Working Paper

Accountabilit(ies) in the Making: An Ethnographic Inquiry Into the Health Information Infrastructure for Malawi's Antiretroviral Therapy Scale-up

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Introduction: Global Health Accountability Beyond a Culture of Audit

This paper starts with the question: What does it mean to create accountability in global health programs, especially in places where systems for tracking progress and demonstrating impact are lacking?

Accountability — which broadly refers to an ability to show evidence that verifies the linkage between action and effect (Rottenburg 2000) — has been a major concern of all international development assistance efforts promising to improve the society of poorer countries. Without accountability to prove that interventions can lead to desired outcomes, both the authority of development expertise and public spending on development programs cannot be justified. As many social scientists have argued, the way accountability is conceptualized in development agencies has changed dramatically since the arrival of neoliberalism and austerity policy in the late 70s. With the expansion marker economy logics and business management techniques into public domains, accountability in development has been increasingly narrowed down to the practice of accounting procedures that, "produce auditable accounts mainly of financial transactions but also of technical activities which can be audited by relating them to defined standards of quality and efficiency (Rottenburg 2000:143)."

The expansion of such 'audit culture (Power 1994; Shore 2008; Shore and Wright 2015; Strathern 2000)' can also be observed in the world of development assistance for global health. Increased donor funding for infectious disease control in low- to middle- income countries (LMICs) since the 90s is accompanied by the recurrent demand for stronger accountability in governance processes (Gostin and Mok 2009; Packard 2016). The emergence of new actors in the international health arena, including philanthropic foundations, private enterprises, and development finance institutions like the World Bank, believe that management methods leading to business success can also be used to manage health programs (Adams 2016a; Rushton and Williams 2011). The emergence of globally agreed development targets, especially the Millennium Development Goals (MDGs) and the succeeding Sustainable Development Goals (SDGs), alsoreinforcee the notion that quantitative indicators are the apolitical and objective means for synchronizing heterogeneous actors toward a common good (Davis 2013). Under such circumstances, mechanisms linked to auditing proliferate at all levels of program design and implementation to generate proof of measurable goals and progress. Generally falling under the term ‘monitoring and evaluation (M&E),’ audit-based accountability is operationalized in health programs through extensive data collection according to pre-defined input, output, and outcomes indicators to inform what works and what does not (Bell and Aggleton 2016). In response to the demand for information for decision-making purposes, recording and reporting data become highly prioritized activities.

Many medical anthropologists have critically examined the sociopolitical implications when accountability is almost exclusively validated by knowledge produced by the logic of audit in global health (Adams 2016b). Drawing inspiration from the Foucauldian notion of governmentality, the main focus of analysis is on the normative effects of M&E on its users. On the one hand, the data-centered M&E procedures, such as the criteria of documentation and definition of indicators, embody moralized discourses about who owes or is obligated to show proof of action in an organization, and which part of their work is deemed worthy (Mosse 2004). In the largely funding-driven world of global health, M&E thus becomes a means for international health finance agencies to control their local agents remotely, reenforcing the largely unequal power hierarchy among donors and recipients (Gimbel, et al. 2018; Inglis 2018; Pfeiffer 2019). Besides this managerial-aspect, the domination of metrics-driven M&E also constitutes a new ‘evidentiary sovereignty (Lorway 2017)': a standardized classification and measurement system developed by science and policy experts that are deemed the only objective frame of reference for approximating the social reality (Rottenburg, et al. 2015). Such a universalist appearance of quantitative knowledge renders invisible the fact that the local landscape of health, care, and diseases are represented selectively through the M&E mechanism, depending on frontline intervention tools available and the policy model adopted in a health program (Tichenor 2017). In general, M&E instruments are mostly viewed by medical anthropologists as an 'anti-politics machine (Ferguson 2006)'; that is, while not without room for contestation and appropriation, M&E turns politically sensitive issues such as power relations and responsibility of governance into purely technical works of making the right decision based on metrics (Rottenburg, et al. 2015).

While the strong emphasis on M&E and data indeed shapes practitioners' and recipients' conduct in most global health programs, this accountability regime is not only the only an (anti-politics) machine in analogy. Anthropologists investigating bureaucracy have noticed the crucial role played by documents' material quality, especially in terms of how the format of documentation could mediate governance processes (Hull 2012). This material quality is particularly dominant in the way M&E data production is configured in global health programs due to its transnational character. The mass collection of standardized data and its movement across a large geographical variance is a magnificent work way beyond simply disseminating reporting sheets into the hands of frontline workers plus placing a few supervisors behind their back. LMICs usually have weak public health administration and surveillance systems that struggle to generate reliable and comprehensive data (Boerma and Stansfield 2007). Therefore, not only do health programs set up vertical data pipelines extending into recipient countries' health sector to extract 'strategic information for program M&E usage, there have also been growing global health initiatives exclusively aimed at improving information infrastructures in recipient countries' ministry of health or at the provincial level (Sahay, et al. 2017).

Problematics, Methods, and Arguments

Considering the scale and complexity of these data-centered interventions in making policy decisions accountable, it is worth investigating how accountability in global health takes particular forms and shapes through the making of *information infrastructures.* From science and technology study (STS)'s relational perspective, M&E systems can be seen as a form of information infrastructures that occupy a crucial role in the 'patterning (Law 2010)' of an auditable program site. It is when the relations between heterogeneous elements – be it devices, standards, humans, organizational norms – are successfully made durable, that donor-funded health facilities and field offices can then enact accountability in a specific material form(Latour 1990).[1] Meanwhile, information infrastructures are not enclosed entities with fixed technological components or functionalities designed by a small group of engineers. Instead, they are constantly tinkered by the participant organizations and people from the bottom-up. With such fluid (Latour 1990) and drifting (Ciborra, et al. 2000) characters, information infrastructures thus become "material and aspirational terrain[s] of negotiating the promises and ethics of political authority, and the making and unmaking of political subjects(Anand, et al. 2018:20)."This negotiation process can also—conversely—reshape the meaning of accountability manifested at a particular locality.

The materialization of global health accountability through information infrastructures is the main topic of this paper. Resonating with Janes and Corbett's (2009) proposition that anthropology's engagement in global health should focus on the "instantiation of global assemblages in local social arenas (169)," this paper examines the assembling of Malawi's HIV treatment monitoring and evaluation mechanism in public health facilities. Like many sub-Saharan African countries, Malawi was severely impacted by the HIV epidemic and had very limited resources to spare for disease control efforts (Conroy, et al. 2006). But the global policy shift toward supporting universal treatment access resulted in the booming of donor funding for rapidly scale up life-saving antiretroviral treatment in poorer countries, including Malawi. It was at this unprecedented moment when an information infrastructure for M&E was experimented and assembled by a wide spectrum of actors – each with its own technological vision, organizational agenda, and ethics of care – in order to address the mounting pressure of expanding treatment coverage in Malawi's local fight against HIV.

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[1] For example, indicators calculated by nurses on a tally sheet based on patient registers, which would then be collected by NGO M&E staff and further aggreged with numbers from other program sites in an online database.

The finding of this paper is mainly based on eight-month ethnographic fieldwork I conducted in northern Malawi. I observed the clinic workflow and data management practices at two HIV clinics in Mzuzu, the largest city in the northern region. I also include many policy documents, grey literature, and secondary sources to situate my analysis about M&E mechanisms and information infrastructures into the broader context of global antiretroviral therapy scale-up.

The main argument of this paper is twofold: On the one-hand, producing fiscal-oriented accountability on the ground is not a pure linear process of reduction through indicators. Instead, the practice of accountability is premised on layers of translation (Baiocchi, et al. 2013; Callon 1986) to make the biological, managerial, epidemiological, social, and political converge. Translation synchronizes modes of knowing, achieving bureaucratic orders across scattered places and organizations in global health governance. In the case of Malawi's antiretroviral therapy scale-up, the evolving information infrastructures materialize such interconnectedness through enchanting program data with the 'slide-ability' to freely zoom in and out between monitoring individual treatment progress and populational program effectiveness. On the other hand, although Malawi's HIV M&E mechanism as being centralized and top-down in most public health literature (Harries, et al. 2016), Malawi's assembling of information infrastructures shows a story more than that. This paper shows a geographically variant and open-ended process of information infrastructural building in global health, similar to what David Fidler (2007) described as an 'open-source anarchy.'

Antiretroviral Therapy Scale-up in Malawi: A Quick Recap

The last two decades of international response to the HIV/AIDS pandemic in sub-Saharan Africa can be summarized as a 'age of treatment (Moyer 2015)'. Effective antiretroviral-based therapies for treating HIV/AIDS had been successfully developed in the late 90s, but the high cost of the drug was unaffordable for the vast majority of people living in low- to middle-income countries (LMICs), especially in the sub-Saharan African region (Crane 2013). In the case of Malawi, before the initiation of national HIV treatment program scale-up in 2004, only nine public health facilities were providing paid antiretroviral therapy to around 3,000 patients (Lighthouse Trust 2003), which was only a fraction of the 930,000 people who were thought to be infected across the nation (around 10% of the total population, Harries, et al. 2016).

The scale-up of Malawi's HIV treatment program reflected the drastically shifting paradigm of global HIV response at the beginning of the Millennium. The tide of HIV/AIDS activism, combined with the skewing of drug price, plus new scientific evidence showing treatment efficiency in resource-poor settings, put strong pressure on political leaders worldwide to recognize the lack of universal access to antiretroviral therapy as a humanitarian crisis (Farmer, et al. 2013). A series of high-profile international events occurred rapidly between 2001 and 2003, providing momentum to make antiretrovirals for LMICs a high-priority agenda in international development assistance. In June 2001, representatives from 189 governments collectively made a Declaration of Commitment at the United Nations General Assembly Special Session on HIV/AIDS (UNGASS). Large-scale funding mechanisms were also launched under the consensus of political leaders from industrialized countries: The Global Fund to Fight AIDS, Tuberculosis, and Malaria (GFATM) by the G8 countries in 2002; and the US President's Emergency Plan for AIDS Relief (PEPFAR) in 2003. The World Health Organization (WHO) and UNAIDS also endorsed the scale-up of antiretroviral therapy through announcing the '3 by 5' initiative, advocating for providing treatment to three million people in LMICs before 2005 (Seckinelgin 2017).

In 2003, Malawi successfully applied to the first round of GFATM funding, allowing the country to expand its antiretroviral therapy coverage rapidly (Cohen 2002). The grant approved was almost exclusively for procuring biomedical products, especially antiretroviral drugs. Until today, GFTATM is still the principal donor covering the cost of HIV-related commodities in Malawi (PEPFAR 2017). Malawi also later became one of the PERPFAR countries of focus in 2007, which resulted in lots of HIV care, testing, and prevention programs being carried out by PEPFAR-funded contractors: mainly US-based international NGOs, universities, and for-profit consulting firms (Farmer, et al. 2013:160; Lakoff 2010:67; Patterson 2018:42). Funding from GFATM and PEPFAR jointly accounted for the vast majority of HIV control expenditure in Malawi's age of treatment (HPP 2016), while the government allocated minimum funds to HIV/AIDS programmatic area (less than 2% according to the most up-to-date statistics, GoM, 2017).

Nevertheless, it is worth noting that with GFATM as the single funding source, Malawi's antiretroviral therapy has been standardized under a single national delivery and monitoring system overseen by the Ministry of Health (MoH). Many HIV clinics are located within public health facilities and administered by MoH-employed staff (though not without donor support). Therefore, while it can be mostly described as a global health intervention driven by donor funding, the rollout of treatment is deeply intertwined with Malawian's public health service delivery system—sharing a national budget with human resources and basic facility infrastructures (e.g., clinic rooms and pharmacies, Rosenthal 2017).

Baking the Logic of Coverage into National HIV Polices

Considering that the beginning of the age of treatment for HIV in Malawi was the direct outcome of its successful application to GFATM funding, it seems safe to assume that the configuration of M&E procedures and information infrastructures addressed GFATM's accountability demands.[2] This section specifically looks at how GFATM's audit-based funding logic is baked into Malawi's national HIV M&E policies at the beginning of the antiretroviral treatment scale-up.

Originating from Northern donor countries' criticism about the UN system (especially the WHO) being too political and inefficient, GFATM was conceptualized as a new form of public-private partnership that could disburse aid funding for infectious disease control with better efficiency and transparency, namely, being more accountable (Kickbusch and Erk 2009; Packard 2016:276; Rushton and Williams 2011:323). Therefore, GFATM sets itself apart from the traditional bilateral or multilateral development institutions mainly in two ways. First, its key principle is country ownership. GFATM is self-fashioned as a purely financial instrument rather than an implementation agency. Countries seeking GFATM support would organize their own Country Coordinating Mechanisms (CCM) to develop grant proposals and administer the fund later if approved (Patterson and Cole 2006). This participatory process could lead to projects being designed and implemented from the

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[2] GFATM is far from the only donor supporting the initiation of Malawi's antiretroviral therapy scale up.

bottom up, thus better suiting local needs at least at a conceptual level.[3] Secondly, GFATM uses a performance-based funding system. As the former Executive Director Richard Feachem described, the totality of GFATM comprises three closely related domains: 'raise it, spend it, prove it (GFATM 2003).' The continued disbursements of funds are not guaranteed after a successful application, but are conditioned on recipients' performance against a set of program output and outcome indicators so that each dollar of donor money contributed to GFATM could be linked to easily tangible HIV control progress on the ground (Rushton and Williams 2011). This performance-based funding system pushes GFATM recipient countries' to adopt audit-based accountability in their health program monitoring: Information from the financial accounting system converges with information from public health M&E systems that quantify disease control activities and outcomes. The dire need to demonstrate the effectiveness of a non-traditional and newly-founded global health imitative also made the early period of GFATM aim exclusively for the 'low-hanging fruits (Steurs, et al. 2018)' of disease control interventions, namely easily measurable improvements in health service coverage, such as numbers of health workers trained, increased amount of service provision sites, and numbers people reached (WHO 2004).

Comparison between national HIV control policies issued before and after the availability of GFATM grant at the beginning of the twenty-first century shows how the HIV governance rationale at the national level had changed considerably. Besides the obvious shift of strategic direction from prevention to incorporating treatment due to the influx of GMATF resources (Hutchinson 2011), the policy implementation rationale also became increasingly driven by numeric targets and sophisticated measurement systems that could produce auditable evidence about the improvement of service coverage (Rottenburg, et al. 2015). In 1999, the National AIDS Control Program (NACP) issued the first National Strategic Framework for HIV/AIDS (NSF), in which activities for mitigating the spread of HIV were laid out in a purely descriptive manner. No performance monitoring mechanisms or quantitative goals were ever mentioned. The NACP was later replaced by a new National AIDS Commission (NAC) in 2001 and a new National HIV/AIDS Action Framework (NAF) issued in 2003. One of the reasons for the institutional reform is to address the 'mounting pressure'

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[3] In reality the autonomy and inclusiveness of CCM varies by county.

for the government to effectively deliver HIV care in the age of treatment, especially after Malawi's successful application to GFATM grant (NAC 2019).[4] One major illustration of NAF's adoption of the audit-based accountability is its criticism toward the predecessor HIV control policies as being "not action-oriented with indicative/estimated costs, clear strategies and indicators" and "M&E was not well articulated and given clear focus (15)." To better account for progress in the age of treatment, indicators are used extensively in NAF to frame the expected outputs of each program's activities and broader effects of policy in quantitative terms. A dedicated National M&E Plan was also issued alongside NAF, with detailed instruction about how each indicator is calculated, the data sources from where information will be obtained, and the institutions responsible for data collection. A total of 59 indicators are listed in NAF, with 20 existing or to-be-established data sources identified to supply the required information, ranging from sentinel surveillance reports, population-based surveys, and the national routine health management information system (HMIS).

Despite being designated as 'national,' a closer look at the indicators and information infrastructure blueprint NAF suggests a different pattern. In NAF, 14 out of 59 indicators and their annual targets are labeled as 'GFATM,' implying that they are included to fulfill the grant institute's reporting standard.[5] Adhering to GFATM's main aim of increasing service coverage, most indicators are associated with the scaling up of interventions (i.e., the 'output' of GFATM investments) with an estimated denominator to calculate coverage, such as numbers of schools with teachers trained in HIV education, HIV-infected pregnant women receiving treatment, or the amount of money that NAC has disbursed to community-based organizations. That being said, it would be misleading to proclaim that GFATM is the only international agency pushing sub-Saharan African countries to embrace a new audit regime largely based on indicators and an expanded M&E system. With gaining momentum to scale up HIV response, time-bound indicators are increasingly adopted in

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[4] This institutional change was drastic. NACP used to affiliated with MoH, while the new NAC was an independent trust comprised a Board of Commissioners appointed by the Office of the President and Cabinet (OPC). NAC as an organizational template was pushed by the World Bank through its Multi-Country AIDS Program (MAP, launched in 2001) to achieve a higher political commitment and multi-sectoral coordination in HIV response. Malawi's establishment of NAC to a large extend was an attempt to secure MAP funding opportunity. See Putzel 2004.

[5] In other reports, NAC also clearly stated that "The [national HIV M&E] system has been designed to be responsive to donor funding requirements, in particular, the GFATM Results Based Disbursement Framework."

global development agendas, such as the UNGASS Declaration of Commitment monitoring indicators. These numeric targets are performative instruments for showing political commitment (Tichenor 2017), and for generating standardized knowledge that is comparable across regions (Merry and Conley 2011). Donor organizations, including the World Bank and UNAIDS, also emphasized strengthening countries' program M&E capacity to help rationalize decision-making processes and improve aid effectiveness. As Swidler (2006) has explained, the establishment of NAC and the national HIV M&E Plan in Malawi are the prerequisites for the country to secure grants from GFATM and other international donors .

When specifically looking at how data is gathered for the two indicators related to antiretroviral therapy in NAF, the prioritization of funding-relevant datasets is even more evident. In NAF and National HIV M&E plan, the goal of scaling up treatment was measured by two indicators called CC1: Percentage of persons with advanced HIV infection receiving ARV (antiretroviral) therapy; and CC4: Percentage of health facilities where ARV services are being offered with no ARV drug stockouts of greater than one week in the last 12 months. However, in NAC's first National HIV M&E report issued in 2003, only the GFATM-requested CC1 indicator was reported while the CC2 indicator remained unavailable because the Drug Stock Supply Survey was not carried out by MoH as planned. It is worth noting that the unreported stockout indicator in NAF does not mean drug logistics are left unmonitored by MoH when rolling out antiretroviral therapy nationally (which is exactly the opposite, as the following section will discuss). This differentiation shows that donors' demand for upward accountability does not completely transform aid recipient countries' bureaucratic ethos and create self-managed subjects (Strathern 2000). Instead, in the context of the understaffed and underbudget public health sectors, showing good governance through indicators is not internalized by the audited subject but becomes a strategically enacted performance.

Information Infrastructures in the Clinic: Creating Data 'Slide-ability'

At first glance, despite the selective implementation of national M&E policy, the performance-based funding system and the growing significance of funding-related indicators still renders recipient governments steerable subjects, thus further allowing donors to direct country policy at a distance (Rose and Miller 1992). But how does the information needed for GFATM indicators translated into documentation and procedures at the facility level? What are the other socio-technical factors at play in assembling the information infrastructures on the ground to make the scale-up of treatment workable? My fieldwork in the two HIV clinics in Mzuzu provides a glance into making accountability the forefront of antiretroviral therapy provision and programs, which involves a constellation of data management tools procedures that produce effects way beyond merely demonstrating service coverage. Here, I adopt the notion of an information infrastructure to denote the networked character of these M&E instruments, meaning that it operates on multiple levels concurrently (Larkin 2013), requires negotiation of standards (Lampland and Star 2009), and embedded with the problems of interoperability between sub-systems(Collier 2011).

I will first describe the totality of the effect produced by the interconnected M&E instruments and people, which is what I conceptualize as the 'slide-ability' of information across multiple levels of monitoring practices. Next, I will discuss how this slide-ness and information infrastructure comes into being when the tension between local and global in Malawi's antiretroviral therapy scale-up is resolved (Star and Ruhleder 1996).

As shown in Figure 1, the clinic workflow for managing antiretroviral therapy is structured by various M&E instruments for recording and aggregating patient data. After a patient enters the clinic, they would first be asked by a health worker to show the health passport: a small booklet that holds his/her patient's registration number (ID). According to this number, health workers can then sort out the patient's 'Mastercard' from the clinic's filing cabinet: an A4-sized paper card containing the patient's basic personal information and structuralized columns for recording medical histories from each visit. In a high-burden clinic with thousands of patients registered, it is common to see a wall full of filing cabinets and one or two health workers dedicated to retrieving Mastercards for each incoming patient. After receiving his/her Mastercard, a patient would then take both the health passport and Mastercard to the consulting room, where health workers would use another electronic medical record system (EMR) along with the Mastercard to monitor the patient's treatment progress and document a standardized set of health information—like side effects, treatment regimen, prescription, and their next appointment date.

Besides these patient data management tools for monitoring individual care, the two clinics also keep the Main Patient Register per facility, which is the complete list of all patients ever registered in that clinic. Each quarter, an Antiretroviral Therapy Service Provision Report would be composed by cross-referencing and aggregating data accumulated in M&E instruments at the individual (Mastercards/EMR) and facility level (Main Patient Register). This quarterly report provides a statistical overview of the number of patients who initiated treatment, their current status (alive/died/defaulted/transferred), and the size of each antiretroviral regimen. The report would be picked up regularly by MoH's staff when on-site supervision is conducted. By further aggregating quarterly reports from each facility into the Department of HIV/AIDS Management Information System (DHAMIS, an electronic database), the national coverage indicators and other strategic information for policy planning could then be acquired.

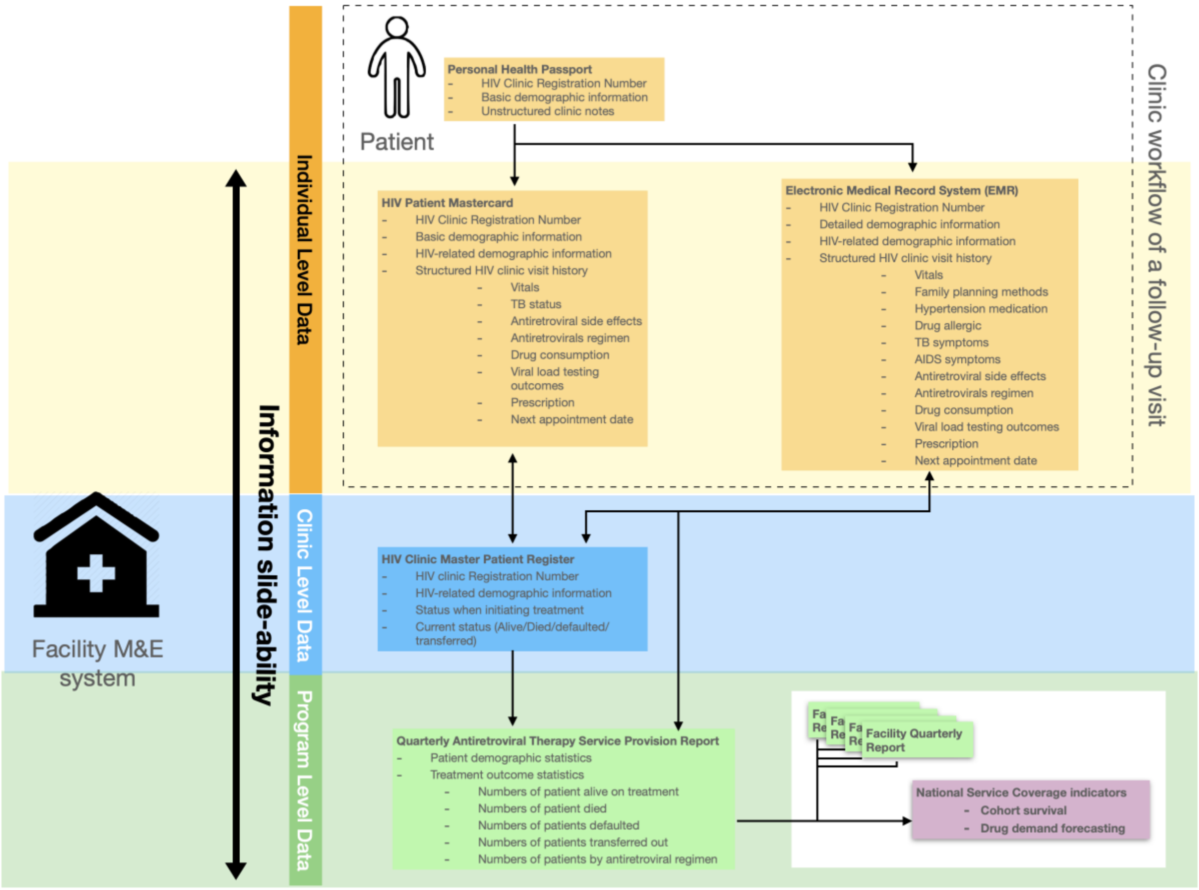

Figure 1. M&E instruments and information slide-ability in two HIV clinics. [6]

The amount of M&E instruments I observed in the two HIV clinics far exceeds those mentioned above. Accompanying the proliferation of donor-funded NGOs in ‘supporting’ service delivery and quality improvement, other registers, logbooks, and tally sheets have overflooded the two Mzuzu HIV clinics. Health workers, I talked with often complained about these ill-coordinated M&E instruments, which not only do not help with HIV care delivery but also impose conflicting assumptions about how clinic activities should be organized. As one of the nurses’ frustrated comment on the impracticality of trying to squeeze all the documentation procedures into their current caregiving workflow: “The partners (NGOs) don't ask before they bring in their own management tools, and now we have too much to follow at the same time!”

Many critical public health studies have also questioned the hidden politics of indicators when donor-imposed data extraction cause fragmentation and unequal distribution of reporting responsibility in an aid recipient’s country’s public health system (Gimbel, et al. 2018; Inglis 2018; Pfeiffer 2019) . But here, I would like to avoid an over-homogenizing criticism that all M&E instruments are either coercive or ineffective in Malawi’s fight against HIV. Instead, I would like to highlight the more productive effect of M&E procedures when a certain extent of interconnectedness between forms of documentation can be achieved. MoH has introduced Mastercards, EMR, Main Patient Registers, and Quarterly Service Provision Report as the standard country HIV clinic management tools since the initiation of the national treatment scale-up (though not without considerable support from other partners like GFATM and PEPFAR). Collectively, this information infrastructure enchants patient data with a unique material quality to consistently ‘slide’ or ‘zoom’ across different epistemological scales, creating ontologically multiple visibilities needed for the clinic's operation to go on (Mol 2002).

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[6] This figure only depicts the workflow for antiretroviral therapy administration. Other HIV service programs are not included.

Among the above-mentioned M&E instrument, EMR contains the most comprehensive individual-level information, allowing health workers to retrieve a patient's virtual medical profile in a matter of seconds when health workers are doing HIV consulting. Being an electronic database, EMR can also merge data into a facility's Quarterly Service Provision Report. This automation saves days of tedious work on reviewing thousands of paper-based records to calculate each indicator. Therefore, EMR allows multiple scales of HIV visibility: seeing both individual patient bodies and a whole clinic population. At first glance, the strong data processing capability makes EMR the perfect one-size-fits-all solution. But its technological complexity also poses restraint in terms of its flexibility and stability. Functionality-wise, EMR operates like a desk-top computer and not every clinic room has one due to the limited donor budget funding. Therefore, when patients cross the clinic to receive viral load testing or collect drugs, information must be transcribed onto portable Mastercards and health passports to keep patients remain knowable subjects to health workers.

Moreover, many health workers I spoke with commented on the importance of both the Mastercard and EMR in keeping individual patients' data, despite the seemingly overlapping role of the two M&E instruments. In their conceptualization, electronic devices are fragile in Malawi. In Mzuzu, a power outage occurs weekly and even becomes more frequent during the dry season.[7] MoH's reliance on outsourced NGOs to maintain the EMR running on hundreds of HIV clinics nationwide also results, at times, in delayed repair. Contrasting with the aspirational belief of many global health agencies that cutting-edge technology can be the 'magic-bullet' for solving complex and socially rooted public health problems (Biehl and Petryna 2014), the instability of local public service provision and the multiplicity of partners make health workers feel the need for keeping Mastercards asa back-up data route to switch to when the new technology (EMR) breaks down.

Another dimension of 'slide-ability' manifests in need for constant cross-referencing between different M&E instruments to ensure that the demographic representation of an HIV clinic is made out of the correct sum of individual data. This accuracy is crucial for

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[7] More than 90% of Malawi's electricity-generating capacity was hydroelectric.

calculating the demand for antiretroviral drugs and projecting the cost of treatment for the country. Yet, public health indicators have often been considered unreliable in sub-Saharan Africa. Such concerns have prompted callings from international health agencies to strengthen aid-recipient nations' health information systems through intensified data quality assurance activities (Mphatswe, et al. 2012). In Malawi's case, MoH's supervision of HIV clinics goes beyond simply collecting facility-submitted indicators and involves an in-depth scrutinization of consistency across M & M&E instruments. As one of the health workers vividly described to me: "When MoH people come, they ask us to open our Facility Main Patient Registers. They would point the finger at a random patient and ask: What happened to this guy?" In this audit, the patient in the register would be recounted in order to ensure the accuracy of both indicators and their data source. When inconsistent or missing data occurs, the Mastercard and EMR are pulled out to review the status of a single patient. Such an audit beyond seeing indicators requires the slide-ability of clinic data, which is a form of visibility different from the linear and irreversible 'aggregation'. Aggregation removes details and compresses persons into a population according to a singular logic of statistical representation (Davis, et al. 2012; Rottenburg, et al. 2015). In comparison, slide-ability implies the patching of multiple data sources to make information remain consistent and accessible amid various courses of action. Through such data slide-ability at a clinic, the minimum level of HIV care—namely having the right amount of antiretroviral drugs to distribute onto the hands of the right patients—could be maintained.

Historical context

In the previous section, I have showcased that M&E instruments in the two Malawian HIV clinics co-construct an information infrastructure that produces a slide-ability of patient data. In this section, I discuss the conceptual origin of the key components of this information infrastructure in Malawi's national efforts of scale-up antiretroviral treatment. Particularly, I focus on how the will to improve health and save lives are translated into the technical quest of overcoming administrative and ethical dilemmas in antiretroviral scale up (Li 2007).

Although GFATM brought abundant financial resources into many sub-Saharan African countries to fulfill its promise of coverage, the first several years of antiretroviral therapy rollout in Malawi was still being described by planners in MoH as a difficult battle fought amid scarcity and uncertainty. One of the major problems was that, with an estimated 90,000 Malawians living with HIV (Harries, et al. 2004a), the amount of resources in need required for achieving the vision of universal access to treatment in LMICs was disproportional to the resources available from GFATM. The first grant proposal Malawi's CCM submitted to the GFATM contained an already 'humble' budget, seeking for 306 million USD to support delivering antiretroviral therapy to 40,000 people over five years. But the final budget approved by the Technical Review Panel of GFATM was further scaled down to 178.6 million USD and a target of treating 25,000 people (Cohen 2002), which was only a small portion of the total HIV-infected population. Moreover, Malawi's public health service delivery capacity has been hampered by severe financial and human resource shortages (Abiiro, et al. 2014). To many health workers I spoke with during my fieldwork, even until today, heavy workload and low salary are still the persistent challenges they face. The two urban HIV clinics could easily have more than 150 patient visits per day. Still, the available nurses around were often less than three due to unfilled vacancies and the need to cross-support other departments in the same facility. These structural limitations in the existing service delivery system posed considerable challenges to the goal of rapidly expanding treatment coverage (Van Damme, et al. 2008). As the numbers of people receiving antiretroviral therapy at a clinic accumulate, the administrative burden would grow exponentially. However, especially during the early rounds of applications, GFATM provided limited funds to support human resource and facility infrastructure development (Steurs, et al. 2018).[8] Its approach to strengthening country public health systems has also been criticized as messy and inconsistent (Dräger, et al. 2006).

This scarcity of resources at the beginning of the scale-up was further accompanied by high uncertainty in terms of how to enact a mass rollout of a treatment that demands long-term care. HIV is not fully curable. Patients need lifelong antiretroviral- adherence to suppress the viral load in his/er body, which includes taking drugs daily and revisiting the clinic

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[8] The budget proposed by Malawi CCM for facility, laboratory, and human resource development was excluded by GFATM from the final grant agreement. It was after calling from other donors that GFATM agreed to reprogram some of the approved funds to support Malawi's national Emergency Human Resource Program (EHRP). See *Systemwide Effects of the Global Fund in Malawi: Final Report*

monthly for follow-up and drug refill. Missed medication doses could lead to treatment failure and antiretroviral resistance (Deeks, et al. 2015). At the service provision end, it is thus crucial to ensure undisrupted drug supply and track individual patients' medical history at each facility; both were unheard of in Malawi's public health sector where stockout and incomplete record-keeping practice were the norm (Rosenthal 2017). Also, at the beginning of Malawi's national scale-up, WHO's antiretroviral therapy guideline for resource-limited settings only described the clinical standard of administering care on a single patient body, such as when to initiate treatment and what antiretroviral regimen to start with. However, for planners in the HIV Department of MoH, existing international guidelines did not help with 'programmatic or operational issues (Harries, et al. 2016)' about how to put together a clinic for registering patients, managing medication adherence, and reporting treatment outcome all at once . This was the unanswered question about information infrastructure making, namely the base on which or means by which to realize the ambition of administering care at a population scale (Jensen and Winthereik 2013).

While infrastructures are embedded with aspirational narratives about a desired future (Larkin 2013), the present scarcity of GFATM resources and uncertainty in treatment administration must be taken into account pragmatically to make a successful scale-up imaginable. For the HIV Department, the emotive vision of Malawi without empty-handed patients could only start with strict rationing of antiretroviral drugs and careful control over patient enrolment. Both were to prevent the disruption of treatment due to Malawi's fragile public health system. In the absence of guidelines for mass rolling out treatment, Malawi's antiretroviral therapy scale-up plan borrowed much of the principles from the Directly Observed Treatment, Short-course (DOTS) strategy, a well-established international model for managing tuberculosis which has been used in more than a hundred countries in the late 1990s (Harries, et al. 2004a; Harries, et al. 2004b; Libamba, et al. 2007). One of the key facilitators of this adaption was Professor Anthony David Harries, a British physician who was the advisor of Malawi National Tuberculosis Control Program (NTP) since 1996 and later joined the HIV Department in 2004 (Union 2013). Adopting the DOTS strategy, the core governance logic in Malawi's antiretroviral therapy program was a 'public health' approach that intended to best utilize the limited resources available through a simplified treatment regimen and centralized planning of drug distribution. These were achieved through streamlined M&E instruments that enabled slide-able data and modes of knowing across patient, facility, and program levels. Antiretroviral drugs were directly ‘pushed’ to each facility from international suppliers. The amount of drugs needed was based on the HIV Department’s six-month procurement circle, in which demands were forecasted mainly based on the numbers of patients reported in the facility Quarterly Service Coverage Report, plus a fixed monthly ‘ceiling’ of the maximum number of new patients allowed to start treatment in the future (Harries, et al. 2007; Schouten, et al. 2011). This deliberately monitored antiretroviral therapy delivery model was largely successful. There had been no major stockout when service coverage increased almost tenfold just within the first two years of national scale-up of treatment (MoH 2003), an absolute achievement that should receive no less praise from even the most critical eyes.

And yet, the rationing of antiretroviral drugs during Malawi’s early yeast of treatment scale-up results in an unexpected form of accountability crisis for frontline health workers. Here, the problem had nothing to do with donors’ neoliberal concern of economic efficiency, but more related to what medical anthropologist Vihn-Kim Nguyen (2010) described as a ‘moral paradox of triage’ when lives are valued differently in the contemporary politics of HIV. In Nguyen’s observation, a new sovereign-like power of deciding exceptions in matters of life and death emerged in West Africa during the 90s, an interstitial period between the discovery of antiretrovirals in the West and the global consensus of scaling up treatment in LMICs. Triage occurred when a loose assemblage of transnational HIV institutions and local support groups created various eligibility criteria for sorting out certain types of people to access the scarce treatment opportunity (Nguyen 2010). Malawi’s early policy of rationing patient slots at HIV clinics showcased that triage continued in the age of treatment, and was practiced in an even more systematic way by the state to safeguard the public health system from being overwhelmed. However, this logic of ‘scaling up by holding back’ only makes sense when treatment visibility is ‘slide’ to a population scale. For the health workers delivering care at the frontline of scale-up, the monthly ceiling of new patient enrolment forced them to arbitrarily accept or reject saving lives that seemed equally eligible to antiretroviral drugs. A foreign doctor who worked in one of the Mzuzu HIV clinics had the following description about the moral dilemma he faced when putting patients on hold:

> *They (the HIV Department) had a very precise calculation when doing the scale-up. But this brought difficulties to our clinic. Lots of sick people could be waiting in the queue. But sorry, this month we did not have any slot remained for them. They had to come next month. In our cogitation, patients can't wait. But for them (policymakers), waiting is acceptable and common. Otherwise, things will soon go out of control. We know resources are limited. But at first, we were still very frustrated......*

During my fieldwork, the policy of rationing patient enrolment quota has long gone. With more than 800,000 people alive on antiretroviral therapy from over 750 HIV clinics across the whole country (MoH 2019), the number of new patients becomes insignificant for forecasting drug demands. Moreover, since around 2010, triumphalist discourses about 'the end of AIDS' became the dominant framing about the once deadly disease (Granich, et al. 2017). The announcing of the 'getting to zero' strategy by UNAIDS, and the subsequently issued 90-90-90 goals (again associated with auditable numeric targets), resulted in a new wave of intervention focusing on not only increase accessibility to treatment but also other segments of the HIV care cascade such as testing and patient viral load monitoring (MacCarthy, et al. 2015). Some scholars critically reflected on the decrease donor funding toward HIV in the aftermath of the 2008 financial crisis, doubting the existence of an austerity motive behind the aspirational narrative about and end of (investment in) AIDS (Ingram 2013; Kenworthy, et al. 2018). Whether the specter of triage still lingers in global HIV politics is way beyond the reach of this paper. Anyhow, while health workers in the two Mzuzu HIV clinics today do not have to worry about putting patients on hold, the largely persistent information infrastructure since the initiation of national scale-up still reconfigured the ethos of health workers, making them associate the administering care with the producing of auditable data. During my fieldwork, I often heard health workers equate their 'accountability' to MoH with the accurate knowing of the numbers of patients alive in the clinic and their distribution in each antiretroviral regimen. Both are then further be related to the responsible distribution of antiretroviral drugs. This enumerative ethos on the ground is far from being solely driven by donor-imposed indicators, but denotes the local attempt of managing the uncertain present at the very forefront of the fight against HIV.

Conclusion

Anthropological research on the audit explosion in global health has critically scrutinized the proliferation of performance-based indicators and the consequential health data vacuuming from low- and middle-income countries. Taking such interest in neoliberal governmentality as a point of departure, I propose an alternative approach to audit and accountability practices in global health. Instead of only examining audit protocols as a form of biopolitical power, I pay attention to mundane M&E policies and instruments. The case of Malawi's antiretroviral therapy scale-up shows that the meaning of accountability is neither dictated by GFATM's performance-based logic of increasing service coverage , nor narrowly enforce service coverage as the sole proof of success. Instead, the assembled information infrastructure carefully guides Malawi's fragile and resource-restrained public health system to incorporate an ambitious vision of scaling up a complicated treatment program. Paying attention to the very fabric of information infrastructure allows a more nuanced understanding of the interplay between indicators, data, and accountability in today's global health governance. Aggregated statistical evidence or surveillance-based epidemiological reasoning(Reubi 2018) are not the only modes of thinking. Beyond merely seeing (the population) like a state (Scott 1998), visualizing an antiretroviral therapy program in Malawi implies simultaneously rendering the body, the clinic, and the population as knowable subjects.

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