only a biomedical solution is possible; it avoids questions of whether the government, health system, or other institutions have any responsibility to introduce ‘socioeconomic treatment,’ such as more public health funding, humane migration policies, and better living and working conditions for the poor. After all, it is worthwhile to recall that most countries successfully eliminated malaria within their borders through investment in socioeconomic infrastructure more so than malaria-specific interventions (Tusting et al., 2013; Packard, 2007). Regardless of how Wilson conceptualized or

attributed a cause for his illness (whether from psychosocial stress or parasitic disease), he essentially followed public health advice to seek care for fever. Aside from his own delay in seeking care when his symptoms began, the breakdown in timely diagnosis and treatment continued *after* he made contact with the health system: at his first visit, clinicians declined to test him for malaria. It appeared that the gaze of clinicians was focused elsewhere. This led to a key question: why, in the end, did the field technician from the country’s central agency treat Wilson rather than the physician who finally diagnosed him?

Diagnosing malaria: “the platelets test”

“Doctors do not think about malaria,” former patients and some field staff often complained. In conversations and interviews, a common pattern arose similar to Wilson’s experience: people with fever and other malaria symptoms made repeated visits to the same clinic or hospital, had their blood drawn for a hemogram, were told they had a viral illness, and sent home. During this first visit, clinicians rarely used an RDT. Instead, they preferred hemograms to check the level of platelets.

For many in the community, the final diagnosis of malaria came through at-home testing by active surveillance teams, leading many to say that they trusted *la gente de malaria*, or “the malaria people,” the field staff who went door-to-door diagnosing malaria, more so than doctors. “[The doctors] must do the malaria test!” exclaimed one former patient, herself finally diagnosed and treated by a field team at her home. Since “we are in an area attacked by malaria,” she said, “a doctor must know [or be aware of] it.”

To better understand why the diagnosis of malaria seemed to break down in the clinical setting, I spoke with clinicians at Hospital Gonzalvo and shadowed a doctor in the emergency room. In time, I came to see how important this hospital was for people in La Ciénaga: as mentioned above, care was nearly free-of-charge, a crucial feature for the mostly un- and under-insured population of La Ciénaga. There were other semi-public and private hospitals and clinics where people also sought care, depending on their means, but the



Figure 4. Triage, Hospital Gonzalvo emergency room. Photo by Hunter Keys, 2019.

unifying thread connecting their illness narratives was that regardless of care source, many were not diagnosed with malaria during their first or subsequent clinic visits. In fact, during my fieldwork, the average time from symptom-onset to diagnosis in La Ciénaga was seven days, a figure likely influenced by both misdiagnosis in health centres and delays in care-seeking by patients. This seven-day average was far from the recommended 48 hours (Dirección General de Epidemiología, 2020).

It was noticeable just how ‘public’ Hospital Gonzalvo was from the outside, where *motoconcho* taxi drivers angled around the exit and an overflow of patients waited on benches under an awning. Just inside, a throng of people stood in lines to speak with hospital administrators behind plexiglass windows and sat in a crowded waiting area; the message on posters to maintain *silencio, por favor*, was roundly ignored. The interior was dimly lit; there was an overall impression of too few resources for the volume of people in need. In a given year, Gonzalvo treats over 90,000 patients, most of whom share a socioeconomic level described as *muy bajo*—very low.

The emergency room cared for 100–150 patients a day. Only one or two doctors and a handful of nurses were available to meet this demand. At their disposal was a small stockpile of emergency medications, an oxygen tank, and a little wooden desk for a triage station (Figure 4). An ultrasound and EKG machine were down

a nearby hallway. This was a step up from the publicly-funded primary care clinics, that, as one doctor half-joked, “are lucky to have a stethoscope.” Under these circumstances, clinicians had only a few minutes to take a quick patient history, develop a preliminary diagnosis, and order tests.

Clinicians confided that it was difficult to distinguish malaria from dengue or other febrile illnesses. “It could be a urinary tract infection, or just a common cold [*gripe*],” said one nurse. They remarked on the suite of vector-borne diseases that plague the capital: not just malaria but also dengue, chikungunya, and Zika. Features of the clinical history and physical exam could be helpful, such as the quality and pattern of fever or external signs like jaundice. Any sudden influx of patients with the same symptoms and coming from the same geographic part of the city signalled an outbreak.

Symptoms, clinical practices, and diagnostic technology mediate between patient and disease (Mol, 2002). For the doctors caring for febrile patients from La Ciénaga, the hemogram was most useful. “You must check the results [of the hemogram] against the reference values,” he said, “to differentiate one infection from another.” A drop in platelets could suggest dengue, while other changes, such as leucocytosis or anaemia, may indicate malaria. “The symptoms [of these infections] are all similar, but the analytical test shows changes [to help you] differentiate

one cause from another,” one doctor told me. Although, following Wilson’s example, malaria can simultaneously be a complicated psychosocial experience and a neutral disease state, practices and conditions of misdirection allowed for only one ‘valid’ interpretation.

Detecting hematologic changes required patients to come back for repeat testing, a practice that left an indelible impression on them. After their illness, some former patients recalled their platelet count from memory, as if to legitimize their symptoms or underscore the severity of their illness. The mother of a young patient said that after making a repeat clinic visit, “his platelets [had] dropped from 214 to 102,” a common clinical finding from infection by *P. falciparum* but of limited utility in prognostication, triage, or management (Hanson et al., 2015). That patient’s final (and accurate) diagnosis of malaria came some days later at another visit, where he was finally checked for the parasites.

Conspicuously absent in these stories and observations was consistent use of malaria RDTs, which are a recent advent in the country’s clinical guidelines for diagnosing malaria (slide microscopy remains the gold standard in the country). Were there simply not enough RDT kits? This question met conflicting answers. In an interview, one doctor said that outbreaks could quickly deplete the supply; on other occasions, staff said that their supply was always well-stocked—accounts overheard in the same hospital!

The clinician I shadowed in the emergency room at Gonzalvo told me that they had indeed run out of RDTs, so only hemograms were collected that day. Patients with fever were sent home with a non-specific diagnosis, told to take acetaminophen, and return for a repeat hemogram later in the week.

A laboratory technician at Gonzalvo said that, “we call the [central agency]” for more RDTs, but according to the hospital director:

We don’t always have the rapid tests. We have to ask from the districts. We don’t have a stockpile.

Author: Why not?

Director: I don’t know [...] It’s their policy.

Author: Of the district?

Director: No, of the National Health Services. These are policies set by those at the top [*allá arriba*].

The director was alluding to the decentralization of the country’s malaria program. Before 2015, all cases of malaria were clinically managed by technical staff from the central agency. Now, all programmatic and clinical responsibilities for malaria fell on local-level health districts and their healthcare centres, from primary care clinics to tertiary-level hospitals. This policy called for new supply chains for RDTs and their appropriate use in clinical decision-making. The transition had not been smooth; according to many, the central agency had been in charge of clinical management for so long that “doctors do not think about malaria.”

Failure to quickly diagnose patients in the clinical setting could not be attributed to a simple lack of RDTs or because clinicians chose not to use them. Instead, it seemed that the almost mystical power of hemograms in clinical decision-making was rooted in larger issues of health system reform, changing guidelines and responsibilities, and resource scarcity. Amidst confusion and flux, hemograms offered clarity and confidence for clinicians, who acknowledged the poverty of their patients and sought solutions however they could, whether by prescribing the cheapest formulation of a given drug, providing pain relief, or giving intravenous fluids despite an unclear diagnosis.

Uncertainty pervaded this assemblage of care: patients wondered about the cause of their illness, over-burdened clinicians struggled to make a diagnosis, and hospital administrators navigated confusing policies and health system changes. In the end, the seemingly straightforward process of diagnosis—presumably made easier with RDTs—was actually quite ambiguous. Amidst this uncertainty, misdirection diverted attention away from health system dysfunctions and towards the ‘truth value’ of hemograms, inadvertently creating a pattern of misdiagnosis and inappropriate medical treatment.

Tracking malaria: “what should be”

“They are going to measure us” (*nos van a medir*), said a central agency executive to a group of district field staff in early 2019. The late afternoon sun filtered through the windows as the group sat together in the district office conference room.

The field staff had just returned from a long day of door-to-door malaria testing; their fatigue was palpable.

I had gotten to know this field team from days spent accompanying them in their daily work, plodding along the muddy footpaths of La Ciénaga in the afternoon heat, knocking on doors, and taking blood samples. A degree of companionship developed between us. Some spoke candidly about their lives, worries, and frustrations.

Perhaps their greatest concern was lack of consistent pay. During a break under the shade of a tree, one field technician leaned closer to me. His tone was serious; he worried what he said may cause trouble. They had not been paid in months, but given the scale of the outbreak, the Ministry of Health mandated that they keep working. “They’re asking us to work without pay.” The work did not correspond with a *pago digno*—a fair wage.

In the conference room that day, officials from the central agency needed to address poor quality blood slide collection and why surveillance forms had to be completed *siempre sistemático*—“always systematically” (Figure 5). District-level field staff were shouldering the bulk of the malaria response in La Ciénaga by then, with the central agency providing guidance and feedback. It was a challenging time; in the throes of an outbreak, the central agency was trying to assist and train a less experienced and under-funded district office.

The comment that, “they are going to measure us” deftly captured the influence of outside experts—in this case, the Pan-American Health Organization (PAHO), the “they” who would ultimately certify malaria elimination in the country. A 2019 technical document on malaria elimination in the Americas discusses “micro-stratification,” or identifying and classifying malaria foci at a local level (PAHO, 2019). This involves epidemiological descriptions of cases in a given area, entomological and environmental characteristics, and gaps and needs in the health system—in other words, metrics that are needed to tell a particular story about malaria in a given place. A data-driven culture is crucial for tracking progress towards elimination: “the micro-stratification process depends on better and more specific data in order to understand transmission dynamics and organize the response or micro-plan” (PAHO, 2019: 25).

In the conference room, the central agency executive held up a surveillance form and continued: “All of this information is important, because PAHO will check our database.” Sensing that the dynamic was slipping into criticism, the executive pivoted. “You are the ones out there spending the whole day in the sun, taking care of our neighbours, our cousins.”

The effort to introduce and improve data-driven accountability for malaria control and elimination has been extensively documented elsewhere,

The image shows a close-up of a malaria active surveillance form. The form is titled "Informe diario del Evaluador de Búsqueda activa institucional" and includes sections for "Cantidad de muestras tomadas por" (Number of samples taken by) and "RESUMEN" (Summary). The "RESUMEN" section includes "Total muestras tomadas" (Total samples taken) and "Nacionalidad" (Nationality). The form also includes a table for "Municipio" (Municipality) with columns for "Edad y sexo" (Age and sex), "Nacionalidad" (Nationality), and "Fecha" (Date). A hand is visible holding a pencil over the form, indicating it is being filled out.

Figure 5. Malaria active surveillance form. Photo by Hunter Keys, 2019.

mainly in Africa (Gerrets, 2015; Tichenor, 2017; Okello et al., 2019). In late 2018, I observed executives, program planners, and consultants gather in the high-rise office suite of the Inter-American Development Bank (IADB) in downtown Santo Domingo. There, they pored over Excel spreadsheets and drew up algorithms to describe a forthcoming community-based intervention: training community members to do active surveillance themselves. Guiding this planning stage was PAHO's DTIR acronym: diagnosis, treatment, (outbreak) investigation, and response (PAHO, 2019). According to PAHO (2019), all suspected malaria cases are to be diagnosed within the first 48 hours by RDT or microscopy; all confirmed cases should start treatment within the first day of diagnosis; an outbreak investigation should start within the first three days after diagnosis; and each case or cluster of cases should trigger a community-level response within the first seven days of diagnosis. Visiting consultants were adamant this new intervention would be integrated into the existing health system, but, "DTIR is our guide," the representative from IADB said; things may be modified or adapted, but fidelity to norms was paramount.

A curious distinction arose in these high-level meetings. Everyone in attendance agreed on the importance of norms and standards, acknowledged as "what should be," or *lo que debe ser*; the challenge, voiced by Dominican colleagues, was grappling with "what is," or *lo que es*. This could relate to, for example, how notification of positive cases in the community *should be done*, but *how it really is*; or which reporting form *should be used* but which *really are*. At one point, one figure from the Dominican health system emphasized this difference between "reality and what we should do," to which the IADB representative reminded everyone: "We are thinking about what we should do."

A universal vocabulary was needed to articulate what *should be done*. "We must all use the same terms," an external consultant said at the start of another meeting. This quest for a shared vocabulary was essential to implement the malaria model they implicitly shared: malaria was a biomedical problem. "You have everything you need for transmission: the vector, parasite, and no

timely diagnosis and treatment," one consultant explained when asked why malaria was such a problem in La Ciénaga. This malaria was unlike that which had sickened Wilson, or the malaria that escaped diagnosis in an under-resourced and confusing clinical environment. Instead, this was malaria in its purest form—a biological parasite—now available for intervention by distributing bed nets, encouraging care-seeking for fever, scaling-up diagnostic testing, and prescribing anti-malarial medicine. In effect, the malaria experts created a circular system of knowledge production, whereby evidence in the form of indicator data and other universally-valid measures made the introduction of a particular technology or intervention seem common-sensical (Peeters Grietens et al., 2019).

Unmentioned throughout these discussions were patterns of diagnostic failure at clinics and hospitals or chronic under-funding of field teams at the district level. More than a year after those meetings at the IADB office, a clinic doctor gave a sobering account that clearly referenced the financial and structural limitations to meeting the expectations of PAHO's technical document:

Imagine, you are asking these teams [of trained community members] to do active surveillance for seven consecutive days around the home of a positive case, and meanwhile, you have to give the three-day treatment to other positive cases nearby, and still do seven more days of active search, all without a vehicle, or enough gas, all in an area of rapid population growth.

In the planning meetings, the assumption was that more surveillance, this time by community members, would logically detect more patients, who would then be appropriately cared for once connected to the health system. Misdirection diverts attention away from structural and administrative challenges or the social nuances of implementing the project and towards collection of indicator data to represent the external world. In the words of one consultant, data "tell us what works and what doesn't."

That data began to trickle in at precisely the same moment that the country's political elite became engulfed in a giant scandal, one with fallout up to the time of this writing. In 2020,

the country's out-going president and certain political appointees—some within the Ministry of Health—were charged with stealing staggering amounts of public money. Consequently, a rigorous but agonizingly slow auditing system was put in place. This, in turn, affected the flow of IADB-financed loans inside the government, delaying monthly salaries to the newly-recruited community health workers and dealing a blow to their morale. In effect, misdirection constructs a 'frontstage' of neutral spreadsheets and incidence graphs, but backstage are human stories of disillusionment and dysfunctional governance.

Still, at the planning meetings, there was pushback against the universalizing discourse. For some, the language and conceptual roadmap were too self-contained and could not account for what was happening on the ground. "We must translate our language," one attendee said in private outside the conference room. Gesturing at the meeting, he said, "That's just technical talk. The dialogue is all one-way. What do these things mean to the people in the community?" Echoing the same sentiment, a field staff member remarked in private that the experts were too busy talking about theory. He looked up at the second-floor conference room from where we were seated outside and said, "Does anyone in that room actually know why there's malaria in La Ciénaga?"

Their remarks were a counter-narrative to the idea that the 'number-grammar' (Guyer et al., 2010: 37) of spreadsheets, algorithms, and standard definitions adequately grasped the messiness of malaria in the capital, a reality that those at the central agency understood, having worked so closely with communities over the years (Valdez et al., 2020). In our conversations and time together, central agency field staff, who had spent decades responding to malaria in the capital and building relationships in communities, continually referenced the need to cultivate spirit (*ánimo*) and calling (*vocación*) among recruited community members. When asked to explain her motivation, a newly-recruited health worker said, "We do not just worry about doing the [RDT]. It's about interacting out of friendship [...] Sometimes, the person has not had a good day, or doesn't feel well."

"It is about showing your face [*dale la cara*]," said another. In short, it is about caring (Fig. 6). The empathetic comment that trained community residents were, "Spending the whole day in the sun, taking care of our neighbours, our cousins," acknowledged essential, humanist qualities in the struggle against malaria. Alternative realities of malaria were forming through human relationships of care and compassion, training and supervision, and disillusionment and feelings of neglect, all elements of a social world that—in the interests of malaria elimination—deserve more consider-



Figure 6. Malaria testing by central agency staff, Santo Domingo. Photo by Hunter Keys, 2019.

ation in program planning and response strategy. Misdirection effectively diverted attention away from malaria multiple and towards its construction as only a biomedical problem to be solved with technical solutions.

Discussion: multiple, hidden malarías

Malaria is a persistent problem in the Dominican Republic, which shares the last endemic island in the Caribbean with its neighbour, Haiti. Performance-based metrics, indicator data, and the 'hard' evidence of blood tests guide international funders, expert organizations, and care assemblages struggling to eliminate the parasite. These data are symbols in a powerful truth regime that calls for "what should be." Misdirection makes the solution to malaria appear obvious, obscuring the complex social relations, politics, local history, and difficult structural conditions that constitute "what really is" in Santo Domingo: that malaria the *disease* is but one of many realities.

The unexpected rise of malaria in the capital and ongoing slumification on the city's margins signal a rupture, both epidemiological as well as social. Santo Domingo, the historical epicentre of progress in an imagined New World, is a bustling metropolis where government-sponsored billboards proclaim in a public relations campaign, *Aquí, hay futuro*—here, there is a future. Yet a seemingly intractable outbreak of malaria in the capital, the "classic economic disease" once limited to rural areas, now slows the steady march of progress (Brown, 1997). So goes the rupture with past understandings of malaria's epidemiology.

The rupture is also social. Before, malaria outbreaks in the country were casually attributed to Haitian migrant workers, who were thought to import malaria from their home country where prevalence is far higher. Instead, malaria settled among the poor and crowded settlements on the city's edges, in places so fragmented they defy descriptions as cohesive communities. The *invasión* of people from impoverished rural areas into the city follows decades of structural adjustment policies and public-sector downsizing (Pomeroy and Jacob, 2004). Their immiseration contradicts the promise of those policies, which have instead transformed them into a new at-risk

population, one now defined along economic fault lines rather than ethnic or nationalist divisions.

The social rupture ripples through a health system in which decentralization of the malaria program has sown operational challenges and confusion, contributing to breakdowns in care. Patients like Wilson follow the advice of public health messages nearly to the letter, seeking care for fever at places made available to them. Yet clinicians turn them away because the diagnosis is unclear—or rather, the ability, or even *responsibility* to make the diagnosis are too entangled to discern. Misdirection extends from clinic to community, where unpaid field staff tote along satchels of blood testing equipment and registers to write down, ever so diligently, the data they are told matter. These data, after all, "go in [the] database" to keep the process moving—and the money flowing, since program funding is increasingly dependent on performance-based metrics. Behind those metrics lies a different story, one less explored but crucial for the whole endeavour: how, and to what degree, spirit (*ánimo*) and calling (*vocación*) are cultivated and sustained.

In a world of ruptures, what might repair look like? A helpful starting point is to reflect upon "the importance of knowing about not knowing." Anthropologist Murray Last's study of medical pluralism among the Hausa people in Nigeria called attention to how little both patients and doctors needed (or cared) to know to bring about healing. "The patient is not interested in knowing the cures or the ideas [of biomedicine]; nor are the doctors necessarily interested in all the causes [attributed by the patients]" (Last, 1981: 387). Indeed, both chase a cure. A patient thinks his illness results from stress, and his clinician diagnoses malaria. The patient still takes the anti-malarial medicine, but remains unmoved in his understanding of stress sickness. For public health professionals, it is easy to claim that only one of the two is 'correct' (Pelto and Pelto, 1997), but that misses the larger point: both do not know, or choose not to know, what is real for the other. Misdirection creates the sense that only one cure is necessary: medications to kill parasites. Malaria the social disease, or 'stress sickness' brought on by exclusion, discrimination, and structural violence,

calls for far more widespread and systemic reforms that require more creative thinking and political will outside the circular form of knowledge production in contemporary malaria practices (Kamat, 2013; Tusting et al., 2013).

The introduction of rapid diagnostic tests (RDTs) into this setting has not made diagnosing malaria the disease any easier. This stand-alone tool is praised for its utility and cost-effectiveness but is always embedded in a social milieu. Health workers may balance the use of RDTs against their own clinical judgment, desire to maintain professional reputations, or the expectations of patients (Chandler et al., 2012)—in short, the demands of everyday life. Here, hemograms came to replace RDTs because of clinician preference, resource scarcity, and unclear protocols following decentralization. “RDTs might function best when they can draw on the medical infrastructure that they were designed to extend in the first place” (Beisel et al., 2016: 3). Along with scaling-up the use of RDTs, there must be concomitant efforts to address the dysfunctions of the health system in which they are used.

Misdirection perpetuates itself by making RDTs *appear* as an irresistible fix to a complex problem. Introducing the technology into communities by way of field teams and trained residents requires a new set of metrics and indicators: number of RDTs completed in a given time period, number of new positive cases identified, or number of patients referred from community to clinic. All of this information must be carefully recorded, which overlooks the social reality in which it all takes place. Fidelity to standard procedures is “perceived as a better indicator of quality than the fidelity to empirical reality” (Peeters Grietens et al., 2019: 398).

That reality may very well contain patterns of data fabrication by those doing the work. Like the field staff in this study, those labouring in low- and middle-income countries to collect data face myriad challenges, especially unpredictable pay. Within expert cultures, these metrics are presumed to depict a neutral reality, but they are collected by human beings, people with their own struggles, worries, and aspirations. Poor morale and supervision and inadequate institutional support can lead them to fabricate or falsify data

as a way to subvert, resist, or redress tensions in the social-economic milieu (Kingori and Gerrets, 2016). ‘Fake’ data may in fact reflect a hidden, just-as-real side of reality, a possibility deserving more exploration in Santo Domingo.

The nascent project in Santo Domingo has shown some encouraging signs, though. While acknowledging the problematic nature of field data, more than half of all cases diagnosed in the community were picked up by trained residents in 2019 and 2020. This is part of the power of indicator data in the malaria elimination effort: they can inspire a sense of confidence and clarity about the problem of malaria. When trending in the right direction, the data evoke hope for an imagined future, one of a malaria-free island (Merry, 2011). Here, I have tried to destabilize the idea that numbers tell the whole (or even main) story of malaria in Santo Domingo by sharing ethnographic accounts along the chain of social relations that translates a sick individual into a case count compatible with spreadsheets and graphs. What escapes this process are the societal nuances and life worlds of the people involved in the production of those data (Holtrop, 2018). In recent follow-up interviews, trained community members describe a sense of inter-connectedness with neighbours, pride in one’s work, and spiritual purpose. “[To] go directly to the person who’s sick and give them medicine, I think this has no price,” said one; “it is done out of love,” said another. But much work remains: they ask for more consistent supervision and training, harmonization of their work with other interventions, respect for having a crucial role in the elimination effort, and especially, *pago digno*—a fair wage.

Practices of misdirection divert attention away from these and other complicated issues by taking malaria as a singular disease to be diagnosed, treated, and eliminated. Alas, this goal is not above the fray of politics and social ills; there is no ‘one’ malaria waiting patiently ‘out there’ to isolate and eliminate. These three ethnographic perspectives show how malaria acquires new forms and meaning through social and material practices, leaving unresolved the best way we should come to know this stubbornly persistent disease. In these circumstances, we may be better served by reflecting on a poignant question put forward

by Annemarie Mol: “[I]f we can no longer find assurance by asking, ‘is this knowledge true to its object?’ it becomes all the more worthwhile to ask, ‘is this practice good for the subjects (human or otherwise) involved in it?’” (Mol, 2002: 165).

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References

- Beisel U, Umlauf R, Hutchinson E and Chandler C (2016) The complexities of simple technologies: re-imagining the role of rapid diagnostic tests in malaria control efforts. *Malaria Journal* 15(64).
- Berg M (1997) *Rationalizing medical work: decision-support techniques and medical practices*. Cambridge, London: MIT Press.
- Boncy PJ, Adrien P, Lemoine J et al. (2015) Malaria elimination in Haiti by the year 2020: an achievable goal? *Malaria Journal* 14(237).
- Bossert T, Larrañaga O and Ruiz Meir F (2000) Decentralization of health systems in Latin America. *Pan-American Journal of Public Health* 8(1/2): 84-92.
- Brown P (1997) Malaria, Miseria, and underpopulation in Sardinia: the “malaria blocks development” cultural model. *Medical Anthropology* 17(3): 239-254.
- Brown P (2017) Anthropologists in MalariaWorld. *Medical Anthropology* 36(5): 479-484.
- Chandler CIR and Beisel U (2017) The anthropology of malaria: locating the social. *Medical Anthropology* 36(5): 411-421.
- Chandler CIR, Jones C, Boniface G et al. (2008) Guidelines and midlines: why do clinical staff over-diagnose malaria in Tanzania? a qualitative study. *Malaria Journal* 7(53).
- Chandler CIR, Mangham L, Ngu Njei A et al. (2012) ‘As a clinician, you are not managing lab results, you are managing the patient’: How the enactment of malaria at health facilities in Cameroon compares with new WHO guidelines for the use of malaria tests. *Social Science and Medicine* 74(10): 1528-1535.
- Dirección General de Epidemiología (2020) Protocolo de Vigilancia de Malaria. Santo Domingo, Republica Dominicana: Ministerio de Salud Publica, Republica Dominicana.
- Eckl J (2014) The power of private foundations: Rockefeller and Gates in the struggle against malaria. *Global Social Policy* 14(1): 91-116.
- Eckl J (2017) The social lives of global policies against malaria: conceptual considerations, past experiences, and current issues. *Medical Anthropology* 36(5): 422-435.
- Engel N, Yellappa V, Pant Pai N and Pai M (2017) Diagnosing at point of care in South India: coordination work and frictions. *Science and Technology Studies* 30(3): 54-72.
- Erikson S (2012) Global health business: the production and performativity of statistics in Sierra Leone and Germany. *Medical Anthropology* 31(4): 367-384.
- Erikson S (2015) Secrets from whom? Following the money in global health finance. *Current Anthropology* 56: S306-S316.
- Gerrets R (2015) Charting the road to eradication: health facility data and malaria indicator generation in rural Tanzania. In: Rottenburg R, Merry SE, Park S-J, et al. (eds) *The World of Indicators*. Cambridge, UK: Cambridge University Press.
- Guyer J, Khan N, Obarrio J et al. (2010) Number as an inventive frontier. *Anthropological Theory* 10(1-2): 36-61.
- Hanson J, Phu NH, Hasan MU, et al. (2015) The clinical implications of thrombocytopenia in adults with severe falciparum malaria: a retrospective analysis. *BMC Medicine* 13(1): 97.
- Hausmann-Muela S, Muela Ribera J and Tanner M (1998) Fake malaria and hidden parasites—the ambiguity of malaria. *Anthropology & Medicine* 5(1): 43-61.
- Herrera S, Andrés Ochoa-Orozco S, González I, et al. (2015) Prospects for malaria elimination in Mesoamerica and Hispaniola. *PLoS Neglected Tropical Diseases* 9(5): e0003700.
- Holtrop T (2018) 6.15%: Taking numbers at interface value. *Science and Technology Studies* 31(4): 75-88.

- Kaiser B, McLean K, Kohrt B, et al. (2014) Reflechi twòp - Thinking too much: description of a cultural syndrome in Haiti's Central Plateau. *Culture Medicine and Psychiatry* 38: 448-472.
- Kamat V (2013) *Silent Violence: Global Health, Malaria, and Child Survival in Tanzania*. Tucson, AZ: University of Arizona Press.
- Keys H, Kaiser B, Kohrt B, Khoury N and Brewster AR (2012) Idioms of distress, ethnopsychology, and the clinical encounter in Haiti's Central Plateau. *Social Science and Medicine* 75: 555-564.
- Khoury N, Kaiser B, Keys H et al. (2012) Explanatory models and mental health treatment: is Vodou an obstacle to psychiatric treatment in rural Haiti? *Culture, Medicine, and Psychiatry* 36(3): 514-534.
- Kingori P and Gerrets R (2016) Morals, morale and motivations in data fabrication: medical research field-workers views and practices in two Sub-Saharan African contexts. *Social Science and Medicine* 166: 150-159.
- Kuhn G (2019) *Experiencing the Impossible: the Science of Magic*. Cambridge, MA: MIT Press.
- Last M (1981) The importance of knowing about not knowing. *Social Science and Medicine* 15: 387-392.
- Latour B (2005) *Reassembling the Social*. Oxford: Oxford University Press.
- Law J (2009) Seeing like a survey. *Cultural Sociology* 3(2): 239-256.
- Martinez S (1999) From hidden hand to heavy hand: sugar, the state, and migrant labor in Haiti and the Dominican Republic. *Latin American Research Review* 34(1): 57-84.
- Merry SE (2011) Measuring the world: indicators, human rights, and global governance. *Current Anthropology* 52(S3): S83-S95.
- Mitchell A and Bossert T (2010) Decentralisation, governance and health-system performance: 'Where you stand depends on where you sit'. *Development Policy Review* 28(6): 669-691.
- Mol A (2002) *The Body Multiple*. Durham and London: Duke University Press.
- Muela Ribera J and Hausmann-Muela S (2011) The straw that breaks the camel's back: redirecting health-seeking behavior studies on malaria and vulnerability. *Medical Anthropology Quarterly* 25(1): 103-121.
- O'Meara W, Mangeni J, Steketee R, et al. (2010) Changes in the burden of malaria in sub-Saharan Africa. *Lancet Infectious Diseases* 10: 545-555.
- Okello G, Molyneux S, Zakayo S et al. (2019) Producing routine malaria data: an exploration of the micro-practices and processes shaping routine malaria data quality in frontline health facilities in Kenya. *Malaria Journal* 18.
- Packard R (2007) *The Making of a Tropical Disease*. Baltimore, MD: Johns Hopkins University Press.
- Packard R and Brown P (1997) Rethinking health, development, and malaria: historicizing a cultural model in international health. *Medical Anthropology* 17(3): 181-194.
- PAHO (1983) Status of Malaria Programs in the Americas: XXXI Report. Washington, DC: PAHO.
- PAHO (2019) Manual de Estratificación según el Riesgo de Malaria y Eliminación de Focos de Transmisión. Washington, DC: PAHO.
- Pantaleón D (2018) Vecinos habían advertido enfermedades en SDO. *Listin Diario*, 7 September 2018.
- Peeters Grietens K, Gryseels C and Verschraegen G (2019) Misdirection in the margins of malaria elimination methods. *Critical Public Health* 29(4): 390-400.
- Pelto P and Pelto G (1997) Studying knowledge, culture, and behavior in applied medical anthropology. *Medical Anthropology Quarterly* 11(2): 147-163.
- Pomeroy C and Jacob S (2004) From mangos to manufacturing: uneven development and its impact on social well-being in the Dominican Republic. *Social Indicators Research* 65(1): 73-107.

- Roberts L (2010) Elimination meets reality in Hispaniola. *Science* 328(5980): 850-851.
- Rodrigues P, Valdivia H, de Oliveira TC, et al. (2018) Human migration and the spread of malaria parasites to the New World. *Scientific Reports* 8(1993): 1-13.
- Tichenor M (2017) Data performativity, performing health work: malaria and labor in Senegal. *Medical Anthropology* 36(5): 436-448.
- Tusting L, Willey B, Lucas H, et al. (2013) Socioeconomic development as an intervention against malaria: a systematic review and meta-analysis. *Lancet* 382: 963-972.
- Umlauf R (2017) Precarity and preparedness: non-adherence as institutional work in diagnosing and treating malaria in Uganda. *Medical Anthropology* 36(5): 449-463.
- Valdez D, Keys H, Ureña K et al. (2020) Malaria outbreak response in urban Santo Domingo, Dominican Republic: lessons learned for community engagement. *Pan-American Journal of Public Health* 44.
- WHO (2007) Meeting of the International Task Force for Disease Eradication - 12 May 2006. *Weekly Epidemiological Record* 82(4): 25-32.
- WHO (2013) Meeting of the International Task Force for Disease Eradication—November 2012. *Weekly Epidemiological Record* 88: 75-80.
- WHO (2021) WHO Guidelines for Malaria. Geneva: WHO.