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Practical norms in emerging infectious disease control: lessons for transnational collaboration from a suspected newly emerging zoonosis outbreak in Ghana

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ABSTRACT

Concern around the emergence of zoonoses with pandemic potential has fuelled significant foreign engagement with domestic infectious disease surveillance and response systems across Africa. These international efforts at augmentation have likely been hampered, however, by an inattention to how such systems actually manifest on the ground and the critical activities and undertakings that take place outside of official structures and protocols. Such deviations from official protocols have previously been treated as inherently detrimental to public service delivery. A growing body of anthropological scholarship arising out of west and east Africa, however, has revealed that such deviations are often crucial to realising some core function or facet of it. Further, these apparent acts of discretion can represent broadly standardised sets of practices and structures that can be elucidated through interviews and observation.

In this paper, we present an ethnographic account of the investigations into a suspected outbreak of a newly emerging zoonosis in the Brong Ahafo Region of Ghana between 2010 and 2016. By following the unfolding of the responses to the Brong Ahafo Region outbreak and drawing on observations from contemporaneous zoonotic outbreaks in West Africa, we elucidate the kinds of unofficial professional practices and shared visions of public service delivery which shape, and frequently augment, national responses to suspected newly emerging infectious diseases. The paper advances recent anthropological work on practical norms by applying them to emerging infectious disease control systems and considering the role of professional ethos in coordinating their use. The paper also clarifies the nature and utility of such unofficial activities for foreign would-be reformers of domestic surveillance and response systems in Africa, potentially enabling more effective transnational engagement with, and strengthening of, these critical systems for emerging infectious disease control.

WHAT IS ALREADY KNOWN ON THIS TOPIC

⇒ Although initially grounded in discussions of clientelism and neopatrimonialism, a wealth of anthropological literature on African bureaucracies and the delivery of public services has come to describe the practical significance of deviations from official protocols and structures. These works not only demonstrate how integral to the functioning of such systems unofficial activities often are, but also that they tend to belong to an array of complex yet relatively standardised practices that can be discerned through careful examination. Prior to our study, the significance of such standardised unofficial practices, also known as 'practical norms', in African domestic disease surveillance and response systems has been overlooked.

WHAT THIS STUDY ADDS

⇒ This study demonstrates the important role palliative practical norms have in the delivery of emerging infectious disease control in Ghana and in the functioning of African public health systems more broadly. Further, it also advances recent scholarship around practical norms, showing how they can be coordinated by the inculcation of their users to a shared vision or ethos. For our case study, the shared vision was one of an enduring Ghanaian state providing disease control for its citizenry.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

⇒ In making the nature and utility of such unofficial activities more apparent to the foreign would-be reformers of African domestic disease control systems, this study will lead to more dignified and effective transnational collaborations.

INTRODUCTION

Recognition of the international spread of HIV-AIDS, a previously unknown disease with zoonotic origins, in the 1980s prompted international concern over the potential economic and global health fallout of unchecked zoonotic pathogen emergence in Africa. These concerns were galvanised

by subsequent large outbreaks of zoonotic disease and the identification of central and West Africa as being at particular risk of wildlife-derived viral emergence.[1] The result was a profusion of transnational initiatives aimed at increasing the effectiveness of domestic emerging infectious disease (EID) surveillance and response systems on the continent.[2–5] These attempts at augmenting national disease control efforts have likely been hindered, however, by an inattention to how local systems actually manifest on the ground. Specifically, an inattention to the aspects of these systems that sit outside of what might be considered official protocols and structures, and when discussion of them does arise, a tendency to treat such deviations as inherently detrimental to service delivery.[6–11]

Although initially grounded in discussions of clientelism and neopatrimonialism, a wealth of anthropological literature on African bureaucracies and the delivery of public services has come to describe the practical significance of these deviations and unofficial practices.[12–17] These works not only demonstrate how integral to the functioning of such systems unofficial activities often are, but also that they tend to belong to an array of complex yet relatively standardised practices that can be discerned through careful examination. For this reason, throughout this paper we use 'unofficial' instead of 'informal' when describing these practices. While 'unofficial' is an imperfect designation, given the frequent blurring between what is official and what is not, 'informal' is at odds with the recurrent forms and underlying structures of the unofficial practices we are looking to explicate in this paper.[18–20] 'Informal' is also an imperfect term because even the notion of deviation from an imagined official or ideal form in relation to service delivery or scientific enterprise is a distinctly Western concept.[21 22] A more 'African', or at least less-Weberian, viewpoint might assume such undertakings to be features of these systems and not deviations or elaborations at all. That said, as this paper is deliberately aimed at addressing a non-African, primarily Western, perspective, we will keep using the term for now.

In this paper, we draw on a growing body of anthropological literature and 4 years of ethnographic fieldwork documenting Ghana's 'actual' EID surveillance and response systems in order to elucidate some of these key unofficial activities and forms in African EID control. Specifically, we will use the unfolding of the responses to a suspected newly EID (NEID) outbreak in the then Brong Ahafo Region (BAR) of Ghana between 2010 and 2016, along with vignettes from other concurrent zoonotic outbreak responses, in order to describe some of the key 'palliative practical norms' (Olivier de Sardan) and coordinating ethoi involved in the functioning, maintenance and expansion of EID detection and response systems in West Africa.

The intention of this paper is not to describe a complete and definitive domestic NEID surveillance and response system. As this paper will make clear, the actual structures of these systems, and as such the unfolding of any given outbreak response, are determined by a number of temporally and spatially specific factors. Rather, this paper has two goals: first, to advance recent anthropological work on practical norms in African service delivery by applying them to EID control systems and considering the role of professional ethos in coordinating their use; and second, to make the nature and utility of such unofficial activities more apparent to the foreign would-be reformers of these systems. We specify foreign reformers, for, as anthropologist Jean-Pierre Olivier de Sardan points out, familiarity with such unofficial structures and practices is typically already the domain of the 'reformers from the inside', namely the local African professionals who comprise these systems.[23]

A number of benefits can be derived from outsiders attending to EID control systems in this more holistic way. In examining the nature and deployment of unofficial norms, they can better understand the nature of the task at hand, specifically NEID control, and what it means to try to meet it in a particular context. Here, 'this context' not only refers to the local epidemiological situation and cultural and material factors such as local patterns of treatment seeking and the availability and interpretation of relevant diagnostic tests, but also the larger landscape of public health resources, authorities, and protocols, that local public health officials must navigate. Looking at the system in this more complete way can also help outsiders distinguish between true gaps and places where unofficial norms have simply taken over and the response has moved outside of official protocols and organograms. This can help more accurately gauge the overall functioning and effectiveness of these systems and identify shortcomings within the official system alone. Finally, a more complete account of the functioning of these systems, including the work and motivations of the people who comprise them, can help outsiders engage with them more effectively. This would feasibly translate into improved strengthening of these key systems or at least help them avoid being unduly undermined by foreign collaborators failing to acknowledge these essential, and likely inevitable, unofficial facets.

This paper proceeds with a summary of the research methods and materials used, followed by a description of Ghana's official EID surveillance and response system at the time of the fieldwork and a brief discussion of why reference to official structures and protocols alone is inadequate when attempting to understand the functioning of such systems. We then briefly outline the suspected NEID outbreak at the heart of this paper, before tracing the unfolding responses to it and, as we do, highlighting relevant anthropological concepts about unofficial aspects of African civil services. The paper concludes with a summary of our findings and discussion of the implications for improving EID response systems in postcolonial settings.

Methodology

This paper is primarily based on the first author's multisite ethnographic study of the public health and researcher-led responses to a suspected simian herpes B virus outbreak that occurred in, what at the time was the BAR of Ghana, but has since been replaced by the Bono, Bono East and Ahafo regions, between 2012 and 2017. In order to create a robust account of the responses to the BAR outbreak and their respective relationships with the official structures and routine activities of Ghana's surveillance and response systems, the study used extensive participant observation, interviews, and the collection and collation of primary documents. The participant observation was primarily directed at the undertakings of Ghanaian and foreign public health professionals working in communities, healthcare settings, offices, and laboratories in Ghana. While there was a focus on the work undertaken within communities and at the district level, significant time was also spent in regional and national offices and research and public health reference laboratories. Interviews were conducted with nearly all of the professionals directly involved in the responses to the BAR outbreak. Other public health professionals not involved in the responses but working in adjacent roles to the responders were also interviewed in order to gauge how representative the observed and reported practices of the BAR outbreak responders were. Hundreds of primary documents, ranging from official reports and research proposals through to personal notes and email correspondences, were collected in order to triangulate the accounts of the responses given in the interviews and to furnish forgotten details.

In addition to the primary ethnographic data described above, one section in the paper draws on relevant informal observations arising out of the first author's work as an epidemiologist in Sierra Leone and Ghana during the 2014–2016 West African Ebola response. The coauthors on this paper helped to interpret these observations and those arising from the larger formal ethnographic study of the BAR outbreak with their respective expertise in epidemiology and anthropology and their experiences working with and within veterinary and human health systems in Ghana and other African states.

Interviews began in Ghana on 7 May 2014. Written consent was obtained from participants who were interviewed as part of the study. When entering a workspace with the intention of making observations, the researcher introduced themselves and explained the premise of the research they were conducting and obtained verbal consent before starting to take notes. All participants were provided with a participant information sheet, which provided a written overview of the study and contact information for the researchers should they desire any further information or wish to withdraw from the study later. Consent was not sought for the observations made during public meetings or where proceedings from the meeting are publicly available. This is in line with the American Anthropological Association's Principles of Professional Practice, specifically Principle 3, which concerns observations made of public events.[24]

Patient and public involvement

No patients were involved in this study.

Ghana's official outbreak response system

If you had asked senior Ghana Health Service (GHS) officials back in late-2010, when the suspected B virus outbreak was first reported, what Ghana's official system for responding to an outbreak of unknown origin was, they would most likely point you towards the Integrated Disease Surveillance and Response (IDSR) framework. The IDSR is a joint United States Centers for Disease Control and Prevention (CDC) and WHO initiative aimed at strengthening disease control infrastructure across the African Region by providing a simple, standardised framework for managing disease surveillance and response activities (WHO & CDC 2010). The IDSR framework organises the GHS into three main levels: district, regional and national, with a subdistrict level sometimes sitting below the district level. There is an obvious top-down hierarchy to this structure, with data flowing upwards and policy and oversight flowing down towards the district level. However, it is the District Health Management Team (DHMT) who are primarily responsible for seeing that disease outbreaks are appropriately responded to, with the support (ie, resources and expertise) of the higher tiers.

Significantly for this paper, the IDSR is the designated medium for the implementation of the International Health Regulations (IHR, 2005), including its mandated surveillance and reporting activities pertaining to outbreaks of unknown aetiology or source. However, while the IDSR might be the most prominent set of protocols relating to disease control in Ghana, it does not have a monopoly on official protocols. There was, and still is, a plurality of official and quasi-official protocols with overlapping remits derived from a variety of would-be health authorities and innovators, unevenly distributed across the country, which must be considered when describing the official landscape.

The plurality of modern African public services, especially where they intersect global health enterprises, is well-described.[20 25–34] Within Ghana, there is a plethora of state, parastatal, non-state and transnational entities looking to influence the performance of disease control. These range from small non-governmental organizations (NGOs) targeting specific diseases to large transnational partnerships looking to implement nationwide changes in the performance of disease control. These initiatives are of varying duration, and the rollout of even the best-funded is often staggered and often not fully realised, creating further variation in protocols. For example, the implementation of a new data management system, District Health Information Software 2, in 2012 signalled changes in the way subdistrict, district and regional disease control officers should record and monitor

disease trends. However, this was implemented unevenly across the different districts and across different diseases, which led to the simultaneous use of different health information systems and, hence, different reporting practices.[35] The anthropologist Thomas Bierschenk has suggested that in this way African public services and the bureaucracies governing them are perhaps best understood as 'never-finishing building sites'.[30]

Even at the national level, different state bodies intermittently produce protocols and systems with overlapping remits that see parallel processes described and, to varying degrees, implemented. For example, there is the National Disaster Management Organization (NADMO), which sits outside of the Ministry of Health (MoH) convenes national-level technical committees to develop strategies for epidemic disasters in Ghana. NADMO has produced guidelines such as the National Preparedness and Response Plan for the Prevention and Control of the Ebola Viral Disease (MoH, 2014) and the National Preparedness Plan for Avian and Human Pandemic Influenza (2005, revised in 2006), which for unspecified periods of time usurp some of the relevant IDSR protocols.

For those health officials working within this kaleidoscopic landscape of protocols and resources, the origin, relative standing and specifics of particular protocols are often unclear. A 2015 study of two districts in the Upper East Region of Ghana found that none of the nine health facilities visited had copies of the IDSR technical guidelines.[9] As it happens, even if they had had access to the technical guidelines, at the time of the fieldwork for this paper, the IDSR did not actually cover outbreaks of unknown origin. Under the relevant section of the IDSR (2008) guidelines, it says that 'These events are NOT specifically dealt with in these Technical Guidelines and more details can be found in environmental control literature'. The literature the readers are referred to is actually a set of guidelines to help countries assess their IHR compliance that in no way instructs readers on how to manage an outbreak of unknown origin. However, none of the GHS officials I interviewed had noticed this, including those relatively senior ones specifically working on IHR compliance and actively reporting events to the WHO through the IHR mechanisms. Again, this echoes what Bierschenk and his colleagues have observed of African state bureaucracies more broadly, that for the civil servants working within them, they are 'highly complex, and to a large extent opaque moral orders which are shot through by hypocrisy and numerous double-binds'.[30]

The above begins to describe the limitations in discussing EID surveillance and response systems as being comprised of a single set of official protocols due to the profusion, variation and frequent ambiguity around what is official. However, this rendering of the system still erroneously imagines that the work public health workers employed by the state are bound by official protocols alone and that these produce entirely predictable patterns of activity. As Keith Hart makes clear in his 2009 description of Ghana's informal economy, though it would be true of almost any civic domain in any country,[36] there are opportunities for discretion between the steps of even the most exhaustive protocols and degrees of autonomy in the performance of the steps themselves.[19] The epigraph on Hart's paper is a line borrowed from William Blake, which is worth repeating again here, 'General Forms have their vitality in Particulars, and every Particular is a Man'.

For the rest of this paper, we will consider how the professionals who comprise Ghana's EID surveillance and response systems navigate this fractured shifting landscape of resources and authorities, their discretion in the selection and execution of official protocols, and the activities they undertake outside of official protocols. Our hope in doing this is to provide a more accurate and instructive rendering of Ghana's EID surveillance and response system and shed light on how other countries' EID response systems function and might be more productively engaged with.

A brief summary of the responses to the BAR outbreak

Between November 2010 and January 2011, 16 children presented to a mission hospital in the then BAR of Ghana with clinical signs consistent with, but not pathognomonic for, encephalitis. Early laboratory testing conducted at the Noguchi Memorial Institute for Medical Research (NMIMR) indicated that simian herpes B virus, a pathogen not previously seen in Ghana, was responsible. In response to the findings, senior public health authorities deployed a team of trainee field epidemiologists from the national Field Epidemiology and Laboratory Training Programme (FELTP) to investigate the outbreak further. Findings from the team's field investigation generated scepticism around the initially indicated B virus aetiology, and it was determined that further confirmatory testing was required. The confirmatory testing was coordinated by the virologist who ran the initial testing. To facilitate it, he requested the help of colleagues working at an Accra-based medical research unit run by the US Navy called the Naval Medical Research Unit Three's (NAMRU-3) Ghana Laboratory. A first attempt to obtain testing at a military laboratory in the USA was unsuccessful. About 9 months later, a second attempt was made by a newly arrived American researcher at the unit. While he managed to obtain some further testing at a simian herpes virus reference laboratory in the USA, the results were inconclusive. The American researcher went on to try to establish a research coalition to investigate the outbreak further, but it failed to gain any traction. By March 2013, staff at the mission hospital had identified a further 26 possible cases, but investigations into the outbreak had ceased and the public health responses to the BAR outbreak had concluded, having failed to either identify a clear causative agent or to generate any meaningful public health intervention.

While the response to the BAR outbreak was ultimately unsuccessful, its unfolding reveals an array of practices and mechanisms used to navigate a dynamic landscape of

resources and authorities in order to realise the complex task of responding to a potential NEID. We will now relay some of the key stages in the BAR outbreak responses in more detail and describe the particular unofficial components and mechanisms of Ghana's actual NEID response system showcased by them. For a fuller account of the epidemiological features of the BAR outbreak and some further anthropological analyses of the public health responses to it, see studies by Jephcott and Jephcott *et al*.[37 38]

Practical norms and the acquisition of specialised testing

The response to the BAR outbreak began when two junior doctors working on the paediatric ward of a mission hospital in Techiman, concerned by what they had thought were a cluster of cerebral malaria cases' lack of response to treatment with antimalarials, approached the senior paediatrician on the ward. The paediatrician, a German nun, examined the children and determined that rather than malaria, the children appeared to be suffering from some kind of cryptic viral encephalitis. She further ventured that, as 12 of them had presented to the hospital within a couple of weeks of each other, an outbreak was occurring. In line with IDSR policy, the hospital's public health nurse notified the DHMT who sent a District Disease Control Officer to investigate. The district officer quickly dismissed the report; however, suggesting the children were either suffering from cerebral malaria, as originally suspected, or possibly meningococcal meningitis. Unhappy with this assessment, the public health nurse contacted a second district officer whom she had previously worked with. At the hospital, the second district officer accepted the paediatrician's report of an unusual viral encephalitis outbreak and went about organising laboratory testing via a virologist working at the NMIMR (hereafter, the Noguchi Institute) at the University of Ghana with whom he was acquainted. That afternoon, the district officer packaged samples from four of the affected children and caught the overnight bus to Accra, where the virologist met him and received the samples.

In undertaking the trip to Accra, the District Officer by-passed a multitude of official IDSR and GHS protocols, including, though not limited to, the convening of a DHMT Rapid Response Team, the passing of relevant samples through a series of reference laboratories at the regional and national level, and the completion and submission of a number of pieces of paperwork. When later asked about this seemingly impromptu, personally burdensome, and potentially deviant undertaking, he explained, "Sometimes you have to beat protocol. Outbreaks are quick!" (interview, DHMT offices, Techiman, October 2015).

The second district officer's contacting of the virologist, and for that matter the Public Health Nurse's recruitment of a second district officer, were not just the spontaneous ideas of a couple of particularly resourceful individuals. These activities appear to belong to larger localised bodies of professional practices among the public health professionals working in Techiman. Oliver de Sardan designates these kinds of practices 'palliative practical norms', which 'deviate from the letter of explicit norms, but have the objective of rescuing the 'spirit' of public service delivery' (Olivier de Sardan 2015 p 48). These norms are cultivated in order to overcome resource limitations and to bypass burdensome bureaucratic structures which might otherwise have prevented the district officer and the nurse from realising their core responsibilities of preventing the spread of disease. For example, the district officer's sourcing of specialist testing through the virologist appears to be a variation of a widespread practical norm among district officers in Ghana involving the cultivation of friendships with local and regional laboratory technicians in order to access the reliable and timely testing necessary to do their jobs. As another district officer explained, "if you do not know someone at a bench, then it can take too long, or not happen at all. When you call, they might say the sample has never arrived or they can tell you [the results] but then you are not sure if the test was done correctly" (interview, DHMT offices, Techiman, November 2014).

A modified version of the practice of befriending laboratory technicians, which involves sourcing specialist testing from research scientists, seems to be an established part of district officers' repertoire of practices for handling outbreaks of unknown aetiology. Its widespread use and acceptance appear to be largely driven by necessity, as public health infrastructure, including laboratory testing, tends to be designed to deal with common pathogens and as such struggles to accommodate rare or novel ones. The virologist even recalled on occasion receiving, and accepting, requests for testing from district officers who he had never met, who had obtained his contact information from the 'polio network' directory. This suggests that the practice, in addition to being much needed, is so well-established that it can be referenced or appealed to without the previously prerequisite step of building phatic channels.[39]

For obliging research scientists, such as the virologist, there is a corresponding set of palliative practical norms for performing this 'unofficial' testing. For example, one of the most immediate challenges they face necessitating the development and deployment of such a norm is the absence of designated resources for performing such unofficial testing, such as specific reagents, cryovials or some other key components.[17 34] According to the laboratory-based scientists and laboratory technicians interviewed, this is typically overcome through the stockpiling of leftover materials from previous research projects. In the case of the BAR outbreak, however, the virologist overcame this by defrosting an old multiplex PCR panel some visiting Japanese researchers had left behind several years beforehand, which claimed to be able to test for over 163 different viruses known to cause encephalitis in humans.[40]

As with practical norms in general, the stockpiling of supplies and the conducting of ad hoc testing on behalf of the GHS is widely tolerated but not universally adopted. In interviews with a number of virologists working in EIDs at the NMIMR, it became apparent that some laboratory-based scientists disapproved of the practice. Around the virologist, however, a 'community-of-practice' or 'pocket of practice' appeared to have formed, encompassing junior researchers working within his laboratory as well as established researchers working in adjoining laboratories, and even some working on behalf of international collaborators.[41] For example, a Ghanaian researcher working for NAMRU-3 in a laboratory adjacent to the virologist's gave an almost identical account of how such testing was performed, explaining, 'normally when you have a grant you have reagents and you often have leftover reagents, which we use when we have a case' (interview, NMIMR, Accra, May 2015). When asked if her American NAMRU-3 bosses knew of this unofficial testing being carried out on behalf of the GHS and minded, she replied, "The bosses in the US know that the testing is going on and they don't mind. I wouldn't call it unofficial. We don't work alone." For the junior researcher, the practice was an assumed part of her work at the laboratory and in no way transgressive or deviant but also not 'official'.

The virologist reported a clear delineation as to when the process becomes 'official'. As mentioned earlier, the results from the initial testing suggested that B virus was the cause of the outbreak, which was particularly significant as the virus had never been described in Africa before. Rather than immediately communicating these findings back to the district officer, the virologist first notified his director, who then relayed the results to a senior official at the National Surveillance Unit (NSU). Again, this was not a random or improvised sequence of events but an established professional practice, one aimed at mimicking the official reporting protocols for named-notifiable diseases and tying the norm-mediated testing into official state infrastructure. As the virologist explained, "He [the director] will not ask why I have the samples. He will say, "Now we must start with the official."" (interview, NMIMR, Accra, October 2014). This practice of simulating the official reporting channels resembles what Frances Cleaver refers to as 'leakage of meaning', that is the borrowing from or drawing on another group's rules and meanings in order to facilitate and legitimise discussion and collaboration.[42] By aligning the informal practices as closely as possible with the official protocols and systems, a relatively stable and cohesive working arrangement between the NMIMR and the NSU was established and maintained.

As the virologist explained in several of our interviews, he had previously been quite successful in negotiating the transition from unofficial testing to official testing and through this process in expanding Ghana's public health laboratory infrastructure. On finishing his PhD on viral haemorrhagic fevers (VHFs), the virologist went about advertising his specialism to various senior GHS officials. This led to him being called on to perform the testing for what turned out to be the first laboratory confirmed Lassa cases in Ghana in 2011.[43] To perform the initial tests on the VHF samples, the virologist used reagents leftover from his PhD research. As he explained: "It happens all the time. You were running your lab or project on VHFs and a hospital finds a case that it believes to be concerning and you'll start to do some testing for them" (interview, NMIMR, Accra, May 2015). The testing led to the NMIMR becoming the national reference laboratory for VHFs. The advent of the West African Ebola outbreak saw the NMIMR become an official WHO Ebola testing facility, even receiving and testing samples from neighbouring countries. Through this process, the virologist had not only legitimised his and the NMIMR's prominence within the GHS, but also increased their standing globally.

The virologist had envisioned a similar trajectory for B-virus testing in Ghana, whereby testing for the BAR outbreak would eventually lead to his laboratory being equipped to perform recognised confirmatory testing for simian herpes viruses. While the virologist did manage to obtain some specialist training in simian virus testing techniques when he accompanied the samples to the simian virus reference laboratory in the USA at the behest of the American naval officer, the results of the testing had been ambiguous and in the interim, the state-led response to the outbreak had essentially dissipated.

Coordination of a complex response through a vision of the state

Practical norms alone are insufficient to describe Ghana's actual outbreak surveillance and response system or to explain its functioning. With so many actors comprising the response system and each performing a specific interconnecting component of it while seemingly acting with a large degree of discretion and often well outside of formal or explicit frameworks, it seems obvious that there must be some larger coordinating entity or entities directing these unofficial activities. Within organisational theory, the success of decentralised organisations (ie, organisations that rely on essentially autonomous actors who perform work away from oversight) is often attributed to these independent actors being inculcated or socialised into some shared vision of the organisation or core set of values or ethos.[44 45] Perhaps unsurprisingly, the underlying shared vision that appears to coordinate and orient the majority of the deployment of palliative practical norms across Ghana's actual outbreak response system is one of the state. More specifically, it is a vision of the state providing public health services to the Ghanaian public, which in the case of the BAR outbreak, includes the detection, investigation and containment of an infectious disease outbreak.

When the district officers were asked about what motivated their more selfless and elaborate unofficial undertakings in the service of outbreak responses, for example,

when they used their own limited finances to pay for fuel in order to investigate a suspected case of polio or the unscheduled bus trip to Accra the district officer took to transport samples for testing in the early stages of the outbreak response, they tended to explain their actions as being motivated by a sense of service to the community that was embedded in their chosen profession. This motivation went beyond a response to the demonstrable necessity of a suspected outbreak within their community and appeared to reflect a larger ethos or culture among the District Disease Control Officers. This culture saw the prioritisation of service to the community above all other things. As one district officer explained, "firstly to the community, and then come to your family, and then to yourself". In one interview the hierarchy was extended to include religion, with the district officer noting, "I keep my phone on in church". This claim is particularly significant as being seen to be either a "good Christian" or a "good Muslim" is also a central part of the larger district officer identity for many, along with dressing well and pursuing continued education and training.

Numerous scholars of public services and the state have noted that civil servants often cultivate a sort of professional persona that integrates expertise and ethics and enables a certain amount of discretion or rule bending. Further, many have also noted that this tends to be especially pronounced among those working lower down in these bureaucratic hierarchies, for instance at the district level.[13 16 46] Facets of the BAR district disease control officers' ethos, including their propensity to work outside official rules and to make personal sacrifices in order to see important public services delivered, can be seen in the ethnographic accounts of public services and medical science across other parts of Africa.[47] For example, in the hopeful, purposeful work of the civil servants tasked with rolling out 'universal health coverage' in selected Kenyan counties documented by Ruth Prince and in the similarly undeterred-by-experience navigation of an interconnected unpredictable and piecemeal ecosystem of health funding and programmes by the Tanzanian partners in a transnational malaria research and control initiative captured in Rene Gerrets' work.[33 48] Further, the district disease control officer's studied political neutrality and pursuit of technical expertise are also central pillars of a 'dignified professional life' for Carol Lentz's self-described 'state-men', career public servants in Ghana.[49] And the officers' dual development of self and state can be seen in Hannah Brown and Maia Green's account of the professionalisation of health volunteers in East Africa and in the memories of the retired Kisumu medical scientists collected by Wenzel Geissler.[50 51] In fact, across all of these accounts, and others like them arising out of Nigeria and Senegal, there is a realisation of a nation state apparent in the professional identities being articulated in the undertakings linked to them.[52–54]

This vision of the state and the drive to enact it was not limited to those formally working in state-run institutions like the GHS. It was also apparent among the Ghanaian professionals working within parastatal organisations such as the NMIMR. A laboratory technician at a private hospital where some of the samples from the affected children were processed and packaged for transport to the Accra laboratory explained his boss' facilitation of the unpaid and unofficial work as, "all his activities go to complement the system and also for the common good of the citizenry. He only allows that [which] are not for personal gains" (informal conversation, Techiman, November 2015). The virologist who ran most of the laboratory testing in relation to the BAR outbreak similarly attributed the off-the-books work he did on behalf of the GHS to an unofficial requirement to serve the Ghanaian public inherent in his position as a Ghanaian virologist working in Ghana. He explained, "If somebody calls from the Techiman unit asking for your help, it is a purely individual thing. There is no institutional requirement to do it…but to not help would have been a disservice to what we believe in professionally as well as to society" (interview NMIMR, Accra, October 2014).

The virologist went on to describe how this professional ethos or vision of his work that he was looking to enact on behalf of the GHS diverged from his vision of being an international researcher, which he was also often concurrently looking to enact. He explained, "The role of a researcher in our local setting at the moment means that the local authorities can call on you when needed. In the international arena you present you findings in conferences, etcetera. You are a different kind of researcher. It means a different thing." This tension around the various compatibilities and incompatibilities of the simultaneous professional identities straddled by the virologist is reminiscent of Noemi Tousignant's ethnographic account of Senegalese pharmacy students as they approached a critical first juncture in their burgeoning careers.[53] Specifically, the students' reticence and resolve around pursuing a career in the private sector, which for them signalled the surrender of a career serving the people of Dakar in a direct and meaningful way. For the Ghanaian virologist, the laboratory technician, and the various other Ghanaian researchers interviewed, the boundaries of these roles, and their potentially divergent orientations, were never fully cemented.

It is important to note that while we use the term 'vision' here, this is not meant to imply that there is some shared comprehensive image of the actual system and its internal workings, like a tacitly conveyed schematic that happens to incorporate the system's unofficial aspects as well as its official ones. In fact, it is not meant to necessarily imply a visualisation at all, although an individual within the actual system might have a sense of what it looks like to perform their job. The shared vision referenced here is an orienting entity rather than a prescriptive one. As organisational theorist Karl Weick puts it, "culture coordinates at a distance by several symbolic means and one that seems of particular importance is the use of stories… those stories provide general guidelines within which they can customize diagnoses and solutions to local

problems".[44] In the case of EID surveillance and response in Ghana, a vision of state service delivery helps to organise and direct activities when individuals are working in a palliative way outside of formal protocols. The looseness of the vision enables individuals to act with a degree of creativity when having to act in contingency to realise a particular task. The widely shared nature of the vision means that these seemingly improvised off-the-book activities on the part of the individual can still connect with the work of other professionals. For example, the district officer's initiative to transport samples directly to a specialist research laboratory and the virologist's compliance in running the tests. This coordinating vision of the state has a further significant feature, which is that it does not look to undermine the formal state infrastructure, and unofficial activities are often performed with reference to the official structures. This is evidenced by the wealth of practical norms relating to 'institutional bricolage',[42 55] such as the NMIMR virologists' mimicking of the official communication systems when notifying the NSU of B virus test results.

A result of a general orienting vision is that while the various official systems can be depicted as an organogram, schematic or series of steps, the actual system cannot. It is not possible to trace the overall shape, structures and mechanisms of Ghana's actual EID outbreak response system or to predict the unfolding of a given response. The unofficial system's responses unfold according to the task at hand (ie, what disease has arisen and under what circumstances), the practical norms currently available to the involved professionals and which they choose to wield and the ever-shifting landscapes of resources and authority they find themselves negotiating. This flexibility and dynamism are potentially a great strength of such a norms-based system when responding to a suspected NEID, which is likely to require resources, expertise and interventions not available within the usual disease control structures which are primarily organised to respond to particular established burdens of disease. This particular conceptualisation of Ghana's EID control systems and the state provision of disease control within fits with Geissler's, and the other contributors' to his edited volume *Para-States and Medical Science: Making African Global Health,* rendering of the state in contemporary medical science and public health enterprises in Africa.[32] To borrow directly from the book, "The state" has morphed into the "para-state"—not a monolithic and predictable source of sovereignty and governance, but a shifting, and at times ephemeral, figure."

There are of course costs associated with a dependence on such unofficial undertakings too, especially where they operate far outside of central oversight and regimented checks. For example, with so much of the state's response to the BAR outbreak occurring outside of official protocols, there appeared to be no official follow-up or checks from national level that the outbreak had concluded when the testing at USAMRIID failed to come through and the state response stalled and then ceased entirely. As one senior NSU official reflected, "The truth is, if there are not so many deaths, it is not causing anxiety, and [if] the media doesn't know, then it goes off the radar. Some way, somehow, these things fizzle out. It [the BAR outbreak response] died a natural death" (interview, NSU offices, Accra, May 2015).

The engineering and administration of a system in flux

The professional norms and shared visions of state-mediated disease control that augment Ghana's EID surveillance and response systems are not entirely organic, in that they do not spontaneously arise and spread untended across the GHS and its 'twilight institutions'.[25] As mentioned earlier, practical norms are often the tools of 'reformers from the inside" and, as will become clear shortly, senior public health officials within Ghana are regularly cultivating further norm-mediated features of the EID surveillance and response system and working to transition some of them into official structures (Olivier de Sardan p425). The deployment of the FELTP team to investigate the BAR outbreak following the virologist's announcement of the B virus test results is an example of such intentional engineering by senior officials. In this case, however, the engineering was not only inspired by a desire to expand the actual system's surveillance and response capacity but also to protect the prominence of the state within a fractured landscape of would-be public health authorities brought about through a proliferation of discrete sources of foreign funding. When the virologist notified his director of the B virus test results and started 'with the official' at the NSU, it was not a team from the NSU who was deployed to investigate the outbreak. Instead, a team of student residents from the University of Ghana's FELTP was tasked with the investigation.

A GHS official attributed this to a number of the FELTP residents having backgrounds in veterinary science and the FELTP's funding to perform 'training exercises' in the form of outbreak investigations. As he explained, "if we think it has a zoonotic component, we get them on board faster because they have vets and clinical human health people. Also, if we are unable to go because of financial, human resource, or time issues" (interview, NSU offices, Accra, May 2015). It is worth noting here that while participants in Ghana's FELTP are technically master's students working towards a Master of Philosophy degree in Applied Epidemiology and Disease Control, admission to the programme is typically reserved for established public health professionals already in possession of a medical or veterinary degree or a PhD in biomedical sciences. In fact, Ghana's FELTP is one of only a handful of field epidemiology training programmes globally that takes the form of a master's degree in applied epidemiology rather than a professional fellowship. During informal discussions, two of the FELTP residents noted that at the time of the BAR outbreak, the NSU had been involved in a WHO-backed yellow fever response and suggested this also may have influenced their decision to

send the FELTP team in their place (Informal discussion, Techiman, May 2015).

Beyond access to veterinary expertise and the economic constraints, the deployment of the FELTP in the BAR response also reflected a much larger brokering of resources and authority that had taken place between officials in the GHS and those at the University of Ghana. The FELTP, with its pool of discretionary resources and its ability to bestow internationally endorsed credentials, and therefore authority, on its graduates, could well have become a threat to the prominence and centrality of GHS and therefore the state oversight of outbreak responses. In informal discussions, respondents at the GHS and FELTP described how public health officials had sensed this early in the discussions around the rollout of the programme and how upset senior GHS members had been when it was announced that the programme would belong to the university and not the GHS. A large array of what were likely norms relating to conflict avoidance and 'institutional bricolage' were quickly deployed to stitch the FELTP to the GHS through an amalgamation of legitimacy and resources.[42] It is hard to elucidate the exact nature of the arrangement that was made, and the stipulations attached to it. It is also hard to gauge quite how official it is, as accounts of it differed between respondents. A senior member of the FELTP claimed their role within the state outbreak response system is not officially recognised and "to write it down would be to create problems" (interview, University of Ghana-Legon, Accra, November 2014). A senior member of the GHS, however, implied that there was an official memorandum of understanding detailing the collaboration and the role of the FELTP during such events. Regardless, this arrangement appears to have come with a few key stipulations: first, all FELTP deployments must be vetted by the NSU; second, the head of the FELTP will always be a GHS rather than university employee; and finally, that movement of graduates into permanent positions will be coordinated by the GHS. One GHS official, however, suggested that this last stipulation was not being met: "As per the agreement we are meant to be assigning the alumni and graduates to places, but those functions are still being done by the School of Public Health. But on paper it says that we do it!" (interview, NSU offices, Accra, May 2015).

The significance of this last, contentious point only became apparent in discussions with senior FELTP officials when they described the larger workings of Ghana's response system and their ambitions for the FELTP within it. Their strategy was predicated on two key concepts: 'capacity' and 'scale'. Capacity was explained as 'knowing who to call' and referred loosely to the quantity and quality of connections a person had with other relevant professionals, with greater value placed on ties with professionals at foreign institutes and other prominent national organisations. This concept is fundamental to Ghana's actual domestic outbreak response system as a whole, which largely relies on actors' tacit ability to create and maintain productive channels with other professionals whose skillsets, status or resources are useful. However, special efforts were being undertaken within the FELTP to instil further capacity within the residents. As a former FELTP director explained, "Capacity is better than a rigid system. The individual needs to be trained to communicate. Capacity will lead to knowing which experts to access" (interview, University of Ghana-Legon, Accra, October 2014).

The concept of scale related to the hierarchy embedded within these connections, in particular the directionality encoded within these channels regarding the passing of information or resources. Scale was brought into the system by the FELTP only accepting applications from professionals already working within the GHS or its parastatal veterinary and laboratory institutions and not allowing any privately funded places. As such, all FELTP residents at the time were reliant on a scholarship provided by the school. The reason given for this was that it would foster a sense of obligation in the residents so that when they returned to relatively more senior positions in the GHS or equivalent laboratory and veterinary organisations, they would feel indebted and attached to the FELTP. Concurrently, FELTP officials were working to increase the visibility and status of graduates so that other public health professionals would know who was a FELTP graduate and would feel compelled to notify them of any significant public health events they came across. The envisioned result of all of this fostering of scale and capacity around the FELTP graduates is essentially a surveillance system with the FELTP as the central node. News of any outbreaks would be passed to a former FELTP graduate who then relays the news to the FELTP, which can go about negotiating with the NSU to have a team of its residents perform the field investigation.

The notion of such en masse engineering of latent behaviours and practical norms might seem quixotic were it not already working in practice. This is exactly the process that manifested during the BAR outbreak: the director of the affected district contacted a nearby DHMT Director who he knew to be a graduate of the programme. The FELTP graduate then reported it back to the FELTP, which successfully negotiated the deployment of a team of FELTP residents with the NSU. For reasons not immediately relevant to this paper, the FELTP team's investigation generated uncertainty around the initial B virus test results, leading senior public health officials from the NSU and FELTP to request the virologist obtain confirmatory testing, the results of which were ambiguous.

During a period of fieldwork in Accra in 2015, an example of the converse process, that is the failure to augment or maintain such engineered structures and their resultant atrophy, emerged as reports of an avian influenza outbreak began to circulate. Interviews with senior veterinary officials about the BAR outbreak became punctuated with lamentations about their struggles to mobilise resources and support to investigate the avian influenza outbreak and the relative ease with which

they had done so during a 2007 avian influenza outbreak. They attributed this change to the 2014 West African Ebola outbreak, which, while technically zoonotic and therefore in their remit, was almost exclusively restricted to human-to-human transmission. As such, their involvement had not been required, and they found themselves marginalised within the larger zoonotic outbreak response structures and struggling to wield authority and access resources as they previously had. As one of the veterinary officials explained, "Avian influenza gave us an opportunity to make such a system, but it has passed … Ebola is a different set of players, and it doesn't help [if] everyone is fighting for power to prove that they have a role to play in controlling the disease. But now they cannot see our role and have forgotten us" (Interview, Veterinary Services laboratories, Accra, May 2015).

Unseeing the system and the collapse of the response

Given how integral these unofficial mechanisms appear to be to the functioning of disease surveillance and response systems, especially in resource-limited settings and in response to unusual or novel public health emergencies such as suspected NEID outbreaks, it is strange that they so often go unmentioned in the formal discourse around EID infrastructure strengthening.[10] It is particularly odd given how readily and proficiently—to the point of having shared terms and shorthand such as 'scale' and 'capacity'—Ghanaian respondents discussed key norms when asked about them. We suspect that this widespread and seemingly habitual failure to acknowledge the role of unofficial mechanisms stems, at least in part, from an underlying failure to acknowledge the capacity of the local public health professionals who comprise these systems.[56] Without the autonomy, ability and motivation of these individuals, such unofficial structures would be untenable. The widespread overlooking, or forgetting, of the capacity and work of local public health professionals appears to have had a role in the premature end of the primary researcher-led response to the BAR outbreak. Before detailing the conclusion of this part of the response, however, it is worth describing some of the mechanisms by which the erasure or obfuscation of this particular kind of local capacity occurs. To do this, we will introduce material relating to the 2014–2016 West African Ebola outbreak and switch to writing in the first-person singular, as what follows are the observations and experiences of the first author alone.

The habitual erasure of the public health professionals who comprise these core public health systems became particularly apparent to me in the wake of the 2014–2016 West African Ebola outbreak. I had been working for a large medical NGO in the Kailahun District of Sierra Leone as a Manager of Epidemiological Activities and had watched as local district disease control officers undertook the basic work of curtailing an Ebola epidemic. They would identify suspected cases, isolate them, and take a list of recent contacts. Should a suspected case become a confirmed one via laboratory testing, they would be admitted to an Ebola Management Unit (or where the affected person had already died, they would be "safely" buried) and their contacts would be monitored, possibly even pre-emptively quarantined, for 21 days. Should one of the contacts develop symptoms and become a suspected case, the process would begin again. It was through this simple repetitive process that the virus was removed from circulation. By the time I arrived in Kailahun the local district officers had already dealt with close to a thousand confirmed cases. In doing so they had had to negotiate hostile chiefdoms and supply shortages, and a few had even contracted the virus whilst endeavouring to maintain the routine of identification and isolation that is key to containing Ebola. Upon returning to the UK a few months later, however, I discovered that stories of their feats had not made it out of the region.

At Ebola "lessons learned" events at various prestigious British institutions, including the Wellcome Trust and The Royal Society, I listened to Western responders; mostly epidemiologists and laboratory scientists, give their accounts of the Ebola response. In these descriptions the cast of African actors was typically limited to 'community members', healthcare workers and government officials. Despite assumedly having borne witness to the district officers' undertakings, their work, and really their entire existence, was omitted. Instead, it was implied that the curtailing of the outbreak was due to the work of the Western responders; for instance, their running of phase III vaccine trials, establishing of sequencing labs, modelling of bed use, and the commissioning of temporary hospitals. In some cases, these were helpful appendages to the response, but in no instance represented the core work of containment. The accounts of those who had visited 'the field' emphasised and celebrated their own ingenuity, creativity and bricoleur-like feats of coordination and networking in an uncertain and challenging landscape—the exact traits that are often denied or disparaged in African actors.[57]

It was not my impression that the erasure of the work of local outbreak responders was conscious, although by omitting their work the Western presenters did avoid a comparison which might have rendered their feats less crucial and less heroic too. Their presentations conformed, in narrative and scope, to a long oral and literary tradition stretching back to the field scientists and epidemiologists of the mid-19th century, whereby products of collaborative work, particularly those dependent on local labour, are presented as the work of brilliant individuals, and where effectiveness is measured in the production of scientific insights and obtainment of simple metrics which do not necessarily correlate with impact on the ground.[58–61] For the representatives of the donor agencies in attendance, their impression was likely that it was these Western responders who had in large part stopped the outbreak and as such were the obvious mediums for further investment in EID control in West Africa.

This habitual forgetting of the capacity and accomplishments of West African public health professionals in outbreak responses resembles what Wenzel Geissler (2013) termed a 'public secret in public health'.[62] The expression 'public secret' is borrowed from work by anthropologist Michael Taussig (1999) and can be understood as 'what is generally known but, for one reason or another, cannot easily be articulated' (p 316), or as Geissler framed it in his discussion of the 'unknowing' of inequalities in transnational research collaborations, the realities which are 'open to experience but often remain unacknowledged in public and scientific texts'.[62 63] Central in the production and maintenance of such public secrets is the process of 'unknowing'. 'Unknowing' is not the absence of knowledge or experience; rather it is the process of silencing or negating that awareness within a particular forum, typically through tacit convention rather than conscious or explicit rule following. As Geissler explains, "unknowing is then, not the opposite of knowing; the pair of terms helps, instead, to describe the work invested in, and the effects engendered by, maintaining this politically salient division."

In a CDC-run meeting in Accra a short time later, it became apparent that this 'unknowing' of local professionals' capacity and ethos was not limited to Western forums. The meeting was aimed at soliciting suggestions from various in-country health agencies and prominent individuals as to how the CDC could best support the implementation of the IHR in Ghana using some recently allocated funds from the USA. In addition to the heads of a number of NGOs and a WHO representative in attendance, the meeting included representatives from the Ghana MoH and a number of prominent Ghanaian doctors, epidemiologists, and laboratory-based scientists. In discussions of how the GHS might be brought closer in line with the ambitions of the IHR, only local public health professionals' transgressive practical norms, such as absenteeism and poor record keeping, were referred to. Correspondingly, the palliative norms that had been developed to circumvent deficiencies within the formal structures went unremarked on. What was most striking, however, was that many of the Ghanaian professionals in attendance also sustained this erasure of local capacity. Despite many of these local professionals at least having borne witness to such palliative norms in the daily running of the GHS, if not having cultivated many of the norms themselves, they failed to address the obvious bias. Instead, they proceeded to further cultivate this perception of an inept Ghanaian workforce in their own contributions to the discussion.

The salient question then becomes why the Ghanaian attendees might sustain this 'public secret', even though it appears to be at their expense? That is, beyond the potential embarrassment around acknowledging in such a forum that some, frankly impossible, ideal versions of workflow could not be otherwise locally realised.[17] In their respective works, Geissler and Taussig point to the power differentials inherent in successful public secrets. As Geissler puts it, 'the force of making violence unknowable exceeds that of the violent act itself' Power rests thus not just in knowledge; 'unknown knowns' are the apotheosis of power.' It would appear that this 'unknowing' of African professional capacity, while likely sustained subconsciously or purely out of habit by many of those in attendance, is part of the unwritten terms of collaboration between African health ministries and Western donors. Here the preservation of a particular outbreak response narrative, such as 'inept Ghanaians warranting the presence (and resources) of able Americans', is once again tangled in the terms and discourse established by donors around the provision of themselves and their resources. Essentially, the implied or even stated deficit of local ability and know-how, rather than some structural inequality in the global distribution of wealth, is the terms by which much-needed resources are being supplied. This is a paradigm that Ghanaian health officials may not wish to risk disrupting lest a more balanced dialogue is not conducive to receiving foreign aid or collaboration. In this context, the 'unknowing' is not only part of the language of providing much-needed resources but also receiving them.

It is possible that this widespread unknowing of national capacity had some part in the truncation of the researcher-led response to the BAR outbreak. Certainly, there is evidence of this unknowing in the research proposals being circulated among the associated researchers and an articulated resistance to it among the Ghanaian scientists and officials privy to these proposals. Taken in isolation, the serosurveys and other testing described in the research coalition's proposals would have constituted a normal research project. However, in his drafting of the proposals, the American researcher also described more overtly humanitarian enterprises. These enterprises included the implementation of community-directed and healthcare worker-directed educational campaigns, the development of independent disease-specific surveillance systems, and even the implementation of appropriate treatment protocols. All of these undertakings would normally fall under the state's remit and were tasks that were regularly undertaken within the GHS.

At least one iteration of the research-coalition's proposal was presented to the Noguchi Institute's science and technical committee and there is evidence, in the form of dated but unsigned submission paperwork, of several attempts to submit proposals to the Noguchi Institute's ethics internal review board (IRB) for approval. Unlike NAMRU-3's initial involvement in the BAR outbreak response, which had simply amounted to attempting to obtain laboratory confirmation on behalf of the GHS and had therefore been granted 'non-research' status, the proposed investigations had been classified as 'research', and as such required clearance from an in-country ethics IRB before commencing. Given that the Noguchi Institute IRB is composed of senior Ghanaian scientists, lawyers and policy-makers, had the proposal been submitted, it would not only have amounted to the

pitching of a project whose humanitarian aspirations were at odds with the established parameters of research, but also the pitching of a project whose humanitarian ambitions implied the redundancy or irrelevance of the very people and structures that were reviewing it. Regardless of whether it was through these formal administrative processes or informal conversations, many senior figures around the Noguchi Institute and GHS were aware of the proposal and unhappy with it. As the virologist explained, "…people weren't happy with [the second naval officer]. They didn't understand who he was and why he was suddenly taking the reins like that" (interview, NMIMR, Accra, October 2014).

It is hard to gauge the degree to which this local resistance was responsible for the abandonment of the research-coalitions proposed investigations. When asked about the early conclusion of the project, the researchers listed on the proposals respectively cited a range of possible reasons, including the end of deployments and finishing up of the research projects that had brought the foreigners to Ghana, disillusionment with the zoonotic origin hypothesis, the absence of new cases reducing the relative urgency of the work, as well as unspecified frustrations with getting in-country ethics IRB approval. Whatever the exact reasons, it is clear that at the time of the projects' conclusion, there was overt resistance to it among key figures within the Noguchi Institute and GHS on the grounds it represented an undue and unwelcome encroachment by foreign researchers and organisations on what should be sovereign activities.

In reflecting on the premature conclusion of the project, the virologist directed much of his frustration at the senior officials who had seemingly stymied the proposals rather than the American naval officer, explaining, "What do they care when he [the second American naval officer] is helping? At least he is doing things!" (interview, NMIMR, Accra, October 2014). The virologist was acutely aware of the significant resources the American-led project represented, both financially and as a network of further specialist expertise, and the research, capacity building and the continuation of the public health response it could have enabled. The American researcher had budgeted his proposed project at a cost of approximately US$100 000. In contrast, the district officer had lacked the equivalent of US$20 needed for fuel and the printing of patient questionnaires in order to do case finding when the outbreak was first reported.

Such dilemmas and tensions around engaging with foreign groups, specifically around the potential resources and opportunities they present and the undermining of interpersonal and interinstitutional dynamics that often accompanies them, are a recurring feature of contemporary transnational public and global health enterprises in Africa.[54 64 65] Seemingly, in order for EID control to be realised, multiple visions of what it is to perform an outbreak response have to be successfully enabled and negotiated. A vision of state-mediated service delivery appears to have oriented and coordinated the palliative practical norms and improvised personal undertakings of the national public health professionals. However, the response's foreign contingent looks to have been simultaneously enacting distinctly stateless visions of disease control. It is not possible to know the full array of influences on the paediatrician and the second naval officer' actions, but their respective professional affiliations and identities, that of a European medical missionary and a deployed American military doctor, likely had some influence on what it meant to them to respond to an outbreak in an African setting. As the sociologist Andrew Lakoff points out, both the humanitarian and the biosecurity regimes of global health look to transcend 'limitations posed by the national governance of public health,' which speaks to a certain disregard of local sovereignty that was perhaps evident in the framing of some of their undertakings and plans.[66]

Throughout the response, the virologist had actively worked to mediate between foreign stateless visions of an outbreak response in Ghana and the state system, which he himself was attempting to augment. As described earlier, previously he had successfully done this and not only helped to investigate suspected Lassa fever cases but also strengthened VHF testing capacity in Ghana in the process. In this instance, however, the vision of a Western-led response to the outbreak was checked and refused, and with it, the resources needed to realise a parastatal state-mediated response became out of reach.

CONCLUSIONS

In this paper, we have demonstrated the central role palliative practical norms play in Ghana's responses to suspected emerging zoonosis outbreaks. We have shown how they are used to overcome immediate shortcomings in official systems during outbreak responses and contribute to the long-term expansion and stabilisation of disease control systems. In detailing some of these norms, we have drawn attention to the fractured and ever-shifting landscape of public health resources, protocols and would-be authorities, that these individual responses and larger systems are unfolding in relation to, and often in spite of. Finally, our account has shown how an enduring, shared vision of state provision of disease control can work to coordinate these quasi-official and unofficial undertakings, including those of Ghanaian professionals working in private and foreign organisations. Through the case study of the BAR outbreak, we have also shown that even where palliative practical norms have managed to rescue 'the 'spirit' of public service delivery', and made substantial contributions to realising a NEID response system, they can still be insufficient augmentation to deliver a comprehensive response. At the end of 2 years, no meaningful public health intervention had taken place and little progress had been made towards developing a compelling epidemiological account of what had afflicted the children. At the point that the state-led response concluded, there

had not even been confirmation that the event had actually ended, which may not be entirely unrelated to the unofficial nature of so many of the key components of the responses.

Given the similarities in circumstances across West Africa in terms of local ecologies, official NEID control strategies, funding landscapes and documented heavy use of practical norms within public services, it seems unlikely that Ghana is an outlier in any of this. In a recent WHO review of ten transnational investigations into outbreaks of initially unknown origin—eight of which took place in African states—half of the investigations were categorised as 'incomplete' or 'unsatisfactory' at the time of their conclusion.[67] In two of the case studies, the investigations were abandoned with neither a compelling explanation for what was causing the event nor confirmation that the event had actually ended. There is evidently urgent work to be done on these crucial processes and systems, and this will involve some degree of foreign engagement. If not for much-needed external funding, then because of the intercountry coordination pandemic prevention and containment activities necessitate. Effective collaboration in reforming and strengthening these domestic disease control systems will require recognition not only of the role palliative practical norms play in the realising of them but an understanding of what is driving their use. This includes an understanding of the particular demands of responding to NEIDs in these contexts, the shortcomings of current official approaches, and an appreciation of the wider complex landscape of non-state resources and authorities that national actors are operating within.

Legal scholar and political scientist David Fidler makes a similar case for how best to understand and engage with global health governance at the international level. In short, he suggests that to imagine, or attempt to realise, a clean and coherent architecture for global health governance is a mistake given the multiplicity of actors currently operating in that particular space.[31] Instead, he suggests that a more productive, and certainly more accurate, way is to understand governance in this space in terms of a normative 'source code' and overlapping superordinate goals. A central tenet of Fidler's argument is that states are not the only, or even necessarily the most significant, players in contemporary global health and that it is important we reconcile ourselves with this post-Westphalian reality. It is on this point that our arguments diverge somewhat. From the BAR outbreak case study, it is clear that when thinking about transnational strengthening of domestic systems at least, what we need right now is greater foreign attention to the role of the host state and commitment to collectively realising it.

None of the foreign collaborators we interviewed or observed appeared to be uncomfortable participating in improvised and unofficial one-off activities, nor did those engaging in the longer-term development of these systems appear to veer away from amending or producing new 'official' arrangements. The problems that arose appeared to stem from the foreigner's undertakings not being aligned with the vision of state public service delivery that appeared to organise the Ghanaian professionals' unofficial activities. This is evident in the failures of foreign collaborators to acknowledge the immediate imperatives and responsibilities of state service provision, exemplified by the 9 months USAMRIID left the samples from sick children untested. It is also evident in the assumptions of the second-naval officers' research proposals that may have collapsed relations with senior Ghanaian officials, and with them, opportunities for further investigative activities. And it can be seen in the framing of the foreign NEID control initiatives observed too, for example, where MoH and GHS officials had to choose to pitch for funding for priority areas selected by US CDC staff at the meeting in Accra rather than use the available funds as they saw fit.

The foreign actors' failure to heed and align themselves with the state when it came to delivering NEID controls reflects a long-standing denigration of African sovereignty and statehood in foreign entanglements in infectious disease control in Africa. From colonial occupation and missionary medicine of the late-19th century through the structural adjustment policies and profusion of health INGOs of the 1990s to the biosecurity rhetoric of NEID control in West Africa today, foreign involvement in infectious disease control in Africa has typically failed to show deference to the centrality of the African state and self-administration in such activities.[29 54 68] As the BAR case study has shown, however, it is not possible to fully comprehend the functioning of Ghana's actual NEID control systems without recognising the state at work in them, and equally, in order to see the state at work, it is necessary to look at these systems in detail as they are actually manifesting on the ground. Failure to see this in either direction means that not only are key opportunities for strengthening these systems overlooked, but quite often service delivery, in this instance disease control, is actively undermined.

There is a wealth of other anthropological insights that could substantively improve engagement with, and strengthening of, these systems.[69 70] Palliative practical norms are only one of four types of practical norm Olivier de Sardan highlighted as key to understanding the running of African bureaucracies.[15] The production of such insights requires careful, long-lasting attendance to what is actually occurring on the ground, why it is happening in a particular way, and what the effect is, especially in the long term. Simple quantifiable metrics of success have not served our understanding or improvement of these crucial systems and standalone initiatives well, nor have rapid reports or simply relying on the rhetoric of well-placed foreign groups.[58 71] With this in mind, we hope that this paper can serve as a case for the production of further ethnographic accounts of global health and NEID systems and initiatives.

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Ethics approval This study involves human participants. The study received clearance from the Noguchi Memorial Institute for Medical Research Institutional Review Board (permit: 089/13-14), the Zoological Society of London Ethics Committee (permit: WLE707) and the University of Cambridge Human Biological Research Ethics Committee (permit: HBREC.2015.24). Participants gave informed consent to participate in the study before taking part.

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