INTEGRATING PROFESSIONALS TO ADDRESS COMPLEX GLOBAL HEALTH CHALLENGES:

VETERINARIANS, ZOONOSES AND ONE HEALTH IN GHANA

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DECLARATION

I hereby declare that this thesis has not been and will not be, submitted in whole or in part to another University for the award of any other degree.

Signature:.....

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Integrating Professionals to Address Complex Global Health Challenges:
Veterinarians, Zoonoses and One Health in Ghana

SUMMARY

This thesis explores the integration of public veterinarians in zoonosis management policy and action in Ghana with regard to the implementation of the internationally-led policy ideal: '*One Health*' (OH). Drawing on theoretical contributions that examine professionalism, integration mechanisms and social processes, I researched vets' potential for OH in a context of new public health imperatives, limited resources and absence of targeted national strategy. During eight months of ethnography in Southern Ghana, I investigated veterinary professional characteristics using participant observation, interviews, document collection and a network survey. I analysed how veterinary perspectives, practices and relationships influenced the scope for integration of vets and their activities in zoonosis management, from the district-level clinics and offices to national-level institutions and international organisations. This work questioned whether and why Ghanaian vets would want to engage in OH integration with regard to their professional values and interests. It also sought to understand which practitioners and practices were professionally promoted or repressed and what were the main dilemmas or opportunities for local vets taking part in local zoonosis surveillance, prevention and control. Furthermore, it studied interactions in networks around zoonoses between Ghanaian vets and other actors, and their potential to create and maintain relationships that favour integration. This research contributes to critical knowledge on global health policy implementation by highlighting the importance of relationships and power dynamics both within and between professionals in relation to integration. This, I argue, can be done through more consideration of their professional values, interests and status, and the heterogeneity of all of these in a national context. The thesis also adds to the scarce literature on veterinary professionalism in low- and middle-income countries by providing 'thick descriptions' of veterinary perspectives, practices and network relationships.

Acknowledgements and reflection on my PhD experience

The PhD is a research degree. I certainly did research and explored/questioned how it should or could be done. But it is also about being a student. And, having the status or identity of student during these five years - that included a second Masters degree - has been source of many challenges, such as low credibility in the research field, financial strain, emotional and moral anxieties etc., and I became very critical regarding the lack of adaptation of the PhD to new generations and societies. Despite, and perhaps because of this, I recognise the importance of my personal learning in this adventure, which I will always cherish and be grateful for.

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To you, future PhD graduate:

Thanks to all of the people above, I learnt much beyond my topic (vets in Ghana) during this intellectual, physical and emotional journey and I want to share my lessons of the process with you.

Do not assume that people understand you. Remember that having good ideas is easy, but expressing them and conveying them the way you wish to is much more difficult and therefore will require a surprising amount of time and energy. Train yourself on how to communicate and forgive yourself when it fails.

Remember that to produce good social science research, you need to be rigorous, systematic but also honest, self-reflective and humble and that these skills take time to acquire. No matter how creative and innovative your thoughts seem to be, humans are not designed to think exhaustively, everyone being genetically and cognitively unique. So, remember to fight your ego because good research is always born of interactions with other people. This includes researchers in your field, outside your field, as well as 'lay' people or non-academics. It is easy to fall in the trap of being too close to your data and getting lost in unconstructive, low confidence-based cycles of thought, and the people who are not participating in your research can help you see the distance you need to make use of your data and findings in a pragmatic way or give you new perspectives.

Learn about yourself and your biases. Try and read between the lines of your field notes to understand how your study participants view their world while recognising your own subjectivities in your interpretations. Through the PhD, and like me, you can learn a lot about yourself, your strengths as well as your weaknesses and, from these, identify how best you can contribute to academic research.

Finally, build your confidence and cultivate self-worth. Due to all of the above and many other reasons, the PhD may be seriously hard on you. So, remember to recuperate from the roadblocks by practising active and intentional self-care. One way of doing so is to plan a series of rewards along the way, since the biggest one, the end of it, may only come after four or five years (which is, naturally, psychologically daunting). Diffuse your doubts and self-criticism as often as needed by sharing frustrations with your peers and embrace inevitable regular sneak attacks of Imposter Syndrome in order to acknowledge and reaffirm the strength and value of your work.

While ethnography returns again and again to the interactions and interpretations of actors showing how they produce policy and its effects, the realm of development offers new challenges to anthropology as a discipline concerned with the always uncertain relationship between thought and action in human society (Lewis and Mosse 2006:21).

To Noé,

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List of Abbreviations and Acronyms

AEA	Agricultural Extension Agents
AI	Avian Influenza
APD	Animal Production Department
AU-IBAR	Inter-African Bureau for Animal Resources of the African Union
BSE	Bovine Spongiform Encephalopathy
CAHW	Community Animal Health Worker
CBPP	Contagious bovine pleuropneumonia
CBS	Community-Based Surveillance
CDC	Centre for Disease Control
DCE	District Chief Executive
ECOWAS	Economic Community of West African States
EHO	Environmental Health Officers
FAO	Food and Agriculture Organization
FASDEP	Food and Agriculture Sector Development Policy
FELTP	Field Epidemiology and Laboratory Training Programme
GDP	Gross Domestic Product
GHS	Ghana Health Service
GPRS	Ghana Poverty Reduction Strategy
GVMA	Ghana Veterinary Medical Association
IDSR	Integrated Disease Surveillance and Response
IPE	Inter-Professional Education
KNUST	Kwame Nkrumah University of Science and Technology, University of Kumasi, Ghana
LMI(C)	Low-and-Middle-Income (Country)
MDG	Millennium Development Goal
METASIP	Medium Term Agriculture Sector Investment Plan
MoFA	Ministry of Food and Agriculture
MoH	Ministry of Health
NADMO	National Disaster Management Organization
NAHP	Animal Health National Programme
NGO	Non-Governmental Organisation
NPHP	National Public Health Programme
NTP	National Tuberculosis Control Programme
OH	One Health
OH-NEXT GEN	One Health next Generation
OIE	World Organization for Animal Health (*Office Inter-gouvernementale des Epizooties*)
PPE	Personal Protective Equipment
PPR	Peste des Petits Ruminants
PVS	Performance of Veterinary Services
SARS	Severe Acute Respiratory Syndrome
SDGs	Sustainable Development goals
SLB	Street-Level Bureaucrat
TB/bTB	Tuberculosis/ bovine Tuberculosis
UES	Unified Extension System
UK	United Kingdom
USA	United States of America

USAID	United States Agency for International Development
VEMTAG	Veterinary Medical Technician Association
VSD (HQ)	Veterinary Services Department (Headquarters)
WAHIS	World Animal Health Information Database
WHO (AFRO)	World Health Organization (regional office for Africa)

Chapter One: Introduction

'Who's manning the front lines against these [zoonotic] diseases? Increasingly, veterinarians. Today's veterinarians aren't merely tasked with giving Fido his shots -- they're asked to serve as public-health warriors, leading the attack against such diseases. The lives and livelihoods of millions of people depend on them […]*'* (Dr. Arve Lee Willingham, 2017).[1]

Rationale and research question

Since we entered the 21st century, and even more so at the time of the sustainable development goals (SDGs), the field of global health governance calls for internationally-coordinated and state-based implementation of integrated policies and actions. These policies are meant to tackle global complex issues at the interface between human systems and their environments, also called 'wicked problems', which underpin complexity, uncertainty and competing goals and resist straightforward understanding and resolution (Rittel and Webber, 1973). But the global health policy space encompasses a variety of old and new stakeholders motivated by development, humanitarian, and security purposes and is contested, unequal and anarchical (Biehl and Petryna, 2013, Kay and Williams, 2009).

This thesis examines the challenge of integration of policies and actions of one such wicked problem that is zoonotic diseases or zoonoses.[2] The unprecedented rate of emergence of zoonotic disease, and the re-emergence of some of these, affects and threatens the health of populations as well as economies, livelihoods, and even political regimes at both global and local levels (Grace et al., 2012, Zanella, 2016). OH is the concept that supports the idea of integrated understanding and response to the issue of zoonoses.[3] OH can be defined as *'a generalised and flexible term that captures the will to address the complexities and interrelations that exist between human, animal and ecological health'* (Craddock and Hinchliffe, 2015:1).

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[1] Excerpt of a blog posted on the 02.14.2017, available here: http://thehill.com/blogs/congress-blog/healthcare/319350-veterinarians-warriors-in-the-battle-against-disease , last accessed on the 11.04.2018

[2] Zoonotic diseases can be defined as infections naturally transmitted between vertebrate animals and humans. Zoonotic agents are bacteria, viruses, fungi or other communicable disease agents (WHO). In 2008, zoonoses were shown to represent at least 60% of infectious human diseases and over 75% of emergent infections (Jones et al., 2008).

[3] Other OH issues include anti-microbial resistance, water pollution, climate change, food insecurity and malnutrition, plant and animal species conservation etc.

OH significantly gained traction after the pandemics of SARS[4] (2003) and Avian Influenza (AI),[5] when the need for more integrative approaches in zoonoses research, policy and management was unanimously and globally recognized (Okello et al., 2015). By 2004, and whilst I was undertaking my training as a veterinarian (2007-2011), the occurrence of zoonotic pandemics became more commonplace and, alongside this, the concept of One Health (OH) was being promoted all over the world.

However, one also can see OH as a '*fragmented intellectual project*' used by different actors for different outcomes (Kingsley and Taylor, 2016). Indeed, while a powerful rhetoric of advocacy for OH was developing internationally along with these threatening disease events – OH was being portrayed as a methodology, approach, movement, strategy, or paradigm shift; more critical and development-oriented views of OH were also emerging. A growing body of social science studies has raised questions about how OH has been used to understand and respond to global health issues (Cunningham et al., 2017b, Kingsley and Taylor, 2016, Lee and Brumme, 2013) and some authors have contested the benefits of the concept through the analysis of particular cases (Mutsaers, 2015, Wolf, 2015). The current study extends this critical perspective of OH by interrogating its practical application in development settings, one of the main critiques made of OH rhetoric and its normative assumptions.

The application or operationalisation of OH is linked to 'integration'. Integration is a notion that is conceptually challenging and lacks a theoretical base (Johnson, 2009). From a social point of view, integration can be seen as simply '*a way of describing the established patterns of human relations in any given society*', which does not imply that integration is either negative (implying conflict) or positive (implying order) (De Alcántara, 1995:5). Most contemporary authors, including OH scholars, however, treat integration as a positive goal where more integration represents better organisation of people in policy and action around a particular issue (De Alcántara, 1995).

Although there is no universally agreed definition for OH integration, within the general literature on this concept, we find useful approaches. For Beresnevièiûtë (2003:97), integration is '*developments that determine connections of related diverse elements into the social whole, system, community, or other unit*' and Shannon and Schmidt (2002:17-18) define integration as '*processes that cross or*

[4] Severe acute respiratory syndrome
[5] Emerged in 1997 but created high international concern by 2004

expand boundaries fixed by existing institutional rules, organizations, and divisions of authority'. In the absence of a definition in their papers, other authors often use the word 'integration' interchangeably with terms of integrative mechanisms such as 'collaboration', 'cooperation' or 'coordination'. Some authors also make a distinction between how these mechanisms contribute to integration (Axelson and Axelson, 2006).[6] In this case, collaboration is often considered as a higher form of integration than coordination and cooperation (Harris and Brimie, 2012, Grepin and Reich, 2008). Collaboration is also the term used by most scholars to represent integration in the fields of public health (Axelson and Axelson, 2006) and OH (Stephen and Karesh, 2014).[7] Yet, the same authors sometimes use the three words 'collaboration', 'cooperation' and 'coordination' to define each other (see Harris and Brimie, 2012:2, Grepin and Reich, 2008:2), rendering their specific contribution to integration unclear. In the end, these three terms are used to talk about integration in multiple ways between: actors, disciplines, professions and levels concerned with research, policy and action. One can therefore understand OH integration in many ways.

Combining the various approaches to integration described above and the thesis' focus on professions (explained below), this research resists the urge to independently define each mechanism and proposes to consider OH integration as processes of collaboration, cooperation and coordination that are co-constructed and connect, cross or expand boundaries set to understand and/or manage OH issues between professionals working in the fields of animal, human and environmental health.

Although the implementation of OH through the concept of integration remains vague and uncertain in OH scholarship, identifying key challenges to the application of OH helped determine the focus of this research. First, OH integration is not straightforward and depends on various conditions in particular contexts:

> *Studies emphasize how the goals of collaboration and coordination are a good deal easier said than done. Professional competition, conflicting priorities, institutional inertia and myriad other factors in diverse contexts make the implementation of OH projects a major undertaking* (Kingsley and Taylor, 2016:2).

[6] As an example where these terms are distinguished, Axelson and Axelson (2006) talk about collaboration as active and voluntary processes of seeking and sustaining relationships, connections or synergies. Contrary to collaboration, they perceive the other two forms of integration as more passive for implementers whereby coordination organises separate sectors and organizations at a high level of government and cooperation combines 'hierarchical management and voluntary agreements' (Axelson and Axelson, 2006:79).

[7] For examples, see Patil et al., 2016 or Bradley et al., 2012 in which collaboration means integration.

The OH concept primarily emphasizes an international approach which frames zoonotic diseases as something that can be tackled through high-level international coordination (Figuié, 2013, Smith et al., 2015) but less attention has been paid to how OH resonates at the national and local level. Indeed, we know little about how the global OH agenda fits into already existing national or local structures and into current practices (Bardosh, 2016, Lee and Brumme, 2013). Yet, zoonosis management is fundamentally determined by what happens within countries (Figuié, 2013, Okello et al., 2015). For instance, the 2014 epidemics of Ebola in West Africa reminds us how important local health structures are, while help from the international community was late to arrive (Jacobsen et al., 2016). In the study presented here, I examine OH integration through a focus on collaboration, cooperation and coordination around zoonosis management in relation to policy and action.

Second, Hinchliffe (2015) worries that emphasizing the global dimension of OH (as does the slogan 'One World, One Health', coined by the Wildlife Conservation Society) ends up promoting narrow approaches and collapsing the diversity of global health issues. Authors recommend that OH research consider a wide range of knowledges and, notably, focus on low-and-middle-income countries (LMICs) (Coffin et al., 2015, Cunningham et al., 2017b, Galaz et al., 2016, Giles-Vernick et al., 2015). Health (including animal health) policy and the factors involved in policy change in LMICs – where resources are limited and the responsibilities for public health are often divided among various government sectors and/or non-governmental agencies – are poorly studied (Gilson and Raphaely, 2008, Okello et al., 2015) and thus require special attention in relation to OH.

Third, we know that, beyond differences of orientation and formal structures of organizations, the biggest barriers to integration lie in differences of values, cultures, interests and commitments (Axelsson and Axelsson, 2006), and these often are very specific to a particular profession. In regard to OH, values and interests on issues and how to solve them are expected to vary significantly across the veterinary, medical and environment sectors (Degeling et al., 2015, Stephen and Karesh, 2014). Although the literature does not offer a clear explanation of how, this variation between professions can challenge integration by threatening professional identities when integration is seen as a '*re-distribution of occupational power*' (Nugus et al., 2010:898).

Therefore, in the spirit of disentangling the complexity linked to OH integration, focusing on how one professional group perceives and participates in policy and action around zoonoses allows an examination of whether the concept of OH has meaning for routine practices and is reflected in day-

to-day activities. In this study, I looked carefully at the role of one profession in its routine work in relation to the policy ideal of OH integration around zoonoses in Ghana.

Veterinarians represent one of the key professions to apply the principles of OH through enhancing their roles as animal health specialists in the management of zoonotic diseases which are of public and environmental health relevance. In the past three decades, the mission of the veterinarian has been associated with a greater demand to contribute to public health (Belino, 1992, Hannah, 1987, Rosol et al., 2009). Being portrayed as one of the 'historical One Health actors' or 'super One Health professionals', veterinarians already appear as dominant players in OH research internationally (Binot et al., 2015, Marsh and Babcock, 2015, Valeix et al., 2016).

However, studies find that veterinarians are generally in short supply, under-resourced, and their contribution to public health underestimated (Rosol et al., 2009, Safman, 2009). While the role of veterinarians in producing scientific knowledge relative to zoonoses is not debated, there is little in the literature about the complexities of the context in which the profession operates and strives to achieve OH in policy and practice. Thus, a better understanding of the roles veterinarians play in managing zoonotic disease among other stakeholders and how these roles can be enhanced in the spirit of OH at a national and local scale in LMICs is a missing piece of the puzzle of integration in OH.

Situated in the Gulf of Guinea in West Africa, which is considered a 'hotspot' for zoonotic disease emergence (Fèvre, 2015, Jones et al., 2008), Ghana is a good example of a low-income country in which zoonotic risk is of concern (Jarikre et al., 2015, Otupiri et al., 2000). In Ghana, veterinarians have been involved in research around emerging zoonoses, exploring zoonotic viruses in bats (Peel et al., 2013) as well as endemic zoonoses (Otupiri et al., 2000). Ghanaian veterinarians have also been involved in recent evaluations and programmes that emphasize the need for integration in zoonosis surveillance and control. Examples of such programmes include: the WHO AFRO strategy for Integrated Disease Surveillance and Response (1998); the assessment of the Ghanaian veterinary services by the OIE-PVS[8] (2008-12); and the creation of the Ghana Field Epidemiology and Laboratory Training Programme, FELTP (2007). Nevertheless, Ghana does not have an organization or government department with a clear institutional mandate to pursue OH.[9] The new challenges posed by zoonoses to Ghanaian veterinarians, with limited official institutional OH coordination, represents

[8] Tool for the Evaluation of Performance of Veterinary Services developed by the World Organization of Animal Health (OIE).
[9] This was still the case in 2017 (WHO, 2017).

a relevant research focus for studying how the profession can enhance its roles for OH. This research seeks to answer the following research question:

How do veterinary professional characteristics concerning policy and action around zoonoses in Ghana influence the scope for One Health integration?

Main concepts for operationalisation

Authors recommend studying OH integration through a systemic approach that takes complexity and power into account (Kingsley and Taylor, 2016, Wood et al., 2012). In this spirit, to situate my research on OH integration around zoonotic diseases, I draw on a body of literature in which scholars have considered policies and actions as intertwined through non-linear complex systems. Policies and actions are not only about decisions, they are part of *processes* in which are embedded in the dynamics of power and politics vis-a-vis policy-making as well as implementation, in local, national and global contexts (Keeley and Scoones, 2012). Authors have recommended that these complex processes be studied in a development context with an ethnographic approach that captures the social dimensions underpinning interactions between multiple actors from various institutions (Kay and Williams, 2009, Mosse and Lewis, 2006).

Among these social dimensions, I focus on professional characteristics using the notion of professionalism, which offers ways of organising work (Cruess and Cruess, 2016, Noordegraaf, 2007, Stanton et al., 2011, van Mook et al., 2009). I consider that veterinarians are science-trained professional bureaucrats – with their own professionalism/professional characteristics – working towards the development-related goal that is OH. I focus on three main professional characteristics that allow me to capture complexities and power[10] in policy processes for studying veterinarians and zoonoses in Ghana. The first characteristic is professional **perspectives** towards a policy issue like zoonoses, due to the variability of how knowledge and expertise are shaped in different branches of the contemporary natural sciences (Knorr Cetina, 1999) such as veterinary medicine. The second characteristic is professional **practices** by which professionals engage with OH and each other and

[10] The literature on power is extensive and comprises authors like Lukes (1974), Escobar (1984), or Gaventa (2006) who contributed a modern understanding of power in development studies. However, in this thesis, I focus on works that examine power relations with regard to professional characteristics and integration in policy and practice (see sections below).

through which a global policy like OH needs to be interpreted and transformed into field realities (Mosse, 2011). The third is the **relationships** between professionals, such as veterinarians and physicians or environmental scientists. These relationships are critical factors in the dynamics of integration and are the medium through which veterinarians, as well as other professionals, must *broker* and *translate* their technical knowledge to other actors in networks (Mosse and Lewis, 2006). Hence, I propose that these three professional characteristics are relevant to explore OH integration. In this study, I, therefore, focus on OH integration in terms of how veterinarians, as a professional group, think about (perspectives), practically manage (practices) and interact (relationships) in their day-to-day routines in relation to zoonoses in an LMIC country (Ghana). I present a theoretical exploration of the three professional characteristics retained (*Perspectives, Practices* and *Relationships)* as analytical units below.

Perspectives

OH implementation requires that actors from different professions work together towards a common goal. However, even if the OIE[11], WHO[12], FAO[13] and other international organizations recognise the risks posed by zoonotic disease outbreaks in an increasingly globalised world (Anonymous, 2010), there are divergences around why and how to apply OH in the real world.

Analyses that embrace the political economies of epidemics have shown that zoonoses and the associated policy responses can be understood and considered through various knowledges held by people and institutions with different interests and priorities (Galaz et al., 2016, Leach et al., 2010). Different, and potentially contradictory, framings and agendas can create tensions around the realization of OH in specific national contexts. This has been shown through identifying competing narratives around disease outbreaks which carry these different framings and agendas and call for different sets of policy responses (Galaz et al., 2016). Differences in perspectives about zoonoses have also been identified by highlighting the gap between international and local discourses (Millstone et al., 2016).

[11] World Organization for Animal Health
[12] World Health Organization (United Nations)
[13] Food and Agriculture Organization (United Nations)

Veterinarians' vision of health and disease management is expected to differ from that of other professionals (Stephen and Karesh, 2014) and the goal(s) attributed to OH can vary across professions (Degeling et al., 2017). However, very few studies (Grant et al., 2015, Musoke et al., 2016, Degeling et al., 2017) have carefully examined how in-country scientists or other professionals embedded within a national context frame zoonoses and OH, and these professional framings can possibly stretch from the global to the very local. Thus, researching veterinary perspectives regarding veterinarians' role(s) vis-a-vis zoonoses at the country level represents a novel opportunity to explore the variety of framings around OH. One way professional perspectives informs how power is exerted when seeking integration, according to Nugus and colleagues (2010:898), is whether a professional group '*assume*[s] *responsibility* […] *and coordinating roles' for disease management'*. There is however little on information on what veterinarians think their responsibility and roles are regarding zoonoses and on how other perspectives might conflict with veterinary ones.

I base my analysis of veterinary perspectives on professional values and interests. Through their professionalism, people develop their perspectives by selecting a particular set of values, orientations and beliefs (Noordegraaf, 2007) which evolve along with changes in society (Cruess and Cruess, 2016). Numerous studies have examined medical professionalism – which is focused primarily on human health professions - and its evolution in the last few decades, mostly in the USA (Castellani and Hafferty, 2006, Heller, 2012, Stanton et al., 2011, van Mook et al., 2009). Even within a broad conception of the medical professions, veterinarians are at the margin because of their focus on non-human animals. Veterinary professionalism on its own remains insufficiently studied (May, 2013, Mossop, 2012). It is therefore difficult to say to what extent the medical literature can relate to and explain veterinary professionalism.

Given the diversity of animal species and the various roles vets play in human society, their jobs entail a wide range of activities (Knopf, 2011, Leighton, 2004, Rosol et al., 2009, Willis et al., 2007). The veterinary profession worldwide has also seen significant change in the last two decades with phenomena like specialisation, feminisation, a higher number of small animal practitioners, and an increase in the demand for vets to contribute to public health (Magalhães-Sant'ana, 2014, May, 2013, Prince et al., 2006). In addition to the large and dynamic spectrum of services vets provide, their specific disease focus – entailing attention to certain risks and employment of targeted responses – is likely to differ across countries as specific climates, geographical and/or demographic characteristics

often determine the presence of particular infectious diseases in any given part of the world (Blancou et al., 2005).

Furthermore, people engaged in diverse roles and activities within the veterinary profession may hold divergent views on animal health and disease or, as Leach et al. (2010:3) put it, '*framings of the social, ecological and technological implications of "epidemics"*', in which we can include epizootics.[14] Leach and colleagues argue that looking for framings means paying '*attention to the many ways in which system boundaries, dynamics, functions and outcomes are open to multiple, particular, contextual, positioned and subjective assumptions, methods, forms of interpretation, values and goals'* (Leach et al., 2010:3). In this thesis, I examine how some of the Ghanaian veterinary professionals frame their role in zoonosis management and OH.

Veterinarians themselves can view their actions against animal disease as favouring various, and sometimes competing, interests. This is best described by De Graaf, who says:

> […] *next to the interests of animal patients and human clients, veterinarians have to consider many more interests, such as their own interests (commercial; the veterinarian needs to make a living), the interests of the animal population (absence of animal diseases) and the interests of society at large (veterinary hygiene and public health)* (De Graaf, 2005:558).

Veterinary interests can be expressed by favouring a certain type of intervention in reaction to disease outbreaks. For instance, Scoones and Forster (2010) analysed how vets from high-income countries (such as the UK and Italy) involved in the international response to the avian influenza (H5N1) pandemic from 1997, had framed the event. They show that it was common practice for these vets, embedded in various international organisations, to streamline a success story based on avian influenza as a 'poultry problem' and thus to call for measures leading to disease eradication (like systematic culling). Scoones and Forster demonstrate that such framing ignored the complexity of the outbreak, favouring political interests and an agenda which fitted in with the priorities and interests of the international organisations with which the vets were related (such as the OIE and the FAO). In these instances, protecting human health in an immediate temporal frame was prioritised over the interests of protecting livelihoods and agricultural (livestock) development; even though these underemphasised elements are highly important for resilience against disease and to human well-being in resource-limited settings (Scoones and Forster, 2010).

[14] An epizootic is a disease event, which is temporarily prevalent and widespread in a nonhuman animal population, analogous to an epidemic in humans.

Scholars seem to have also overlooked the possibility that veterinarians themselves may have divergent perspectives on zoonoses and on OH. In academia, professional values and interests create challenges in achieving collaboration between disciplines, through divergent framings of scientific issues (Lélé and Norgaard, 2005). For example, values such as '*altruism*' or '*commercialism,*' identified in a veterinary academic setting in the USA (Roder et al., 2012), may help or hinder OH collaboration. These professional values and interests also play out in policy processes (Keeley and Scoones, 2012). For example, new acute zoonotic diseases potentially leading to pandemics may compete as priorities with endemic zoonoses in LMICs (Kay and Williams 2009). Furthermore, dealing with major outbreaks through emergency-oriented and short-term interventions can occur at the expense of long-term, crucially-needed, measures in LMICs (Leach and Dry, 2010).

One important aspect of professional perspectives is that they are formed around the evolution of the institutions that have shaped a given profession. Galaz and colleagues claimed that perspectives on integration in OH have been driven by '*the legacy of each profession's embedded histories*' (Galaz et al., 2016:29). The current study thus also explores how veterinarians see their profession's evolution in one country (Mitsuda, 2017). When veterinary medicine was introduced in Ghana, government veterinarians used to operate under the Ministry of Health but that work was transferred to the remit of the Ministry of Food and Agriculture (MoFA) after Ghana's independence in 1957 (Oppong, 1999). The history of animal medicine and its interactions with human medicine (Woods et al., 2018) may therefore have influenced veterinary perspectives regarding OH.

Practices

The particular practices used to take the actions deemed necessary to implement government policies and pursue professional strategies often bring with them new layers of complexity. While some research has begun to examine the influence of OH concepts on professional practices (Leung et al., 2012), the influence of routine professional practices on the application of OH within local regional realities has often been overlooked in the literature on global health (Biehl and Petryna, 2013) and still remains poorly investigated in OH scholarship (Bardosh, 2016). In Ghana, coordination of OH at the national level appears limited, given that, besides an inter-ministerial committee set up for avian influenza control in 2007 and a few OH training programmes, so far there has been no official

OH strategic plan in Ghana that calls for institutionalized collaboration between different sectors.[15] Therefore, a lot of the realization of OH has relied on the initiatives of individuals such as veterinary practitioners on the ground.

In Ghana, veterinary practice, the delivery of veterinary services, can be undertaken by practitioners with different qualifications. There are veterinary surgeons, technicians, and community animal health workers (Mockshell et al., 2014). In other developing countries, the roles of these different kinds of veterinary service providers have been shown to overlap and to create tensions in the absence of clear policy or legislation that clarifies their respective roles (Catley et al., 2004, Woodford, 2004). Professionalism represents a form of social control under such circumstances, based on processes of inclusion and exclusion of individuals into a bureaucratic structure according to recognized qualifications and standards (Castellani and Hafferty, 2006, Noordegraaf, 2007). For veterinarians, this professional control can be done, for example, via veterinary associations (Noordegraaf, 2007). They then expect this control to be formally recognized in all districts through local power dynamics.

A better understanding of this process of professionalization could arise from paying more ethnographic attention to local veterinary practitioners. Hamilton (2013) argues that looking at the importance that '*material things*' play in practices helps explain veterinary attitudes and power dynamics vets are part of on the ground. For instance, via an ethnography of British farm veterinarians, she showed how material items, like faecal samples, were linked to particular meanings and to prestige differences within veterinary teams in which people have different qualifications. Following this approach, this study interrogates Ghanaian veterinarians' opinions regarding who they consider to be a veterinarian and who they do not. Also assessed is how this control over veterinarians by professional structures takes place, what practices are accepted, rejected, or promoted, and where do practices around zoonosis management and OH fit in relation to these definitions of veterinarians?

In Ghana, like in many other LMI countries, most veterinarians work for the government[16] and these public veterinarians operate at the interface of citizens and the veterinary service bureaucracy. Public field veterinarians, therefore, represent a key research focus to understand grassroots realities of zoonosis management, notably disease surveillance. Animal disease surveillance programmes aim at

[15] Unlike other developing countries such as Uganda (see Kimani et al., 2016).
[16] Despite a process of privatization undertaken in the 1990s, which has been very limited (see Turkson and Brownie, 1999).

early detection of zoonotic pathogens in domestic animal populations or in wildlife in order to prevent outbreaks in humans. Surveillance involves continuous monitoring of the health of given human or animal populations (livestock and wildlife) and associated disease risk factors (Dufour and Hendrickx, 2011). The success of surveillance operations at the very local level is directly linked to the active collaboration of multiple stakeholders on the ground. For instance, veterinarians need farmers and other locals to notify them of suspected disease cases.

As frontline workers, field veterinarians can be agents of discretion, that is to say that they can act in ways that do not fit strictly with official procedures in order to privilege certain interests, such as their own personal gain, or those of certain clients, or public health interests (Ballard, 2005, Lipsky, 1980, Meyers and Vorsanger, 2007). This means that, a priori, discretionary behaviours in field veterinary practice could both favour or impede veterinary roles in zoonosis management by implementing national guidelines or by emphasising local needs which contradict these guidelines.

The literature on this kind of street-level bureaucracy describes significant tensions for such policy implementers, who play an important role in policy processes. Lipsky portrayed the '*dilemma of the street-level bureaucrat (SLB)*' who must find intermediary positions between, on the one hand, compassion and flexibility that comes with caring for circumstances of their local context and, on the other hand, impartiality and rigid application of orders coming from top managers (Lipsky, 1980). Street-level bureaucrats '*can rarely produce desired policy outcomes without the active cooperation of the individuals who are beneficiaries of public service or the targets of public regulations*' (Hasenfeld, 1992 in Meyers and Vorsanger, 2007:154).

The notion of street-level discretion is generally portrayed as a negative factor that undermines policy implementation. Some recent studies, for example, have revealed resistance by local stakeholders, for socio-economic reasons, to cooperating in surveillance operations for avian influenza, which thereby limited the detection of AI cases (Paul et al., 2015, Safman, 2009). However, other studies of local health practitioners as SLBs suggest a more positive impact of discretion mechanisms vis-à-vis policy implementation. For example, Axelsson and Axelsson (2006) argue that SLBs in public health are likely to '*identify more with their clients than with their parent organisation*' and that empowered clients represent opportunities for bottom-up policy integration. Gaede (2016:7) showed that medical doctors in rural South Africa use discretion to '*align their practices with policies*' and '*compensate for inefficiencies and failures* […] *in how the system functioned*'. My study is evaluating positive as well negative aspects of discretion linked to veterinary practices and vis-à-vis zoonosis surveillance.

Furthermore, I do not expect vets to all behave following the same logics and therefore I expect and I am attentive to variability in veterinary practices. Lounsbury (2008) posits that organisational practices vary across practitioners and should be understood as decision-making at the interface between not only institutional forces but also technical forces and where the micro-context and its power dynamics matter. Lounsbury considers practices – alongside organisational values and rules – as '*socially constructed*' and '*by which individuals produce and reproduce their material subsistence, organize time and space, and provide meaning to their social reality*' (Lounsbury, 2008:353).

Along this line, in this thesis, I explore field veterinary medical practices in Ghana as multiple and the result of both the profession's strategy and best practice models promoted by the Veterinary Services Department (VSD) at the national level and the discretion field vets potentially adopt on the ground. I identify dilemmas and contentions field vets have to deal with on a regular basis.

Relationships

Relationships between actors (such as policy-makers, practitioners and researchers) in professional networks are also a key dimension of the power dynamics at play in policy processes (Keeley and Scoones, 2012). Yet, very few papers on OH examine how these interdisciplinary, cross-sectoral and multi-professional relationships promoted under the OH ideal actually work to advance OH in reality. Studies looking at professional relationships, networks and OH have targeted large inter-country networks and disease platforms (Mekaru and Brownstein, 2014, Vandersmissen and Welburn, 2014) or were based on international research activities (Binot et al., 2015, Valeix et al., 2016). They have rarely addressed routine practices and local constraints.

The literature on social networks in general and networks for integration in policy and practice (notably in health care[17]) gives insights on the drivers of collaborative relationships[18], which are the

[17] The literature on inter-professional collaboration in health care (with authors like Nugus et al., 2010, Zillich et al., 2004, Manring, 2007, Johnson et al. 2018 and Homesland et al. 2010) helps because it treats of relationships between different professions in routine work and for better integrated health, and takes power dynamics into consideration. However, it is based on people working in the same workspace or in already constituted teams, which may not be the case for vets and other professionals concerned by zoonoses. Another difference is that the need for integration is centred around the patient's needs whereas in OH, the need for integration may appear less tangible and immediate.

[18] This literature, when talking about relationships that favour integration, almost systematically uses the term 'collaboration'.

type of relationships needed for implementing OH integration. I use key ideas found within this literature to frame my investigation of veterinary relationships.

One such idea that needs to be tested here is that vets must have rich networks with a large number of relationships through which they can frequently interact with other actors if they are to collaborate around zoonoses. Such an idea is rooted in the concept of '**social capital**' applied to work relationships. Social capital is the resource provided by relationships. Using works from Bourdieu, Coleman and others, Nahapiet and Ghoshal (1998:243) define social capital as '*the sum of the actual and potential resources embedded within, available through, and derived from the network of relationships possessed by an individual or social unit*'. Simply put, social capital means that '*better connected people enjoy better returns*' (Burt, 2000:348). Several authors have acknowledged that social capital can lead to collective action (Krishna, 2002), to integration of knowledge across organizations (Bhandar, 2010), and that social capital is '*the essential ingredient for collaboration*' (Cohen et al., 2001), all of which are elements of the idea of working together supported by the OH concept. Therefore, social capital is a relevant concept through which to explore how inter-professional relationships can work for OH.

Social capital has several dimensions, such as the structural, relational and cognitive (Nahapiet and Ghoshal, 1998), or opportunity, motivation and ability-related dimensions (Adler and Kwon, 2002). Two main aspects of social capital that cut across these typologies are particularly relevant to my research and frame my analysis of relationships in regard to veterinarians: 1) the network and its social structure, and 2) the potential assets mobilized through that network (Nahapiet and Ghoshal, 1998).

The first aspect, the network and its social structure, is mainly represented by the presence or absence of relationships and how actors are connected, which relationships exist in veterinary networks, why, and at what frequency of interaction. Creating relationships that involve frequent interactions between actors in professional networks is posited to be the basis of successful OH enterprises (Kayunze et al., 2014, Mackenzie et al., 2014). The second aspect of social capital corresponds to what represents the previously identified relationships in terms of facilitating actions and achievements that would be impossible without the relationships. Establishing relationships between professionals of different sectors or organizations is expected to be difficult (Weick, 1979) and relationships between key actors relevant to OH sometimes appear limited to very little

interaction (Binot et al., 2015, Grant and Olsen, 1999, Musoke et al., 2016). Therefore, I investigate what veterinarians' relationships with other professionals mean to veterinarians themselves and what assets they represent vis-à-vis potential collaboration in zoonosis management.

One can find examples of what the accumulation of social capital can provide for integration in the literature on policy networks which posits that inter-sectoral policy integration requires relationships which involve rational dialogue and mutual agreement (Shannon and Schmidt, 2002). This link between social capital and inter-sectoral collaboration, although not necessarily labelled that way, has been picked up in the literature on integration in healthcare practice and is embedded in the notions of '*mutual adjustment*' (Glouberman and Mintzberg, 2001) and '*power-sharing*' (Orchard et al., 2005). Here power can be 'soft[ly]' used as '*a form of influence*' to persuade or convince stakeholders to engage in relationships and networks that would benefit all (Kent et al., 2016:95). And, consistently, the principle of 'soft governance' – which relies on self-organisation in networks independent of control through hierarchy or legislation – has been presented as underpinning One Health (Leboeuf, 2011, Vandersmissen and Welburn, 2014) and:

> [The notion of network] *suggests the linking together of interdependent organizations in all kinds of ways; to foster better communication in order to solve mutual problems. In between the authority of the hierarchy and the competition of the market sits the network of mutual relationships* (Glouberman and Mintzberg, 2001:85).

All these concepts express the same idea, namely that, assuming a good level of communication between different health professionals in networks, we can expect them to spontaneously organise and engage in collaborative practices, considering that the overarching goal (integrated health) should be greater than individual or disciplinary/professional concerns. In absence of strong national coordination and structural changes at the national level, mutual arrangement towards collaboration implies a process of power negotiation towards a *power symmetry* (Corser, 1998 in D'Amour et al., 2005) or equality between professionals working together through power-sharing negotiations. Exploring veterinary networks and social capital is therefore expected to identify opportunities for formal as well as informal relationships that are key to collaboration in OH. This is why I explore the existence of relationships involving frequent interactions between veterinarians and other professionals around zoonosis management to explore the scope for OH in Ghana.

However, examining social capital to grasp the potential for collaboration and therefore integration may not suffice. What is missing is the relationships that do not exist and the relationships that do not foster collaboration. There are indications that relationships relevant for OH in routine contexts may not be associated with evident positive meanings and outcomes. Power may be an important determinant of whether this can happen or not. Nugus et al. (2010) argue that relationships that exist between several healthcare professionals are not always collaborative and are instead competitive (and dominative). Binot et al. (2015:45) remark that the long-term and collaborative nature of relationships between veterinarians and professionals in other sectors, like agriculture, rural development or the environment, remains insufficient, globally. Therefore, relationships may be approached with a spirit of competition in which power dynamics do not facilitate collaboration and therefore integration. In this thesis, and through the study of veterinary networks, I care to examine who exercise power over whom to understand the potential of relationships between vets and other key actors for OH integration.

To do so, I identified three conditions that must be satisfied in order to have collaborative relationships and in relation to which the failure to negotiate power between actors can be a barrier: Awareness, Trust and Role Specification. Awareness of other professionals' potential and interests as well as the possible synergies that can emerge from a collaboration appear crucial. Holmesland et al. (2010) state that different professions must become familiar with each other to achieve collaboration in health care practice. They warn that professionals may have stereotypes about other professions that need to be corrected in order to collaborate. Similarly, Zillich et al. (2004) suggest that inter-professional relationships are facilitated by professionals' learning about each other's practice and the benefits of working together. In the case of veterinary networks, I look at how vets feel about other actors' awareness of vets' role in managing zoonoses.

Trust also emerged as a critical condition for collaborative relationships. Manring (2007:131) and Franke (1999) agree that '*trust begins at the point when members of the network acknowledge the legitimacy of each other's goals and commit to the collaborative partnership'*. Zillich et al. (2004) state that professionals spending time together will have occasions to prove to others that they are knowledgeable and skilled, and therefore are worthy of others' trust, and this is essential to developing collaborative relationships. Krishna (2002) also highlights that how professionals feel about whether their relationships are based on trust and reciprocity is a factor for inter-sectoral collaboration, which I enquire with vets in Ghana.

Role specification also was an important factor in whether relationships could lead to collaborative practices. In their study, Zillich et al. (2004:767) identified role specification as the '*most influential factor supporting collaboration between pharmacists and physicians*' and concluded that actors' roles and responsibilities needed to be specified in order for actors to depend on each other and thus allow functional collaborative work-relationships. Similarly, Cross et al. (2001) found that, more importantly than with trust, relationships would benefit professionals in organisations if the different tasks professionals undertook were interdependent. In the case of OH, Zinsstag and colleagues (2015) considered that clearly-defined roles facilitated inter-sectoral communication between OH practitioners and were required for collaborative work to be done:

> *Integrated approaches can be depicted as a reorientation along horizontal lines in which regular communication takes place between practitioners in different disciplines and sectors, revising questions like 'Is this my job?' into statements of 'This work needs to be done'* (Zinsstag et al. 2015:232).

Here we understand that the challenge associated with the lack of clarity of roles, if arising, must be solved by everyone's efforts to understand each other's roles and to self-limit personal involvement in roles that are understood as not theirs. In this thesis, I seek to identify if such situations happen in veterinary routine work and if so, what they mean for veterinary relationships and their potential for OH collaboration.

Therefore, examining the potential of vets' relationships for OH beyond social capital involves asking how veterinarians maintain relationships with other professionals but also how these relationships can serve their professional interests vis-à-vis zoonosis management via how vets feel about the level of awareness, trust and role specification in their relationships with key OH actors.

In this analysis of the literature, I explored the theoretical foundations that are relevant to investigating OH implementation. This suggested a need for research to focus on OH professionals and their role in policy processes in LMICs. From this, I propose the study of professional perspectives, practices and relationships vis-à-vis OH implementation, through the example of veterinarians and their role in zoonotic disease management in Ghana. This research aims at informing our knowledge on global policy concepts through the consideration of in-country social dimensions and power dynamics that present challenges as well as opportunities for implementing these concepts.

Methodological choices and challenges

Research approach: ethnography

My research question and sub-questions call for adopting a socio-anthropological approach, and I opted for ethnography as I found this to be the most relevant methodology. An ethnographic angle allows for the study of a category of people (veterinarians) in their context (Southern-Ghana). I sought to understand the challenges and opportunities presented by the intersections between professional veterinary perspectives, practices and relationships and the wider socio-political context of zoonosis management in the country.

Compared to other forms of qualitative enquiry, ethnography maintains a focus on people rather than phenomena, and is about describing and interpreting a '*culture-sharing group*' (Creswell, 2012:90), something noted as being much needed within the field of global health (Adams et al., 2014, Biehl and Petryna, 2013). This approach was mostly welcomed by Ghanaian vets who appreciated the rare research focus on their profession.

Due to my background in biomedical sciences, ethnographic analysis and writing constituted a real challenge. I struggled with teasing out multi-dimensional findings and turning these into relevant chapters and sections since data related to perspectives, practices and relationships often appeared interconnected through professional frames and power dynamics. Connecting professional values and national level findings with what happened in local contexts also proved challenging. However, despite these difficulties, I learned to navigate between understanding and appreciating the complexities of data and telling people's stories, and it is this which represents this work's originality.

Participants

All my participants, their positions (grade and/or administrative level of operation and/or level of seniority and/or role), and the specific methodological ways I interacted with them are displayed in the table in Appendix A. I considered people to be 'vets' if they had graduated (or were about to graduate) with a university degree in animal health and were practising animal medicine and/or the management of animal diseases in an official government position or in private practices. This broad

definition included para-professionals but not informal practitioners.[19] Rather than retaining the terms 'para-professionals' or 'paravets', used by most vet surgeons in reference to their subordinates, I chose to use the term 'technician' in this thesis. I made this choice because, on the ground, no one really seemed to differentiate between para-professional grades.[20] Moreover, the prefix 'para' was perceived as offensive. The term 'technician' was received more positively due to its inbuilt reference to technical skills for practice rather than subordination to more formally-qualified surgeons. In the thesis, I use first names when referring to vet technicians and the prefix Dr and a letter (for example Dr B) to refer to vet surgeons.

I also met people who were not vets but who had frequent interactions with vets. This included medical doctors working at the WHO, civil servants working in agriculture, and one person working for an NGO. I took advantage of these opportunities to enquire about their relationships with vets.

Tools

Participant observation- I carried out participant observation with district vets, taking part in their daily activities which included clinical work (clinic consultations, farm visits), administrative work and surveillance activities like meat inspection in slaughterhouses.
Participation in meetings was also a great source of information as my notetaking seemed normal and meeting attendees, busy with what was being said, did not pay much attention to me. Not being the centre of attention allowed me to record a large amount of interesting information that would not have come up during interviews.

Participant observation allowed me to become – at least in part – an insider, '*immersed in the day-to-day lives of the people*' (Creswell, 2012:90), which I felt welcome to do in the vet clinics I visited. These rituals included things like waiting for clients, holding treatment trays, restraining animals during treatment, cleaning equipment after treatment, and participating in discussions around animal infections with vets and animal owners. I also spent time at the national veterinary headquarters in Accra and at the regional veterinary office of the selected region. As in all ethnographies, I used in

[19] I referred to non-vets who were known by vets to deliver veterinary services to the public without an official mandate as 'informal practitioners'. I did not meet any informal practitioners during the fieldwork because my access to people depended on official vets' networks who resented the presence of informal practitioners of animal medicine. I discuss these informal practitioners in Chapter Three and Four.
[20] These grades correspond to animal health officer and technical officer grades and feature in Appendix D.

combination of techniques (Gains, 2011), including interviews, a network survey and document analysis to complement my observational findings.

Interviews - I carried out 34 formal semi-structured, open-ended interviews with national and non-governmental actors (operating at local and international levels) involved in zoonosis management, and asked them to speak about specific themes (see checklist in Appendix B). This was the best way to find out what vets thought and how they saw their profession. Formal interviews also represented the only way to talk to vets in senior positions in the ministry. These interviews, coupled with informal discussions, were used to capture narratives as well as career histories to study how actors experienced zoonotic disease events and their responses to these events.

Only one interviewee, a senior veterinarian involved in public health, was reluctant to talk to me after a few minutes of interview, and refused to allow me to use the information he had shared with me for the reason that he did not believe in a social science approach to understanding vets' role in zoonosis management. If I did not fully comprehend why he was so hostile to me, the encounter proved interesting in itself as it reflected important complexities and controversies around the contribution of vets to public health. This motivated me in my investigation with later participants who were more willing to talk to me.

Network survey and analysis - I distributed and collected 32 network questionnaires (see questionnaire in Appendix C). Questionnaire participants included 22 vets who had already been interviewed by me or with whom I had informal discussions and three vets who had been identified by my interviewees and whom I had not previously interviewed or spoken with. Additionally, when opportunities arose, I collected network data from seven non-vet actors who worked in local agriculture, human public health departments or slaughter facilities[21], and who were in contact with vets.[22] Participants were asked if and at which frequency they exchanged knowledge/information around zoonoses (over the last two years) with key actors from a list I had constituted during the first period of fieldwork, after talking with national vets. For each listed actor, participants were asked to

[21] In the subsequent chapters, I use three different terms to talk about slaughter facilities: slaughter slab, slaughterhouse, and abattoir. 'Slaughter slab' was used by my participants to mean an informal place, limited in space, where the slaughter of only a few animals occurred, generally at the village level. 'Slaughterhouse' and 'abattoir' were used interchangeably for bigger and more official structures where organised slaughter took place.

[22] Upon conclusion of my fieldwork, it was apparent that these opportunities had been very limited and did not provide sufficient data for analysis as a separate focus.

indicate the frequency of their interaction with them from 'never' interact to interact 'every day or almost every day', as presented in Appendix C. This represented 650 (26 listed actors X 25 participants) possible interactions between my participants and the listed actors, which I then attached to one unique frequency weight or score (a number that allowed quantification of interactions) ranging from 0 to 6, as shown on the questionnaire.

The resulting quantitative data obtained were entered into Excel and analysed through the creation of network graphs in Pajek, an open access network analysis software programme.[23] The software allows for network data to be displayed visually, showing who has communicated with whom and how often, as used by other studies of inter-professional interactions in health (such as Pinelli et al., 2015). Network graphs were built with respect to positioning the nodes so that the number of intersecting ties was minimal. This way, nodes in the centre of a network correspond to the actors who have the highest number of ties and the nodes at the periphery, the ones that have the fewer ties.

In this way, network graphs allowed me to identify central and peripheral relationships between my participants and the main actors involved in zoonosis management, why vets took part in those relationships, and what potential vets thought these have for OH collaboration. Although using some key measurements (density, degree centrality and betweeness centrality) helped analysing my study participants' network structure, I primarily used this tool as a means of complementing and triangulating data obtained from interviews and observations.

Document collection - I collected 40 official documents and grey literature related to the history of the veterinary profession in Ghana, as well as to policies or policy-making processes (such as meeting minutes, emailed reviews of policy drafts) on zoonoses or veterinary legislation. These documents were either given to me by participants, found online or locally published. This material was useful in understanding vets' priorities concerning zoonoses in animal health-related policies (over the last twenty years) and veterinary legislation as well as how these priorities were promoted.

I also examined a selection of Ghanaian mass media[24] coverage of veterinary and public health issues with a focus on how veterinarians have been portrayed and have portrayed themselves relative to veterinary and public health issues between 2007 and 2017, a period which included coverage of the AI outbreaks in 2007 in Ghana and the scare surrounding the Ebola epidemics in West-Africa in

[23] Pajek is free and available here: http://mrvar.fdv.uni-lj.si/pajek/
[24] From the main newspapers available online, essentially the Daily Graphic Online

2014/15. Following Scoones and Foster (2010:9) who argue that *'in today's world,* […] *the media – in all its forms – has a major role to play in* […] *framing the narratives and practices of response* [to zoonosis outbreaks]', articles in the Ghanaian press were essential in helping me situate veterinary perspectives on zoonoses in a national context and among various public interests.

Fieldwork

Timeline - I conducted my fieldwork from July 2014 to February 2015. I spent the first couple of months in Accra, the country's capital (see Figure 1), and home to government ministries and a concentration of private clinics and non-governmental organisations. Here I met many vets in senior government positions working at the veterinary services headquarters (VSD HQ), including my first

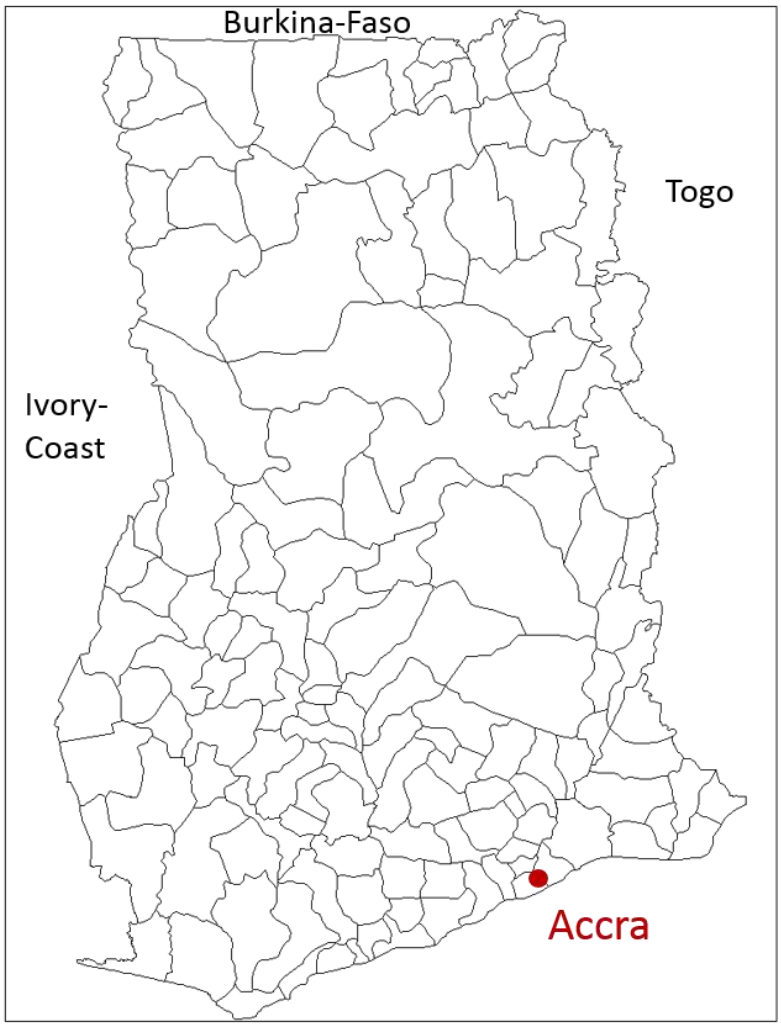

Figure 1. Map of Ghana with district demarcations, neighbouring countries and position of the capital city: Accra.

(Source: https://commons.wikimedia.org/wiki/File:Ghana_districts_blank.png)

contact who directed me towards a short list of people and organisations with whom he felt I should speak.

After I had relocated to a town in one of the ten regions[25] of Ghana (situated in the southern part of the country), I returned to Accra intermittently for short visits as well as for a month's stay at the end of my time in the country. The fact that I could commute to and from Accra on a coach journey allowed me to attend specific events like conferences and meetings in the capital. For instance, I attended a full day of a OH-labelled workshop where vets participated along with other professionals (OH-NEXT GEN). I also attended a '*stakeholder meeting*' where different parties concerned with animal husbandry and animal health debated future legislation and policy around livestock and veterinary services. I also attended most of the 20th Veterinary Congress in November 2014. This was extremely helpful in building my understanding around the research priorities of the veterinary community in Ghana, how they felt existing knowledge could influence disease surveillance and control practices in the country, and where they felt there were important knowledge gaps.

I spent approximately half my fieldwork time in and around a town of the selected region. I had been advised to base my study in this region by the director of the veterinary services. It then became a matter of respect and access to follow this recommendation as the regional vet director there had received orders to '*show me around*' and help me approach district vets. The major town was an important hub for livestock and the meat trade and hosted an abattoir (which I visited twice) where vets inspected meat and played an important role for zoonosis surveillance in the region. Almost half (44.5 percent) of the economically active population of this region was engaged in Agriculture (Government of Ghana, 2016)[26] and livestock keeping was diverse. Moreover, I was told that the major town was regularly visited by vets based in Accra, and thus presented opportunities for interactions between local and national vets that I found interesting to investigate.

[25] The level of 'region' is an administrative unit situated between the district and national level and equates to the province in many other countries. Therefore, in this thesis, it should not be confused with 'region' as the supra-national level, i.e. West-Africa.

[26] '*The next highest proportion of the economically active population is employed in Wholesale and Retail Trade (18.4%), followed by Manufacturing (12.2%) and Community, Social and Personal Services etc., (9.9%)*' http://www.ghana.gov.gh/index.php/about-ghana/regions/

Among more than twenty districts, I spent some time in three, which were located around the major town. I chose these particular districts following discussion with the regional vet director regarding differences in terms of staff (number, qualifications, and gender), local resources, and types of animals and related infections prevailing in respective areas. I was interested in examining the diversity of practices that vets engaged in this particular region.

Over one and a half months in the region, I spent 18 full days at vet clinics in District One[27]; followed by eight full days in District Two and five full days in District Three. I progressed from descriptive observations to more focused and selective observations in relation to my research question (Denzin and Lincoln, 2011), which justified the decreasing amount of time I spent in each district.

Although I had originally planned to limit my investigation of veterinary field practices across the three selected district veterinary clinics, snow-balling brought me to spend some time at the regional vet office, with its director office, classrooms (for vet students), laboratory and pet clinic, and which also delivered local vet services to the public.

Interacting with people – in the three chosen districts I visited, I sought to develop much closer relationships with particular vets. I observed these vets in several different environments: the clinic, the farm, public places and their homes. In each vet's office, I focused most of my attention on one person (the most senior district veterinary officer and main decision maker)[28] but I was also interested in her/his relations with others both inside and outside the office (with clients, other vets, and other locals). I spent time 'hanging out' with vets and being around when there was no work to do, such as at lunch breaks, or on transport, moments when the atmosphere was more relaxed and favourable for talking and sharing. I stayed at the vets' homes in two districts. Informal discussions were easier in these situations and it was here where I had extensive conversations with these vets as we spent considerable periods of time together; it was for this reason that I never formally interviewed these individuals using the semi-structured questionnaire (see Appendix A).

[27] Districts are not named here for purposes of anonymity; see section on the research ethics later in this chapter.

[28] These vets were: Dr Simon Bani (referred later as Dr B) in District One, Afia Nsiah in District Two, and Bernard Ayensu in District Three. These and other names appearing throughout the thesis are pseudonyms used for anonymity purposes.

Not only were informal discussions with the vets easier outside the office and before and after working hours, but they revealed aspects of vets' personal lives and gave me the chance to develop deeper bonds and trust with them and their families. For example, Bernard's wife taught me how to manually wash my laundry. The three of us laughed that I, a grown woman, could have such poor skills. This entertaining event was talked about with visiting neighbours and friends for some time after that day. I also tried to find them a foreign volunteer to come help them manage their farm in the approaching summer. All this made my relationship with Bernard and his family a friendly affair, based on far more than my research alone. At Afia's, I felt like a welcomed guest. I spoke in French with her son in law who was learning the language at school and whom she looked after. In moments when we did not talk – watching television with the family before going to bed or taking the bus to work in the morning for instance – it did not feel awkward or uncomfortable. Instead, it felt unusually and agreeably safe, and I believe, for the both of us. By the end of my stay (as short as it was), she had begun calling me 'sister' and took great care accompanying me to her local tailor to get myself a custom-made dress of Ghanaian fabric.

Taking notes - When taking observational field notes, I tried to describe situations, spaces and behaviours in as much detail as possible. I quickly noticed that using a digital-recorder on my phone made my interviewees uncomfortable and wary and that this was not feasible for informal discussions. So, I focused on taking extensive notes. When attending meetings or observing consultations in clinics, notetaking was expected and therefore easy to do. In situations where notetaking was less expected, I refined my notes by adding details at inconspicuous moments, or on the laptop after coming home. During one-to-one interactions, notetaking was more awkward as it felt like time spent writing prevented me from engaging in the conversation with respect and appreciation for my interviewees. In these cases, I would take most of my notes after the encounter, though I knew that these notes would include a layer of my interpretation (Falzon, 2016). Indeed, where I had to delay note writing, as Lofland points out, there was an element of '*previously forgotten now recalled*' information (Lofland and Lofland, 1971), thus heightening the need to triangulate findings with other interviewees' comments, other observations and so forth.

Once, a participant saw her name written on a page of my notebook while she was helping me write a Ghanaian town's name. I noticed straight away that she was upset that I had written about her and what she was doing in detail. The sentence in my notebook read:

"When I arrived, [her name] was taking some water out of the fridge in Dr B's office."

She became more distant and less talkative with me after this incident, probably because she had not anticipated that I would take note of every single action I witnessed, which could quite understandably, make someone feel uncomfortable. Indeed, it would be easy to assume I might have had a judgemental agenda even if this was not the case. Regrettably, I never discussed this with her.

Data analysis

The bulk of my analysis was done during the writing process, although it had already begun during fieldwork as I redirected my attention to new participants, places and topics of interest. A first coding of field notes was done with N-Vivo software during my fieldwork, using a wide range of themes including policy, practice, networks, para-professionals, meat inspection etc. Following this, I did a second round of coding by manually fitting data into potential chapters and sections of my draft outline. Then, for each section of the three empirical chapters (perspectives, practices and relationships), I read my field notes and developed the coding categories inductively into more precise codes by adding keywords in text margins (Emerson et al., 2011). These keywords corresponded to how participants found meaning around the given theme. After this, I wrote short sections in which I presented ideas derived from these codes. These were subsequently integrated as reflections into a more coherent whole for each section/chapter by moving increasingly elaborated pieces of text around to help the main arguments emerge. This approach emphasised vets' emic views and did not try to establish causality between the veterinary professional role and One Health integration in a measurable or generalizable way. Indeed, I did not measure integration levels or outcomes, rather I explored contexts and processes as having meaning for OH integration.

During my fieldwork, my observations were dominated by the overwhelming impression that vets were fighting for the continued existence of their profession every day. It seemed to me that every single activity was underlain with disappointment and frustration due to limited resources and the lack of recognition vets received. However, following my fieldwork, and with more distance from study sites, participants, and data, I came to approach my findings differently. I was more able to recognise nuance, get beyond an 'all-is-black' mindset, and include positive aspects. This helped me write stories that more closely represented the reality I was exposed to in Ghana.

Ethics and positionality

As a participant observer who had access to sensitive information[29], ethical considerations were important and entailed a set of responsibilities (Junker, 2004). In my case, this meant going through ethical review processes both in the UK and Ghana; the systematic collection of informed consent from participants before using their data; the protection of this data during fieldwork; and the anonymization of key participants about whom I have written in the thesis as well as places like region and districts. For instance, and despite what it could have added to my writing, I decided not to disclose the name of the chosen region as this may make it possible for readers who know vets in Ghana to identify my participants.

My own training as a vet greatly facilitated my access to vets. Although my presence as a vet was well received, my research approach was difficult to grasp and was sometimes not taken very seriously. This can be explained by my apparent youth, my student status, my gender, and the fact that vets saw value mainly in quantitative, natural science research. As a white middle-class vet from France/UK, I was often seen as someone who came from a place with high standards. This meant I was sometimes assumed to be negatively judging their premises and practices, both of which were severely affected by a lack of resources. I was also assumed to be capable of bringing in money through grants and solving problems by making recommendations to Ghanaian authorities based on the learnings from my research. Finally, I was expected to leave the country without having given any feedback. To address all these assumptions, I spent some time explaining my intentions and my research approach, and, along with some vets, I co-organised two meetings – one in the major town of the chosen region and one in Accra – in which I presented and discussed my preliminary findings with my participants.

Thesis Structure

Chapter One has presented the rationale for and set the boundaries of this research as well as reflected on design choices and fieldwork experience. I explain why I propose to study OH integration through a professional angle that pays attention to power dynamics and using an ethnographic approach. Chapter Two provides essential information on the institutional and policy context in which vets are embedded in Ghana. It explores vets' institutional positioning through a brief description of

[29] Mainly linked to the fact that vets often complained quite violently about the rigid hierarchies in their profession (such as in the Ministry of Food and Agriculture - MoFA), and also about other professionals.

the veterinary services' historical path before presenting the structure and functioning of the official veterinary system for disease management in 2014, when I started my investigation. It then offers critical insights, based on the study participants' perceptions, on the place given to vets and zoonoses in national policies. In Chapter Three, I study veterinary practical settings and main practices through the exploration of five examples of veterinary service delivery in one region of Ghana. The Chapter pays attention to vets' perceived ability, in routine practices, to play a greater role in zoonosis management with emphases on vets' material context and discretion mechanisms they can use on a daily basis. In Chapter Four, I examine how vets in Ghana perceive their job and their role in zoonosis management. I explore the intersection between vets' perceived role, entangled interests and prestige. I also present what entails vets' strategy with regard to zoonoses and OH. In Chapter Five, I investigate the potential for OH integration which resides in vets' relationships with other actors in work-related networks. I describe vets' main interactions, which occur in different ways at the national and local levels and highlight the importance of cross-level interactions. I then scrutinise how previously present (or absent) relationships offer, in the vets' eyes, opportunities (and the lack thereof) to enhance integration around zoonosis management in Ghana focusing on challenges of awareness, trust, and role specification. Chapter Six assembles and confronts the findings emerging from the analysis carried out in Chapters Two to Five. I argue that differences in professional characteristics and professionalism not only represent a grand challenge but also, if taking into consideration at the research and policy levels, an opportunity for OH integration which should not be overlooked.

Chapter Two: The Ghanaian Veterinary Services - Institutional and Policy Context

This chapter establishes the institutional and policy context in which public veterinarians in Ghana were embedded. To do this, I use information from the peer-reviewed literature, grey literature, as well as empirical data. The chapter also introduces vocabulary I use in later empirical chapters when talking about vets, their levels of operation and official roles, and references to main events that shaped the Veterinary Services Department (VSD) and more broadly the veterinary services[30] as they were in 2014/2015 during which my enquiry took place.

Beyond providing background, this chapter shows how the Ghanaian national context and supra-national trends have situated vets and their profession amongst various and dynamic institutional arrangements which are far broader than the veterinary profession itself. This is important as it helps us to understand how veterinary characteristics, which I analyse later in this thesis (practices, perspectives and relationships), may have emerged in relation to zoonotic diseases.

Evolution of the positioning of the Veterinary Services in Ghana

Veterinary services are animal-related services rendered to the public and according to Smith, can be split into four categories (2001:188): '*clinical (treatment of diseased animals and control of production limiting disorders); preventive (avoiding the outbreak diseases); provision of drugs, vaccines, and other products; and human health protection (inspection of marketed animal products)*.' In this thesis, the veterinary services also encompass the people who deliver these services and their organisation in institutions. In this section, I focus on the main historical events that shaped the veterinary services' institutional structures as it existed in 2014.[31]

[30] In this thesis, I refer both to the 'VSD' and the 'veterinary services'. The distinction lies in that 'veterinary services' is a broader term than is VSD. The VSD stands for the public veterinary institution in Ghana and veterinary services stand for general animal health services offered to the public by official government vets as well as the private sector, and even more informal practitioners (the latter are discussed in Chapter Three).

[31] As mentioned in Chapter One, my fieldwork lasted until February 2015. However, in discussing the official VSD system at the time of my enquiry, I focus only on 2014. This is because an important change happened in

Ghana became the first country in West Africa to establish veterinary services at the beginning of the twentieth century. Oppong is one of the rare authors who has written about this history and his writing reveals that the veterinary department had never completely existed on its own, as a sector, and rather, started off as closely linked to the human health sector. Interestingly, Mr Beal, the first veterinarian sent by the British Empire in May 1909 by boat, came to work within the Medical Department. Mr Beal was supervised by the Principal Medical Officer in Accra and had a medical dispenser for a technical assistant. He and his assistant took care of horses and travelled around the country to conduct a livestock census to describe and characterise species and to carry out disease investigation (Oppong, 1999).

Animal health was clearly a concern of the human Medical Department which, even after Mr Beal left the country during the First World War (1914-1918), continued to investigate animal diseases – especially in the northern parts of the country, where the bulk of the country's cattle were. For instance, during Mr Beal's absence, a medical doctor named Dr Le Fanu, was sent to investigate Rinderpest epizootics which were killing cattle on a massive scale. After Mr Beal returned from the war, the British governorate decided on the full establishment of a veterinary department in order to expand veterinary activities. This was done in 1920 through the recruitment of more staff, independence from the Medical Department, and the establishment of the Government Veterinary headquarters in Tamale (Northern Ghana).[32]

In the years which followed, the veterinary department wavered back and forth from being tightly linked with the agricultural sector through animal husbandry to being quite detached from it. In 1920, before leaving Ghana, Mr Beal wrote a report which contained unprecedented data on the livestock industry in the country and key recommendations for legislation and policy on animal health as well as veterinary activities (Oppong, 1999). Oppong (1999) sees this report – with its aims to develop Ghana's livestock resources into a key industry – as the foundation of the Veterinary Department. Because there was no other government organisation responsible for livestock improvement in the 1920s, the Veterinary Department integrated animal husbandry into its mission, alongside animal medicine.

January 2015 (the reversion to a centralised VSD in districts and regions, as described later in this chapter), and my participants had not yet understood or experienced the consequences of this.

[32] From: Oppong (1999) and mofa.gov.gh

Following Ghana's independence in 1957, the Veterinary Department, under the name of the Department of Animal Health, was positioned within the Ministry of Animal Husbandry in 1965. Oppong (1999) described the creation of the Department of Animal Health in 1966 as directly linked to the livestock sub-sector:

> *Cattle owners were crop farmers and not livestock farmers; animal husbandry practices, including feeding, animal breeding and housing were inappropriate; the local animals were small and (seemed) stunted; Rinderpest and CBPP[33] were killing animals in large numbers; there was the urgency to cut down the importation of livestock, which not only drained resources but also introduced diseases in the country; and there was the need at the same time to supply meat to the population and therefore the desirability to accelerate increase [sic] in livestock numbers* (Oppong, 1999:116-117).

A year later, however, the Ministry of Animal Husbandry disappeared following the coup d'état and the Department of Animal Health was housed in the Ministry of Food and Agriculture (MoFA). This time, animal production was not seen as its function, as this was undertaken by a separate Animal Production Department. The two separate departments merged again in 1987 into the Animal Health and Production Department. In 1995, the department was split yet again into two: the Animal Production Department (APD) and the Veterinary Services Department (VSD). Two decades later, at the time of my fieldwork, I sensed that my participants regretted that animal health and animal production had become two separate institutional elements.#48 [34] In 2015, even though it was not an official duty, vets still contributed to animal production and productivity in ways that went beyond health care for these animals, which I discuss further in Chapter Four.[35]

Vets' continued role in livestock production in practice has created frictions between the APD and the VSD. An FAO coordinator reported to me that Ghana was an exception in that APD and VSD were separate departments, and was in this way, unlike most other countries. He asserted that representatives of the two departments tended to claim that issues such as livestock feed or diseases

[33] Two major cattle diseases. Rinderpest was eradicated in 2011 (globally) but CBPP (Contagious bovine pleuropneumonia) remained enzootic in Ghana in 2015.

[34] The symbol # followed by a number refers to the source of evidence I use in the text (i.e. from an interview or observation). Each number corresponds to an entry in the table in Appendix A, where I describe all my encounters with participants during fieldwork with respect to anonymity.

[35] The difference in remit between the two departments (VSD/APD) was not very clear to me during fieldwork. My understanding, according to the MoFA website (mofa.gov.gh) and discussions with vets, was that animal production agents had a similar goal as vets, except that they contributed to livestock industry through all possible ways except animal health which was the focus of the vets (at least officially).

were their domain and both departments wanted to '*be in charge'* officially, as this enabled them to have a mandate on the ground. One of the district vets I talked to also mentioned this dispute asserting that the APD tried to '*take livestock feed and insemination* [responsibilities] *from* [the VSD]' so that the APD could 'escape' from being decentralised as those responsibilities required national management.[#28]

These tensions were also noted in official reports. For example, an expert from the OIE condemned the separation of livestock production and animal health into '*two disparate Departments'* as this impedes the capacity to strive towards a livestock development policy (Daborn, 2008:1). Similarly, Oppong (1999:150) talked about the '*unhealthy rivalry and bickering*' between the two departments, which, in addition to '*the lack of constant policy,* […] *the lack of resources, frequent changes of Ministers of Agriculture, undue political interference* […] *and constant restructuring of the organisational command*', impeded the improvement of livestock husbandry and livestock growth prior to 1999. All of this suggests that animal husbandry had emerged as a natural veterinary function and its institutional separation from animal health was, therefore, a hotly debated question.

The VSD, under the remit of MoFA, also represented a challenge to vets obtaining the resources they felt were needed. In the 1980s, the International Monetary Fund and the World Bank promoted Structural Adjustment Policies (SAPs) aiming to correct government failures to deliver goods and services efficiently to citizens, by enhancing the role of the private sector and markets and shrinking the public sector in developing countries (Amankwah et al., 2014). In Ghana, according to several respondents, the two main reforms under the SAPs, decentralisation and privatisation, were slowly implemented in the late nineties and had a tremendous impact on how veterinary services operated in the 2000s.[#21,#23,#81]

Decentralisation entailed the transfer of administrative responsibility, fiscal resources, and political authority from central government agencies to subnational government entities, non-governmental organizations or to the private sector (Robinson, 2007 in Amankwah, 2014). In Ghana, the decentralisation process of MoFA resulted in the local (district) units of the veterinary services being placed under the Ministry of Local Government.

At the same time, the public agricultural services (which included the veterinary services) were affected by the Unified Extension System (UES) set up in 1992 (Asuming-Brempong et al., 2006, MoFA, 2004). The UES positioned the veterinary services alongside other agricultural services such as 'crops',

'extension' and 'animal production' at the regional and district levels. The decentralisation of MoFA aimed to '*empower the districts to plan and implement their own agricultural extension activities*' (Asuming-Brempong et al., 2006:8). *The 'extension initiative […] was set up and implemented to help (i) improve efficiency in the management and delivery of extension services, (ii) improve the relevance of technologies available to farmers, and (iii) strengthen the technical departments of MoFA'* (Asuming-Brempong et al., 2006:14).

The decentralisation and the UES together resulted in the fact that, at the district level, financial and material resources allocated to veterinary units no longer came from the central veterinary services (VSD), but from District Directors of MoFA, and from a pool which was shared with other local MoFA units. Money, given to district clinic staff members (whether they were surgeons or technicians), was to cover the following: 1) staff salaries; 2) funds for the clinics' basic needs (mainly covering vets' displacement expenses: 300 Ghana Cedis (GHc)[36] for surgeons and 150 for technicians per quarter for each staff member); and 3) some 'extra' money for surveillance and prevention campaigns (around 800GC) that some vets have called '*special activities'*.[#27,#61]

However, funding for 'special activities' had stopped being officially mandated at the time of my fieldwork. Ahwoi (2010) has remarked that financial resources allocated to local governments from national budgets have been '*inadequate*' and that this has put pressure on district directors to allocate funds to units in immediate need or which are managing crises. Thus, surveillance and prevention campaigns related to animal diseases – being considered 'extra' – do not receive priority for funding.

In addition, in the region examined in this study, field vets also complained that their displacement fees were no longer paid.[#48,#49] As a result, by the end of 2014, according to my participants, the funding provided to district vet clinics had become so minimal that government vets often struggled to find the necessary finances to support their clinics' basic operations and were often forced to use their own salaries for many clinic-related expenses (I discuss this further in Chapter Four).

The **privatisation** reform involved the *'transfer of power, resources, and functions from government to the private sector, non-governmental organizations, and civil society'* (Amankwah et al., 2014). Before the privatisation process, like in many West-African countries, Ghana's veterinary services were

[36] The Ghana Cedi (GHc) is Ghana's currency. On the 1st January 2018, 1£ was worth 6.17 GHc.

entirely public (ibid). The intention behind the privatisation reforms was to encourage veterinary practitioners to enter private practice to deliver private services[37] where they would also undertake some public services such as surveillance and prevention campaigns (ibid). Oppong (1999) regarded privatisation as having been inevitable for the veterinary services in Ghana because of simultaneous increases in the number of heads of livestock in the country and decreases in national resources for the provision of free veterinary care.

While none of my participants opposed the privatisation of some veterinary services, many regretted that the reforms came with negative unintended consequences. One senior veterinary technician[#71] reported that public vets such as himself expected privatisation to improve the image of the veterinary profession in the eyes of the public and that this would lead the Ministry of Finance to allocate more money to the VSD. This has not happened, although some private vets do possess high-level equipment which allows them to undertake sophisticated animal examinations and to diagnose disease very efficiently.[38] There were very few private vets remaining at the time of my enquiry,[39] which explains, in part, the poor effect of private vets on improving the profession's status.

The privatisation process was accompanied by Cost Recovery Programmes and drug liberalisation policies which posed risks to the veterinary services. These programmes and policies introduced charges that farmers and pet owners had to pay directly to their veterinarians in exchange for animal health services or drug administration. Turkson (2003) has argued that, although these changes were supposed to improve access to veterinary services for the general public, given limited resources, they also affected the quality of services actually delivered. Turkson also warned that drug liberalisation could lead to the introduction of bad quality or 'fake' drugs and thus encourage farmers' use of informal practitioners (see more on this in Chapter Five) to treat animals, which could, in turn, lead to disease spread and drug resistance in animal and human populations. The effects of these policies were still being felt in 2015. A senior lecturer at a veterinary school asserted that, because of drug liberalisation and informal practitioners, private vet practice was only really viable in Ghana's urban

[37] Clinical services (mainly pet care) is considered as a private service when there is no public health stake (Amankwah et al., 2014).

[38] For example, I visited a private vet in Accra[#26] who had a rapid test for rabies done on dog saliva, whereas the laboratory at the VSD HQ was at the time, still waiting to receive necessary chemicals from abroad which would allow them to do this type of test.[#5]

[39] In 2011, they were only 18 private vets (Diop et al, 2012) and this number did not seem to have gone up by the time of my fieldwork, although I could not obtain an official number.

areas.[#76] In 2014, private veterinary clinics were concentrated in big cities like Accra and Kumasi and focused on companion animals. Veterinary experts talked about a '*failure*' to privatise the Ghanaian veterinary services: *'Planned privatisation initiatives* […] *did not as intended, fill the vacuum created by the withdrawal of Public VS* [veterinary services]' (Daborn, 2008:2).

All my participants agreed that neoliberal reforms had had dramatic consequences on the veterinary services as a public body. Amankwah et al. (2014) argue that the effects of '*the transformations of the formal and informal institutions resulting from decentralisation and privatisation'* have been underestimated. In Ghana, public investments in construction, equipment and vehicles for the veterinary services had fallen to zero by 1997 and salaries have been drastically reduced (Amankwah et al., 2014).

A consequence of this has been that exhaustive livestock censuses are no longer carried out, the last one having been in 1996.[#13] Since this date, estimations have been produced on the basis of expected growth rates of different livestock species. A senior vet working at the VSD headquarters (VSD HQ) was convinced that these estimated numbers did not reflect reality and that they probably largely underestimated the number of livestock heads, and thereby hindered the appropriate release of vaccines and other key resources.

The success of vaccination in humans and animals depends in part on the proportion of the subjects vaccinated; only being able to vaccinate part of a population can render the vaccination effort less efficient in eliminating or preventing a disease (Andre et al., 2008). The limited capacity to vaccinate a major portion of the national cattle herd against anthrax in Ghana has been identified as a problem for the prevention and elimination of the disease (Kracalik et al., 2017). In 2015, the vets I spoke with expressed concern that too few vaccines, for anthrax or otherwise, were being delivered to field vets, and they worried of a failure to deliver sufficient coverage that could prevent important animal diseases.

A former director of the VSD asserted to me that, in 2008, the VSD had received funding for a poultry census. However, this was an isolated event and happened only in reaction to the 2007 outbreaks of AI, and other species of livestock (goats, sheep, and cattle) were not included in this census. Vets advocated for another livestock census in 2013, as one was being planned for crops for the year

2014.[40] I, however, found no evidence that their request had been taken into consideration at the ministry level during my fieldwork and no such survey had been conducted in 2014.

As suggested earlier, disease surveillance and country-wide preventive vaccination were significantly undermined by structural adjustment. Although national vaccination campaigns against animal diseases with public health or economic relevance – essentially rabies in pets, PPR in small ruminants, anthrax in cattle and Newcastle disease in poultry – were at the centre of veterinary interventions before the reforms (Amankwah et al., 2014), by 2001, the procurement of vaccines had become seriously affected by delays in access to government funding. Prior to reforms, teams of veterinary technicians would organise annual mass campaigns in villages. By 2014/15 however, this occurred only on an ad-hoc basis in communities touched by serious disease outbreaks and where emergency control was required (Amankwah et al., 2014). In other words, the VSD had to shift from privileging prevention to a focus on disease control.

Reductions in prevention efforts lead to resurgences of serious diseases such as PPR or rabies. Amankwah et al. (2014) reported a significant increase in mortality of sheep and goats due to the lack of vaccination against PPR following reforms. These negative impacts continue to be felt by vets in Ghana. A district vet #59 told me, for example, that she tried to convince farmers to vaccinate every year against PPR as this would benefit them financially, but they usually refused on the basis it was too difficult to organise such events on their own.[41] A lecturer of veterinary medicine mentioned that free annual rabies vaccination campaigns ceased in 1996, just as decentralisation began.#81 This had immediate impacts as while more than 12 million dogs were vaccinated against rabies in 1994 and 1995 respectively, only 6 million were vaccinated in 1996 (Oppong, 1999). According to a senior vet, despite attempts by the VSD to bypass usual government routes and use private traders to import vaccines, this was 'unsustainable'.

Furthermore, the numbers of public technical veterinary staff (doctors as well as technicians) were reduced by '*ending the automatic employment of graduates' and 'retrenching veterinary* [low grade technicians]' (Amankwah et al., 2014:303). More than one thousand Community Animal Health Workers (CAHWs) had been trained between 1995 and 2000 with international funding. They were selected by their communities, and were supervised and provided with kits and annual licenses by

[40] This comes from a statement about the need for livestock census made in the VSD annual report for MoFA and the year 2013.
[41] This could not be done on an individual basis as the vaccines could only be purchased in large quantities.

the VSD (ibid). These CAHWs also participated in private sector activities since they collected money directly from farmers after having delivered basic animal healthcare services. On this issue, vets reported that some CAHWs went beyond their official remit and '*provided injections and even engaged in surgeries*', which discouraged vets from supporting and training CAHWs (Amankwah et al., 2014:304). As a result, the CAHW scheme collapsed in Southern Ghana and district vets were charged with responsibility for wider areas. In 2014/15, I did not meet or hear of any CAHWs during my fieldwork. Structural adjustment has also made it harder to get an education to be a vet doctor as the number of scholarships offered by the World Bank decreased.[#13] In reaction to the shortage of vets, MoFA opened two veterinary schools: in 2009 in Kumasi and 2010 in Accra. This was to end reliance on veterinary training abroad (mainly in Eastern Europe, countries of the former Union of Soviet Socialist Republics and Cuba)[42] and to reduce the shortage of veterinary human resources in the country. The first batches from both schools graduated in 2015, so were not yet employed and working at the time of my fieldwork.

Ten years after the government decided to decentralise MoFA in 1993 (including the veterinary services), the Local Government Service act was promulgated by the new government (under the *New Patriotic Party*) to re-establish the Ministry of Health and the Ministry of Education back into the central government as these domains were considered to require centralised governance (Amankwah et al., 2014). MoFA, however, did not benefit from similar consideration and remained decentralised as departments of district assemblies until January 2015 (I discuss why this changed in the last section of this chapter).

To sum up, the veterinary services as an institution has been shaped by its association with the ministries of health and agriculture and by neoliberal institutional changes that represented sector-wide agendas as well as internationally-led governance reforms. The VSD within MoFA found itself reoriented by numerous rearrangements, which over the last 30 years, have constituted the institutional context in which government vets found themselves at the time of my study. Understanding this dynamic context informs our understanding of the role public vets may play in managing animal diseases, through consideration of underlying agendas that are not purely veterinary in nature. With this context in mind, the following section presents how the VSD was

[42] Source: article in Modern Ghana of the 14.04.2010 available at: https://www.modernghana.com/news/271353/ugcacs-launches-school-of-veterinary-medicine.html (last visited on 01.04.2018).

structured in 2014 and introduces the official procedures for animal health management at the time of my fieldwork.

VSD structure and the official system for animal disease management

In Ghana, there are very few veterinarians. In 2015, there was a total of 704, with an average of 60 vets per region.[43] A comparison with the numbers of public medical officers in the country suggests just how small these numbers are. Schelling et al. (2005) noted that in rural Africa, vets used to be seen as the '*most extensively distributed, highly educated human resource'*. In Ghana in 2015 however, the local medical sector is much more extensive than the veterinary sector, with just above 50.000 medical doctors and nurses (GHS, 2016). As a result of the shortage of vets, some areas do not have a veterinary clinic. In 2008, there were only 59 vet district offices for a total of 171 districts (Diop et al., 2012).

In Ghana, vets can occupy a variety of positions and grades (see Appendix D). However, for analytical purposes, in this thesis, I consider two main categories of veterinary officers: veterinary surgeons and veterinary technicians.[44] Vet surgeons hold doctorates in veterinary medicine and have studied at the post-graduate university level whereas vet technicians hold only undergraduate degrees in animal health. I chose to refer to both surgeons and technicians as 'vets' in this thesis as among my participants, as both categories were taking decisions and action in regard to animal health in Ghana. In addition, in the veterinary services, people with both qualifications operated across the three levels of administration: district, regional, and national.[45] I nonetheless specify when the distinction between surgeons and technicians is relevant.

In Ghana, veterinary surgeons were credited with particular animal health expertise, primarily due to their higher qualification. The Veterinary Surgeons Law of 1992 established the legal status of veterinary surgeons through their membership in the veterinary council, and this was still applicable in 2015. Most of my participants who were surgeons had trained abroad for six years (in Eastern

[43] Source: VSD administration, April 2015.
[44] Veterinary surgeons are also called doctors and veterinary technicians are officially called para-professionals or paravets. I explain why I only use the term 'technician' in this thesis in Chapter Two.
[45] There were more technicians at the district level and more surgeons at the national level as higher qualified vets would occupy management positions. However, highly experienced technicians were also working at the national level while there were also surgeons working in district vet offices.

Europe for most, but also in Germany, the UK, Cuba, Nigeria and Kenya for some),[46] as there was no school of veterinary medicine teaching at the post-graduate level in Ghana until the last decade. Most vet surgeons I met had followed similar career paths and had moved from studying overseas to acting as district vet officers to working at the VSD HQ. Over the course of their careers, vet surgeons would often be posted to different districts or regions in the country and would then, after a period of time, end up working in Accra. Sometimes, they would even be asked to go back practising in district vet clinics, after having occupied high management/policy positions at the VSD, as the example of Dr H's career demonstrates:

> Interview notes: *When I met Dr H, we talked about his career path in the veterinary services of Ghana. He graduated in veterinary science (with a speciality in tropical medicine) in Germany in 1981 and started working as a district vet in Ghana the following year. At the time, vets were generally in charge of three or four districts at a time. After 12 years of work in districts, he undertook a course in Agricultural Resource Management and obtained a Diploma in Agricultural Administration at the Ghana Institute of Management and Public Administration. He went back to being a district vet officer for a while and then became a regional vet officer for 14 years. After that, he was appointed deputy director of the VSD and finally director (Chief Veterinary Officer). After two years at the head of the veterinary services, he turned 60, so had to retire from his position as VSD director. Since then, he has been the registrar of the veterinary council of Ghana and has worked on a contract-basis with the VSD in a small governmental district clinic. He explained that the main factor for this progression from a local field veterinarian to higher levels of bureaucracy was age and regular promotions - generally every three years –which were based on vet officers having satisfied their basic duties. Every director of the VSD had first been a district vet, a regional director and a deputy director (national level). The choice between two people of equal grade for one position depended on their date of birth, not merit, and therefore the most senior vets were prioritised.*#13

Dr H's career path represented a classic example of someone who had 'climbed the ladder' in the veterinary services from the local to the national level, and many of the senior vets I interviewed had undertaken, or were following, a similar path.

While vet surgeons represented the most knowledgeable workforce in the profession, in Ghana, veterinary technicians constituted the bulk of the workforce (88%) at the time of my fieldwork.[47] This

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[46] I learned this from interviews and other sources (an article online: http://ugfile.com/knust-trained-veterinary-doctors-are-first-to-be-locally-trained-and-inducted-in-ghana/, Oppong, 1999). Ghanians were offered scholarships to study abroad, especially in the 80s and early 90s due to cold war-related diplomatic interests (Oppong, 1999).

[47] There were 617 vet technicians and 87 vet surgeons officially registered in Ghana (VSD, 24.04.15). The number of vet surgeons is likely to have decreased since an article published on the 23.08.2017 states that there were 32 'practising' surgeons (Ghana News Agency: http://citifmonline.com/2017/08/23/ghana-has-only-32-practicing-veterinary-doctors-council/).

is typical in countries where the veterinary workforce remains mainly public (Smith, 2001). The role of vet technicians evolved from the duties of individuals called 'drug dispensers' in the British Empire's veterinary department in Ghana (Oppong, 1999). In 1922, the British administration established a Veterinary College in Tamale to train veterinary dispensers but, as a former student of the school wrote in a blog, the school closed in 1925 due to lack funding.[48] According to this same source, the USA provided funding to rebuild the college in the near-by town of Pong-Tamale, and it reopened in 1960. The school of Pong-Tamale was the only domestic teaching institute for animal health practitioners in Ghana until 2009 when two new national veterinary schools were established.

Due to the importance of vet technicians in the history of the profession as well as their relatively high numbers in Ghana, in 2015, my participants who were vet technicians felt a strong sense of belonging to the Ghanaian veterinary culture and traditions.

However, despite the fact that technicians were much more numerous than surgeons, they were yet not included in legal texts. For instance, The Veterinary Surgeons Law (1992) did not include reference to vet technicians and thus, they lacked official status.[49] This represented a problem for vet technicians who were demanding more recognition and representation at higher levels in 2015. Prior to new legislation in 2015, vet technicians also lacked representation in the Veterinary Council and the Ghanaian Veterinary Medical Association. There was, therefore, less prestige linked to being a vet technician and fewer opportunities for technicians to climb the professional ladder, and they aspired to more recognition and rights. As a senior vet technician put it: '*We* [vet technicians] *are the majority but we are considered as the minority because we are not officially represented'*.[#9] I discuss this further in Chapter Four.

The Ghanaian system of animal health management is illustrated in diagrams in figures below, which situate the official role played by different units of the VSD as well as their key partners prior to the 'recentralisation' of the VSD in January 2015.

Figure 2 and Figure 3 illustrate the hierarchical organisation of the VSD with functions pertaining to specific veterinary positions. In Figure 2, we see that resources flow not only in a top-down fashion from the international and national levels to the local level, but also from the local level up to the

[48] The blog of Richard, a veterinary technician, is available here: http://vetcogh.blogspot.co.uk/ (last visited on 04.12.2017).
[49] Numerous observations and informal discussions during fieldwork (05.08.2014, etc.)

national level through service charges which are collected by district vets from animal owners. Funding is also shared at the national level between ministries and the VSD, and at the local level between district vet offices and the local MoFA and district assemblies.

The diagram in Figure 3 presents the official system of general animal disease surveillance in which district vet officers receive information about suspect disease cases through notifications from animal owners or through farm/household visits. Following this, the regional vet office may need to carry out diagnostic tests at the regional lab and relay information coming up from district offices to the VSD HQ in Accra. The VSD HQ, and the epidemiology team, in particular, may also instigate further tests in the national level laboratories to diagnose a disease. The VSD HQ then report the disease to MoFA as well as to international organisations (OIE, Inter-African Bureau for Animal Resources of the African Union – AU-IBAR) through online platforms (World Animal Health Information Database – WAHIS[50], Animal Resources Information System[51]). In addition, an annual performance report for MoFA is shared within and outside the Ministry. From the district to Accra, every vet has a specific role to play in animal disease reporting and management.

[50] Available at: http://www.oie.int/wahis_2/public/wahid.php/Wahidhome/Home

[51] Available at: https://au-aris.org/

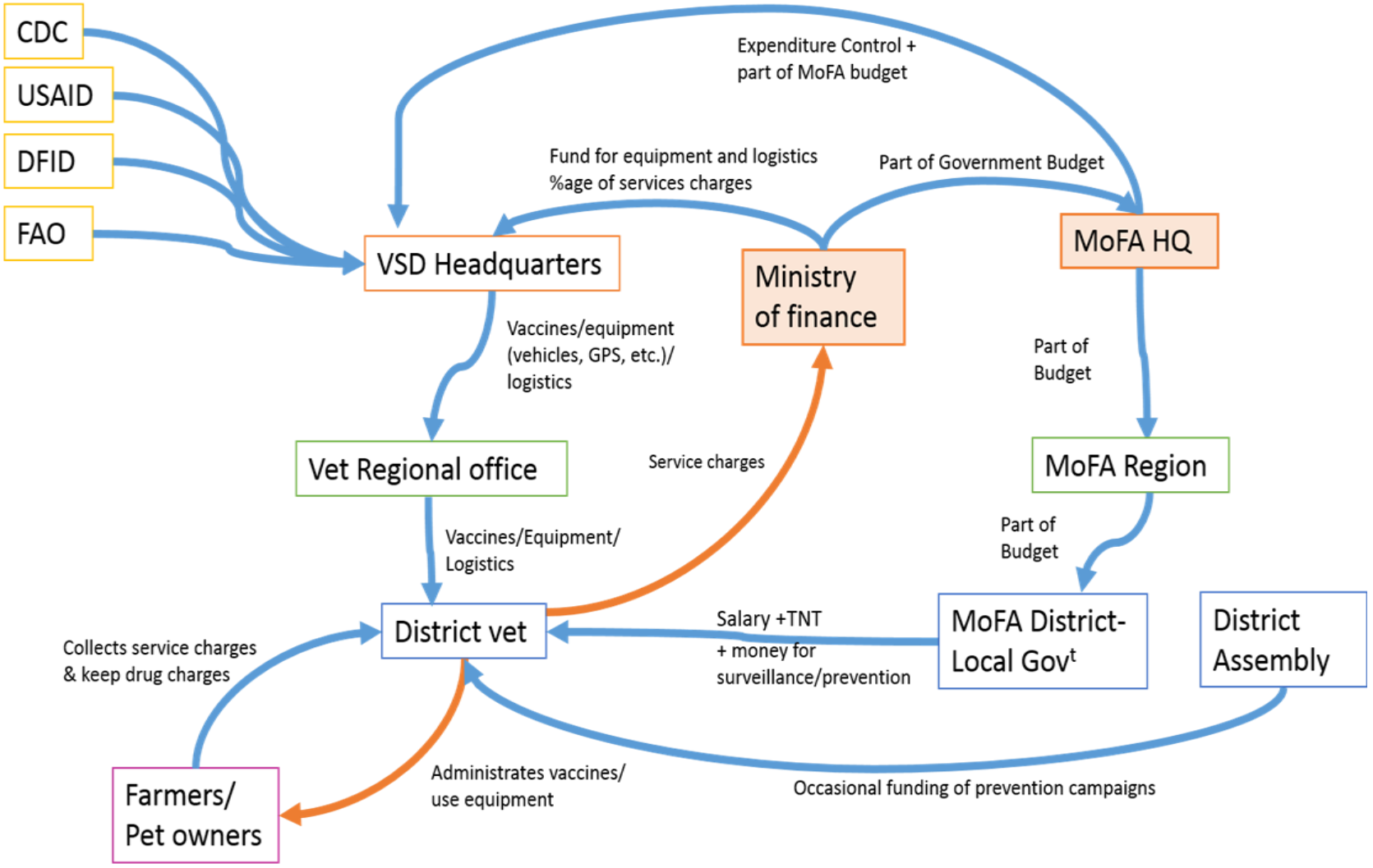

Figure 2. Government-related resource flows for animal disease Management.

(diagram designed by the researcher)

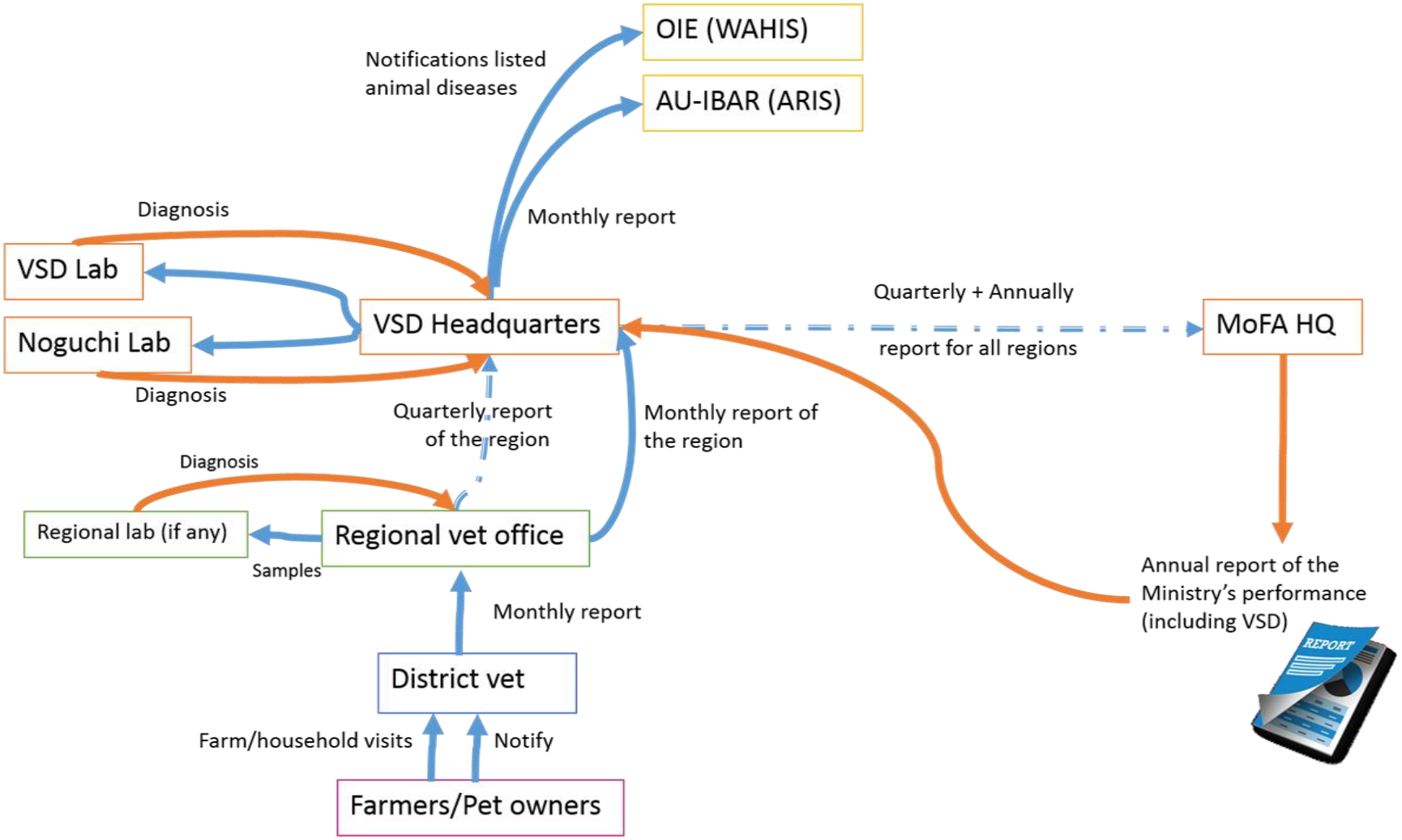

Figure 3. Official reporting system and general animal disease surveillance.

(diagram designed by the researcher)

The diagram in Figure 4 shows what should happen in the case of a serious outbreak requiring significant disease control interventions. Since information about disease cases must be communicated upwards quickly, district vets are encouraged to call regional or national vet officers on the phone as well as submit forms (VF1 is such a form, and can be seen in Appendix E) to report a disease event so that the necessary resources and/or scientific support can be dispatched to affected and at-risk regions.

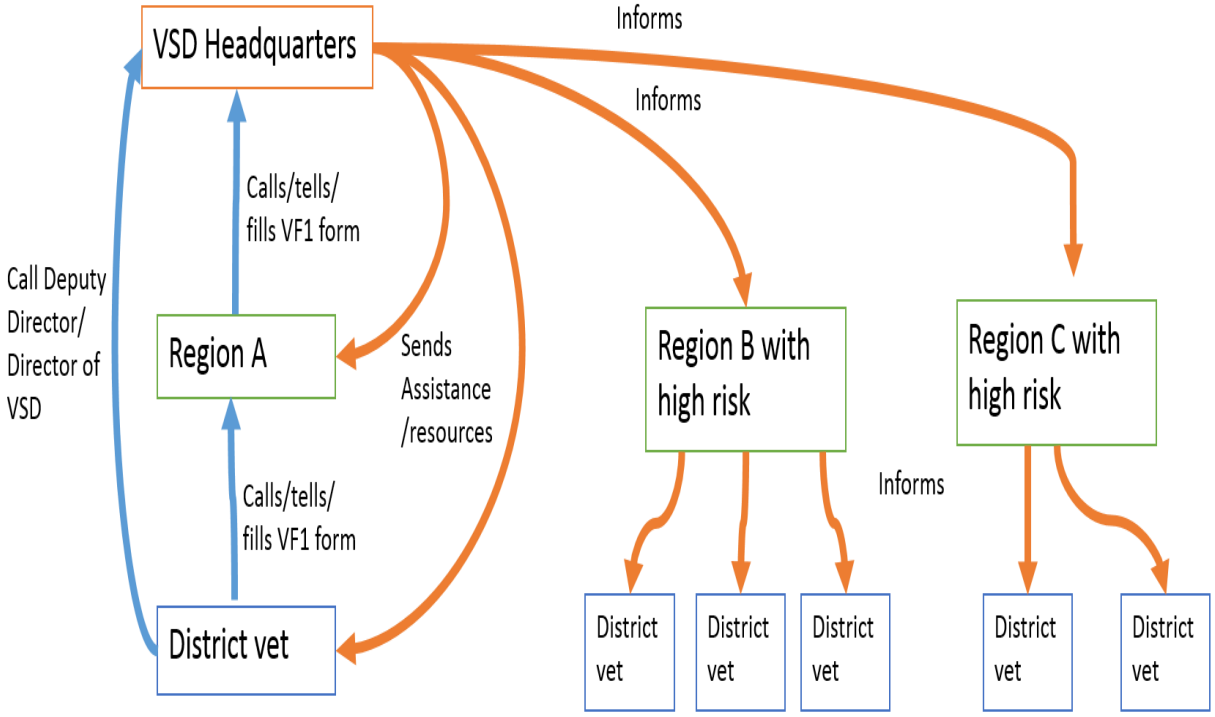

Figure 4. Diagram representing the official system to control disease outbreak in region A.

(diagram designed by the researcher)

These diagrams illustrate the complexity of flows of resources, decisions and actions linked to animal disease management in Ghana. Vets constitute the central actors but they also rely on and report to many other key actors within and outside of their home ministry.

To sum up, vets in Ghana hold various grades, positions, and qualifications. For vet surgeons, this often involves upgrading from the local to the national level after having worked in different parts of the country. Vet technicians do not have this career structure and tend to remain in local level positions. However, they all operate in a very hierarchical, well-structured but complex system and with clear roles for animal health management. Such a system should, in theory, allow for good disease surveillance and, in turn, disease control (Dufour et al., 2006). The next section examines how national policies envisage utilizing this veterinary system in order to manage animal diseases and especially zoonoses.

Vets and zoonoses in national policies (1995-2015)

Vets and Zoonoses in Agricultural Policies

Livestock health is critical for public health and can ensure human livelihoods, food security, food safety, and prevent livestock-borne zoonotic diseases in people. Because the VSD is situated within MoFA, the most important policy statements concerning animal health from 1995 to 2015 are almost exclusively embedded in livestock development plans and programmes.

As demonstrated above, the veterinary services, since they began, and even more so over the last twenty years, have played an essential role in improving livestock for agricultural development in Ghana. In the nineties, the policy rationale for developing the livestock sector was – in keeping with structural adjustment policy – that more people would want to eat meat as the average income was increasing and therefore the country needed to produce its own meat to save money on imports. Even though agricultural investments had been primarily focused on crops before the nineties (MoFA, 2004), the livestock sub-sector became increasingly important. In the late nineties, agriculture became a prime contributor to Ghana's economic growth and was responsible for around 40% of the gross domestic product (GDP) (World Bank),[52] and with this, a recognition of the need for '*coherent and implementable livestock policies*' emerged (MoFA, 2004:1).

[52] Rate obtained here:
https://data.worldbank.org/indicator/NV.AGR.TOTL.ZS?end=2003&locations=GH&start=1985

Promoting agriculture and especially livestock production to strengthen the economy was part of a plan to reach Ghana's '*vision 2020*'. To achieve this goal, MoFA launched the Accelerated Agricultural Growth and Development Strategy [53] in 1997. Pushed by the Millennium Development Goals (MDGs) set internationally in the early 2000s, Ghana set up the Ghana Poverty Reduction Strategy (GPRS) in 2003, which perpetuated structural adjustment policy prescriptions and created guidelines for all development agendas (Nur, 2015). Within this framework, MoFA facilitated the preparation of the Food and Agriculture Sector Development Policy (FASDEP) with technical and financial support from the Economic Community of West African States (ECOWAS) and the FAO.

In parallel, the VSD was involved, alongside the Animal Production Directorate, in a working group to review and synthesise policies and strategies in the livestock sub-sector. Amongst constraints concerning livestock improvement, animal health issues were recognized in a list of twelve major enzootic and epizootic diseases or categories of diseases, which contained two zoonoses: Brucellosis and Rabies (MoFA, 2004).[54]

In 2007, the FASDEP was revised into the FASDEP II. Aligned with the most recent strategies for poverty reduction, like GPRS II, and the Ghana Shared Growth and Development Agenda, the FASDEP II established the long-term policy objectives of the government in relation to developing the agriculture sector. These objectives were to be achieved through the Medium Term Agriculture Sector Investment Plan (METASIP) of 2009, which constituted the investment plan to implement the medium term (2011-2015) programmes of the FASDEP II.[55] Aligned with MDG 1, METASIP aimed to reach 6% annual GDP growth of the agricultural sector to reduce poverty by 2015 and used a government expenditure allocation of at least 10% of the national budget. For members of the Policy Monitoring and Evaluation unit of MoFA whom I interviewed, METASIP represented the policy of reference for veterinary services in Ghana.

METASIP mentions vets in relation to Programme 1 (*Food Security and Emergency Preparedness*) and 2 (*Increased Growth in Incomes*). These two programmes were significant as they constituted

[53] Source: MoFA (2004:3)

[54] The other major (non-zoonotic) diseases were: Rinderpest (eradicated since 1989); Contagious Bovine Pleuropneumonia; Trypanosomiasis; Peste de Petits Ruminants; Swine Fever; Streptothricosis/heartwater; Newcastle; Pullorum; Ecto-parasites; and Endo-parasites.

[55] The METASIP was based on two regional policy frameworks: the ECOWAS Agriculture Policy and the Comprehensive Africa Agriculture Development Programme from the New Partnership for Africa's Development of the African Union.

priorities for investment by representing 63% of the ongoing agriculture-related projects funded by development partners in Ghana (MoFA, 2010:20). Vets were mostly involved in Programme 1 wherein they were expected to participate in the following objectives: '*productivity improvement*; *support to improve nutrition*; *support for diversification of livelihood options of the poor with off-farm activities linked to agriculture*; *food storage and distribution*; *irrigation and water management*; *mechanisation services*; and *early warning system and emergency preparedness'* (MoFA, 2010:3-20).

Concretely, the way vets were to implement this policy was to achieve quantitative improvements in livestock production. For example, regarding '*productivity improvement,'* the first component of Programme 1*,* vets were required to increase poultry production by 20%, and production of small ruminants and pigs by 25% by 2015. The policy indicated that the way to do this was through the adoption of '*improved technologies'* and actions such as:

> *Undertake genetic characterisation and improvement of local livestock species; Introduce improved livestock breeds; Train farmers on livestock disease management; Train community livestock workers (health and production) to act as service agents; Conduct active diseases surveillance in both domestic and wild animals and birds; Produce or procure relevant vaccines for livestock; Organise nationwide campaign for prophylactic treatment of livestock diseases; Strengthen the capacity of VSD to carry out regulatory activities; Control the local movement of animals and local slaughter of livestock for food; Alleviate the suffering of animals through timely veterinary interventions; Strengthening institutional capacity for improved animal healthcare management and technical services delivery; Strengthen the diagnostic capacity of the regional veterinary laboratories; Equip and provide logistics for animal health clinics in all district capitals; Rehabilitate and equip all the quarantine stations; Collaborate with the neighbouring countries of Togo, Benin, Nigeria, Burkina-Faso and Ivory Coast on emerging and re-immerging diseases* (MoFA, 2010:28-29).

All these actions (except the first two) were relevant not only to animal production, but also to supporting zoonotic disease management for protecting public health, even if this may not have been the primary goal of MoFA, nor explicitly stated as such. Further, the programme of action of METASIP attempted to bring all MoFA stakeholders together through '*effective coordination and participation'* (MoFA, 2010:iv) and through attributing roles in implementing FASDEP II for improving agricultural growth, rural development and food security. This promotion of coordination can be seen as compatible with a OH approach.

Nevertheless, the ultimate goal of these policies remained economic growth and food security, with a focus on meat quantity. There were very few references in these policies around improving meat

quality or safety, something important from the standpoint of zoonosis management. This orientation was also clear in the last component of the programme, entitled '*Early warning system and emergency preparedness'.* This referred to veterinary services out of concern for the danger of livestock disease outbreaks to emergency food insecurity, that is to say, the risk of famine. Here, vets' role was directly compared to that of the Plant Protection and Regulatory Services Directorate, which aimed to protect crops against pests and weather hazards. Vets' participation was thus seen as being in the service of increasing meat production to ensure that people did not starve and was painted as complementary to the protection of cereal production.

With such orientations towards growth and food security, official agricultural policies were thus consistent with neoliberal reforms (discussed earlier), wherein livestock development was treated as a business model for economic growth. METASIP stated that: '*in the short to medium term, the policies and strategies should be consistent with* […] *the wider macro-policies, public sector decentralization, privatisation and liberalization of the economy, etc.*' (MoFA, 2004:4). In this framework, the METASIP displayed a clear orientation towards '*government's market-oriented policy stance*' with the private sector leading the way (MoFA, 2010:xiii) and did not envision nor promote veterinarians as providing public services for the public good. This was criticised after the OIE-led evaluation of the VSD in 2008:

> *As indicated in the National Priorities, the development of a viable livestock industry is a developing priority for the VS [veterinary services]. However, […] no national priorities have been identified for the livestock sector and thus no expenditure is budgeted. Transboundary animal diseases, as well as zoonoses, place health of especially the rural population at risk* (Diop et al., 2012:15).

Vets and Zoonoses in Human (Public) Health policies

As shown above, although the veterinary services came to be embedded in the agricultural sector, it had been initially associated with the health sector. And, in recent years, because of a growing concern around zoonoses, joint coordination between veterinary and public health policies has come to be seen as an important aspect of OH collaboration (Schelling et al., 2005). I, therefore, searched for evidence of animal health and the veterinary workforce as part of human public health policies in Ghana, which I present below.

Since Ghana had become a member of the AFRO group in 1998 (mentioned in Chapter One), the country adopted the Integrated Disease Surveillance and Response (IDSR) strategy. The WHO

developed the IDSR system as a framework for implementation of the International Health Regulations (2005)[56] to improve data collection and analysis for communicable diseases as well as to develop networks between disease investigation bodies (Nsubuga et al., 2010). The Ministry of Health adapted the WHO AFRO strategy to the Ghanaian context through a set of technical guidelines. According to a senior vet at the VSD HQ with strong connections in the Ghana Health Service (GHS), this adapted text produced in 2002 constituted the main policy guiding the work of the GHS but did not mean much for the VSD.[#16] This text was strongly oriented towards '*priority diseases*' – mainly communicable diseases – as these '*remain the most common causes of death, disability and illness*' (MoH, 2002:12).[57] By focusing on known and mostly endemic diseases, the guidelines excluded concern around yet-to-emerge zoonoses.

Animal diseases and therefore the role of veterinary knowledge for human health became more visible in later policies. In 2007, Ghana produced a new National Health Policy, the motto of which was '*Creating wealth through health*'. In this text, the veterinary services and its role against zoonoses were mentioned once with the objective to '*strengthen collaboration between health and veterinary services in surveillance, prevention and control of zoonotic disease*' (MoH, 2007:44). Such collaboration targeted zoonoses like rabies, avian influenza, trypanosomiasis and yellow fever. However, the text did not expand on the matter nor elaborate concrete actions to support this collaboration.

Similarly, in a revised IDSR strategy (from 2002) in 2010, the WHO AFRO raised the idea of integrating multiple surveillance systems, including the animal health system, '*so that forms, personnel and resources can be used efficiently and effectively*' (WHO and CDC, 2010:7). Although this new IDSR mentioned zoonoses and veterinary officers several times, it failed to provide concrete measures to shape necessary collaboration between multiple stakeholders on the ground. Based on this revised strategy, the IDSR technical guidelines for Ghana were also revised, with the concept of OH being used as a guiding perspective for desired integration (MoH, 2011). This new version contextualised Ghanaian public health issues within the broader global system and considered socio-ecological

[56] Available at: http://www.who.int/ihr/legal_issues/legislation/en/ (last visited on 01.03.2018).
[57] These priority diseases were: Cholera, Diarrhoea with blood (Shigella), Measles, Meningococcal meningitis, Viral haemorrhagic fevers, Yellow fever, Poliomyelitis (polio), Dracunculiasis, Leprosy, Neonatal tetanus, HIV/AIDS, Malaria, Tuberculosis, Buruli ulcer, Diarrhoea in children less than 5 years of age, Lymphatic filariasis, Viral hepatitis, Pneumonia in children less than 5 years of age, Onchocerciasis, STIs, Schistosomiasis, Trachoma, Yaws (MoH, 2002:13).

factors that influence disease and health (climate change, urbanisation, increasing access to information technologies). It also ascribed new importance to animal health surveillance.

After SARS emerged in 2003, establishing preparedness plans and investing in resilient health systems became a priority worldwide, including in Ghana.[58] This and emerging influenza pandemic viruses (H5N1 in 2005-2007, H1N1 in 2009, and more recently H7N9 in 2013-17) have created worldwide momentum for preparedness to emerging zoonoses (Dissanayake et al., 2012, Fineberg, 2014, Oshitani et al., 2008). In Ghana, zoonoses and the role of veterinarians became important in health policies through targeted surveillance for early detection as well as preparedness plans for two diseases of international concern: avian influenza starting in 2006 and Ebola Hemorrhagic fever from 2014.

Whilst there was no reported case of human AI in a West African country in the early 2000s, the threat of H5N1 at the end of 2005 led Ghana to set up the inter-agency Avian Influenza Working Group which undertook a risk assessment and drafted a preparedness plan. This plan aimed at preparing for a pandemic of influenza, with human-to-human transmission, by defining the actions and resources necessary to build the capacity to respond to the threat (AIWG, 2006). One of my participants, a vet who had been involved in the national coordination around this preparedness effort at the time said that '*this was the first time ever that vets and medics came together in joint action'*.[#13]

By 2006, given its potential to become the '*next human flu pandemic*', H5N1 was causing worldwide concern, and had been detected in Ghana's neighbouring countries (Ivory Coast, Burkina-Faso, Nigeria and Niger) (VSD, 2006:v). Ghanaians were worried about the virus[#13] so the VSD undertook targeted (active) surveillance of highly pathogenic forms of AI throughout the country, in addition to the reinforced on-going general (passive) surveillance of dead/morbid domestic birds. The virus was actively sought in poultry and wild birds as part of efforts to pro-actively prevent outbreaks.

Because of their role in targeted and general surveillance, vets were at the centre of collaboration. To take samples from animals in the field, they had to work closely with poultry farmers, poultry market leaders and people in households tested for the virus. They also had to regularly share their findings with other Ministries, Departments and Agencies, international organisations (USAID[59], WHO, FAO)

[58] Source: press article on GhanaWeb on 14th May 2003: https://www.ghanaweb.com/GhanaHomePage/NewsArchive/SARS-Ghana-s-Emergency-Preparedness-36357
[59] United States Agency for International Development

and the Noguchi Memorial Institute of Medical Research.[60] Vets were also given important resources (such as vehicles) and visibility in the media. No single sample tested by the VSD's targeted surveillance in 2006 turned up positive, which gave the VSD the confidence to reassure Ghanaian consumers through the media, that it was safe to consume chicken in the country (VSD, 2006).

A year later, in 2007, the virus emerged in three industrial farms in southern Ghana and caused three outbreaks,[61] but the disease was controlled quickly through culling and no human cases were recorded (Odoom et al., 2012). This level of preparedness and reactivity allowed vets to prevent spill-overs from poultry to people and several of my participants felt very proud of this accomplishment. Schiffer et al. (2009:iv) reported the pride of the authorities and partners for handling the crisis with '*an impressive ability to do the right thing at the right time'.*

The enhanced role and elevated status of vets remained high after the 2007 outbreaks. Vets had already recommended the establishment of regular targeted surveillance '*every six months'* and the intensification of general surveillance, especially through the involvement of as many locals as possible (VSD, 2006:15). Following the AI outbreaks, two simulation exercises brought vets into contact with a wide range of stakeholders including the Ghana Police Service, Customs Excise and Preventive Services, Ghana Prisons Services, National Disaster Management Organization (NADMO), and the Ministry of Health (MoH) (Odoom et al., 2012). From 2011 to 2015, in partnership with the Noguchi Medical Institute, the VSD carried out annual active surveillance for AI around military barracks across Ghana (Odoom et al., 2012). This was particularly interesting for researchers working on AI surveillance as all outbreaks in Ghanaian poultry had occurred close to military barracks.[62] #13,#41

Veterinary researchers were also involved in assessing the ongoing risk of the introduction of the virus into Ghana from neighbouring countries (Turkson, 2009). Although the risk was found negligible or

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[60] The Noguchi Institute was set up in 1979 as a '*semi-autonomous*' institute of the University of Ghana (Accra). Through leading biomedical research in the country, the Institute carries out research on national public health priorities and trains biomedical scientists. It encompasses nine research departments such as the virology department, which conducts research on and diagnosis of zoonotic viruses like avian influenza http://www.noguchimedres.org/

[61] The first avian influenza outbreak in Ghana occurred on April 14 2007 at Kakasunanka near Tema, where 12,811 birds died and 23,327 were culled. The second outbreak occurred in Sunyani on May 11, 2007 with 210 deaths and 2,671 birds culled with a possible contamination through feed movement from the first infected farm.#13 Then on June 13, 2007, another outbreak occurred in Aflao, near the border with Togo, where 350 birds died and 1,357 were culled (from Odoom et al., 2012).

[62] There is no clear explanation as to why this has happened.

very low, in 2015, the VSD remained concerned about approved entry points as well as illegal channels across borders with Togo, Burkina-Faso and Ivory Coast (I give an account of this in Chapter Five). These activities elevated the status of vets in Ghana, increased the material resources available to them and gave them new opportunities to work with other actors while undertaking active surveillance (I come back on this in Chapter Four).

As mentioned above, another important event in addressing zoonoses in national health policies came about with preparedness for Ebola haemorrhagic fever. When I started my fieldwork in mid-July 2014, Ebola outbreaks had emerged in three West African countries since March. Although Ghana was not affected, the epidemic garnered a lot of attention from the general public. As ECOWAS country coordinator during the 2014/15 epidemic, Ghana had access to information and expertise and was a major player in organising the fight against the disease in West-Africa. There was considerable potential for Ebola to spread to Ghana and the whole country was in a heightened state of awareness. This is illustrated by the vocabulary used in newspaper headlines which contained words like 'Fight', 'Scare' or 'Crisis' (see Figure 5 below).[63]

[63] Mahama (John Dramani) was the president of the Republic of Ghana at the time (2012-2017) hence numerous reports in the news about what declaration he had made regarding Ebola in Ghana and West-Africa.

Figure 5. Word cloud of Ghanaian newspaper headlines on Ebola.

Headlines were initially compiled by Ghanaweb.com and of these, I selected those which were published during my fieldwork (15 July 2014 to 06 February 2015, a total of 274 headlines).

Ghanaian vets were also very aware of the risk posed by Ebola emergence. It was all over television news, which was constantly broadcast in the reception area of the VSD HQ, and I often overheard discussions on Ebola in the building's large open corridors on my way to offices and to the lab. I will not forget an encounter from my first week in which a vet presented me with his elbow to shake, instead of his hand. When people asked him why he did that, he said '*Ebola!*' echoing information in the media which warned that handshaking was a possible transmission route.

In August 2014, the Ghanaian government came up with a preparedness and response plan for Ebola. The plan established the necessary resources (in terms of staff, transport and other logistics, and data) for handling disease detection and control and had an estimated cost of 25 million GHc (Republic of

Ghana, 2014). It also involved a 'multi-sectoral response' to limit the spread of the disease once emerged. This was done through the establishment of specific tasks: screening at entry points; isolation of cases; diagnostic and confirmation of cases; case management; contact tracing; burial and safe disposal of victims; psychological support for patients and relatives and social mobilization (Republic of Ghana, 2014:6-7). Vets were mainly involved in '*social mobilisation*' within the National Coordinating Committee, and was explained by one participant as '*making sure that the message given to the public is uniform and doesn't lead to reactions of panic*'.[#98] Vets were also part of the Technical Committee where they were charged with developing targeted surveillance of the disease in wild and domestic animal populations (monkeys and other primates, bats, antelopes, pigs etc.).[#95,#97]

To sum up, vets and concerns around animal health have found a specific place in national policies, cleaved between livestock production for food security and economic growth and, in recent years, preparedness against zoonotic disasters from viral diseases with international pandemic potential. This new role has done much to promote vets on Ghana's political stage, bringing them into close proximity with other significant health actors and providing them with additional financial resources. However, according to the participants of my study, an important priority was missing from national policy agendas. I develop this below.

The gap in policy and legislation

Despite the increasingly important role of vets in agricultural and human health policies as seen above, vets' motivations for animal health tend to be broader than those of either MoFA or the MoH. Vets, therefore, find it important to be able to *'assist in the formulation of sound animal health policies' and in the 'general formulation of animal health development policies'*.[64] This requires using '*data on animal health information for efficient management decisions*' (MoFA website) and for '*problem solving and decision or policy-making at livestock and poultry production levels*' (VSD, 2012:5-6).

[64] This is the first function of the VSD, as stated on MoFA website: http://mofa.gov.gh/ (last visited on 05.04.18).

However, apart from only a very few examples of the VSD's involvement in policy formulation, such as the acknowledgement by the GHS (MoFA website) that the VSD '*made some input into the Section 9 of the Public Health Bill, 2010',* I found little on vets' policy-making influence.

This is reflected by the fact that, within MoFA's policy system, vets were portrayed as implementers or facilitators of national policies and, as such, their advisory role in policy formulation was limited. In the MoFA report of 2004 for instance, the VSD was seen as an implementation body and vets' participation in national policy-making was limited to 'approving' and 'implementing' policies (MoFA, 2004). The participation of the VSD director in the working group which produced this report had limited scope to '*ensure ownership of emerging policies and strategies by* [the] *VSD and to facilitate full support and implementation*' (MoFA, 2004:119). The '*political direction*' of this text belonged to the highest level- represented by the Deputy Minister of Food and Agriculture in charge of livestock.

Some senior vets recognised vets' limited say in formulating animal health policies as they have felt less and less heard at the policy level over the last twenty years. [#38,#93] For example, although the initiative and participation of vets on teams like the inter-ministerial committee for Ebola were celebrated, this was insufficient for some of my participants. One senior vet who had participated in the some Ebola meetings stated '*health people play God*'.[#9] By this, he meant that the lone presence of one veterinarian on the inter-ministerial committee was insufficient to get a veterinary perspective across and this, in turn, meant that public health policymakers were taking a great risk in not giving due attention to potential disease emergence in animals. Another former director of the VSD was also worried that the little attention given to wild animals as sources of transmission of the Ebola virus meant that the GHS did not have to engage. Although he was pleased that one vet was on the committee, he felt that this vet had little power to influence decisions and that therefore the way the committee was organised had '*not been handled very well*'.[#22] For him, Ghana would only remain Ebola-free if authorities controlled borders efficiently and reinforced public education initiatives. This entailed leveraging the knowledge and participation of people such as vets to discourage citizens from eating bush meat and to prevent unsubstantiated panic in the Ghanaian population. According to the vets I talked to, this was not going to happen with only one vet in the committee.

Vet's difficulty in influencing national policy is reflected in the literature and has been observed in many countries. Vets' concerns are sometimes under-prioritised at higher levels of decision making and may conflict with wider political interests since vets' role in national policy is generally perceived

as technical (Hueston, 2003) and since there may not always be vets in high management governmental positions (Willeberg, 2012). International organisations involved in animal health, such as OIE, WHO or FAO, often help with identifying gaps in national policy. However, as Dissanayake et al. (2012) show, international organisations provide guidelines for preparing for zoonotic diseases, especially emerging infections, but have limited regulatory power outside food safety and trade concerns to influence official animal health systems in developing countries. They also argue that public policies should be comprehensive and take into account the complexity linked to emerging diseases and that policies *'should ideally be based on a systematic appraisal of the best evidence available in the context of local values and resources*' (Dissanayake et al., 2012:204).

In Ghana, international organisations have attempted to influence Ghana's animal health policy. For instance, working alongside MoFA, the Food and Agriculture Organisation of the United Nations (FAO) helped to review animal health and production laws, policies and strategies with the aim of establishing new legislation for the veterinary services as well as a new livestock policy (one senior vet was actively overviewing the process as a consultant). Many national-level vets were asked to provide input on the new texts during the time of my fieldwork. Alongside a legal consultant, this senior vet produced a draft bill on animal production and health, which set the VSD up as an independent centralised service (an 'authority'), like the GHS. I come back on this in the next section.

Another example of policy driven by international organisations was an evaluation of the Ghanaian veterinary services, carried out by the OIE in 2008. The report from this evaluation (mentioned earlier), was released publicly and it detailed the steps and resources necessary to strengthen the veterinary services and endow them with adequate agency *vis-à-vis* zoonotic diseases (Diop et al., 2011). However, the report did not seem to have led to any specific action or policy change and it held little significance for my participants. As a matter of fact, one told me that this report was *'sitting on a shelf'* at the VSD HQ and was not of any help as the VSD had not been – and was unlikely to be – allocated more resources from ministries.

So what changes, according to Ghanaian vets, were required in national policies? Chatterjee and colleagues have argued, using the example of India, that policies in low- and middle-income countries should incorporate the '*assessment and mitigation of downstream impacts*' from emerging zoonoses as this allows for going beyond the establishment of preparedness plans (2016:1). Only when this happens can integration of OH principles into national policies be claimed. What Ghanaian vets have called for is in line with such a view, and the essential aspects they have found missing in national

policies for animal health are twofold: 1) the detection of unknown emerging zoonoses and 2) the management and eradication of endemic zoonoses.

Detecting newly emerged zoonotic infections is crucial for vets as early identification of pathogens allows for timely action. But for my participants, it was clear that the Ghanaian government prioritised the prevention and control of diseases already present in the country. In some countries, like Sri Lanka, *there is 'no system for reporting unusual epidemiological events or diseases since all regulated efforts focused on the list of reportable diseases*' (Dissanayake et al., 2012:205) and this was also the case in Ghana.

In Ghana, the list of reportable diseases[65] (see Appendix F) only appeared in grey literature produced by a few vets at the national level and its use by the veterinary services was unclear. I came across the list when I was handed a booklet entitled: '*Animal Disease Surveillance Guide*' (VSD, 2012) in a regional vet office. This 32-page booklet was presented to me as the only VSD policy in Ghana, and I was assured that everyone – from the national to the district level – had a copy in their pocket or on their desk.#24 The text had been written by a veterinary surgeon while he was the head of the Epidemiology Unit of the VSD, using OIE guidelines adapted to important diseases in Ghana. Apart from the list of the 28 reportable diseases, the booklet also presented a set of actions to undertake in cases of outbreaks caused by these diseases. Although it seemed to be a significant piece of policy, some senior vets working at the VSD headquarters, as well as several local vets, were not aware of the document.#64,#96 This led me to believe that it was only an informal document, developed internally for the veterinary community and to help local vets, but never officially promoted by MoFA nor the VSD at the national level. Moreover, there was no official system which explained how the list was determined, nor whether it was reviewed or updated at the ministry level. Other participants said that this was '*VSD policy*' and not MoFA policy and therefore could not be enforced.#71

The WHO identified a list of eight tropical zoonotic diseases (anthrax, brucellosis, bovine tuberculosis (bTB), rabies, human African trypanosomiasis, cysticercosis, cystic Echinococcus, and leishmaniasis) which are qualified as 'neglected' and yet responsible for a large proportion of health problems in domestic animals and humans in poor countries (Okello et al., 2015) . The three last diseases on this list, cysticercosis, cystic Echinococcus, and leishmaniasis, were not monitored in Ghana at the time of my enquiry. Yet, vets in Ghana suspected these zoonoses, along with others, such as leptospirosis,

[65] Also called notifiable or schedules diseases.

toxoplasmosis, and Creutzfeldt-Jakob diseases to be prevalent. Similarly, some zoonoses displayed on the OIE list of important communicable diseases, like Q-fever, were not listed as 'reportable' in Ghana. All of these may indeed cause human illness in Ghana – as evidenced by their presence in other nearby countries and their tendency to be found in tropical areas – but were not being officially monitored in the country during my fieldwork.

According to one district vet, some medical staff suspected a case of Creutzfeldt-Jakob disease[66] in his district five years ago. However, the doctors assumed this could not have been the right diagnosis as there had been no detected cases of Bovine Spongiform Encephalopathy (BSE, aka Mad Cow disease) in cattle in the country. According to the vet, there could very well have been (and be) undetected cases of BSE in cattle because the veterinary services did not actively look for this disease, even though it featured on the VSD's list of notifiable diseases (see Appendix F). This vet added*, 'They* [medics] *think they are Gods'*, implying that prioritising their official categorisations and biomedical understandings of the situation meant that the prevalence of zoonotic disease in humans in Ghana may be dangerously underestimated, whereas vets were able to understand that unrecognised infections could be prevalent in animals.

These excerpt notes from an informal discussion with a district vet provide further explanation about the difficulty of identifying zoonotic diseases:

> The vet asserted that z*oonotic infections like toxoplasmosis or cysticercosis were 'not examined' in Ghana. He suspected that there were cases of these diseases in his district but that he did not know much about their epidemiological situation. He was interested in getting more resources to investigate these diseases. He explained that, contrary to viruses linked to high mortalities, these neglected diseases were caused by parasites and bacteria and were associated with low mortality.[67] But for him, neglected zoonoses impacted on livelihoods in different ways and over the long-term and therefore needed to be identified and combated.*#27

According to my participants, the management and eradication of endemic (established) zoonoses also constituted a big gap in national policy. As an illustration of this gap, the National Disaster Management Organisation (NADMO), a branch of the Ministry of the Interior of Ghana which was created in 1996, dedicated two separate units to potential emergencies linked to animal diseases

[66] Zoonosis transmitted to people through cattle affected by Bovine Spongiform Encephalopathy (BSE).
[67] The same argument can be found in the literature around neglected zoonoses which insists that these diseases are often ignored because of their chronic burden and low mortality despite the fact they are preventable or treatable (Hotez et al., 2009, Pullan and Brooker, 2008, WHO, 2010).

(including zoonoses). The first was the '*Epidemics'* unit which focused on diseases such as HIV-AIDS[68], SARS, influenza viruses, Ebola, cholera and meningitis. The second, called the '*Pests and Insects'* unit, which comprised endemic zoonoses like rabies and anthrax.

From 2005 to 2015, the VSD reported cases of anthrax, rabies, bTB, and trypanosomiasis in livestock[69] to the OIE [70] as having caused outbreaks every year in the country. Brucellosis was notified intermittently for six years across this ten-year period. Because of this consistency, these five zoonoses (anthrax, rabies, bTB, trypanosomiasis and brucellosis) could be classified as endemic in Ghana.
During interviews with senior vets working at the VSD headquarters, such as in the example below, it was often suggested that there remained insufficient policy support available for vets to identify, mitigate or eradicate endemic zoonoses.

> Interview with a senior vet from the VSD HQ: *I asked his opinion about the priority that should be given to emerging versus endemic zoonoses in the country. He thought that emerging diseases often got too much attention, like for example at the time of Ebola: 'all is about Ebola which has 90% fatality, whereas rabies has close to 100% fatality'. He insisted that statistics regarding rabies infections were not properly gathered in Ghana. Later in the conversation, he added: 'we should include rabies in the list of the "six killer diseases" (human diseases) to be able to leverage funds to vaccinate pets systematically and for free all over the country'.*[71] *The vet asserted that the majority of endemic zoonotic disease cases went undiagnosed. For example, in animal populations, 'TB and Brucellosis [were] screened occasionally in peri-urban areas but not at the national scale. On the medical side, leptospirosis, trypanosomiasis and TB presents symptoms of anaemia and* [were] *not automatically related to zoonoses because medics* [did] *not suspect them'*.#19

The importance of identifying and monitoring neglected zoonoses without dramatic symptoms or high fatality rates was constantly stressed by vets. During a discussion around programmes targeting neglected tropical diseases at a OH workshop I attended[72], one of the Ghanaian vet participants interjected: '*There's no problem for emerging diseases. When there is a problem, international donors act. But there is no one for endemic diseases, they [donors] think it's an animal problem*.' By 'animal

[68] Human immunodeficiency virus infection and acquired immune deficiency syndrome
[69] The case of Trypanosomiasis is peculiar. Some may think it is not a zoonosis per se as only one strain of the parasite is transmissible to humans from animals (T.Brucei brucei). Therefore, all cases of Trypanosomiasis in livestock are not necessarily zoonotic. However, considering the disease as zoonotic can be seen as necessary for controlling it as humans and animals share the same vector, the tsetse fly (Fevre et al., 2008).
[70] Source: WAHIS Interface for Ghana, available at: www.oie.int (last visited on 24/05/2017).
[71] National vaccination campaigns for livestock and pets used to be regular and free (Oppong, 1999:137-139). The fact that Pong-Tamale veterinary laboratory produced a large amount of vaccine (such as against anthrax) made this possible.
[72] #81, I elaborate on this workshop in more detail in Chapter Five.

problem', the vet meant that endemic diseases caused by regular contact with livestock or pets in poor areas did not constitute a public health priority for the government; this in contrast to emerging zoonoses of international concern like AI or Ebola (Waldman et al., 2016).

This lack of policy attention is also influenced by the question of data collection and the statistics produced. In the case of rabies, for example, one of my participants asserted that, even though rabies infected mainly children and can cause painful deaths, its prevalence was underestimated because it was mainly transmitted to people from pets and not wildlife, the latter generally causing more fear amongst the public.[#95] The same principle was true of the health department, as explained by a data analyst I met at the university hospital in Legon.[#91] He said that if a disease was not seen by decision makers as alarming, its prevalence would not be investigated by the GHS and there would be no or very limited data on it. He added that priority for data analysis at the time was being given to diseases affecting children under five: namely, malaria and cholera. Rabies, on the other hand, was not a research priority at the hospital, and data on dog bites were not recorded. Moreover, the data analyst complained about the absence of standard policies to monitor dog bite cases and detect human rabies victims.

Another explanation for the neglect of endemic zoonoses was the lack of the legislative empowerment of vets. Food safety and the example of bovine tuberculosis (bTB) illustrates this well. Although this has not been highlighted in agricultural programmes (see above), food safety has become increasingly important to veterinary activities in Ghana over the last two decades. Atiadeve et al. (2014) wrote about vets' role in meat inspection and condemnation as well as livestock disease prevention and control in Ghana:

> *In Ghana,* […] *MoFA, through its* […] *VSD, has a policy to subject all livestock slaughtered in government-certified abattoirs to necropsy before the meat is passed for human consumption. This is done in an effort to control the spread of BTB and other zoonoses from cattle and other livestock to humans. Unsuitable carcasses, particularly those with generalised infections are removed from the food chain and destroyed* (Atiadeve et al., 2014:199).

Research publications on the prevalence of bTB in Ghana show a high risk of infection among people, especially from the handling or consumption of beef (Asante-Poku et al., 2014, Lopes et al., 2016, Otupiri et al., 2000). This justifies the policy of meat inspection mentioned above. Food safety seemed to be a concern shared by MoFA, the MoH and the Ministry of Environment, as they regularly organised 'collaborative' trainings. For instance, one three-day workshop on '*safe meat for public*

consumption with special reference to bovine tuberculosis' gathered veterinary officers and environmental health officers in several regions of Ghana in 2011.[73]

Nevertheless, there is a lack of policy attention regarding bTB as there is no mention of it nor the possibility of infection stemming from animals in the National Tuberculosis Control Programme (NTP) Training Manual.[74] Lopes and colleagues explained this lack of policy attention around bTB as follows:

> *There is no officially written case definition for bTB.* […] *Additionally, since no daily records were kept of slaughter activities and findings, it was unclear how monthly estimates of suspected cases were arrived at.* […] *butchers and meat inspectors interviewed revealed that a significant number of carcasses were not subjected to post mortem inspection due to lack of cooperation on the part of some butchers.* […] *They estimated that of the number of carcasses that are subjected to post mortem inspection, an equal number slip through without inspection.* […] *Furthermore, not all the suspected cases are reported. All these grossly undermine the sensitivity of this method for the detection of bTB.* […] *Furthermore, the number of samples which were sent for laboratory confirmation was rather low. This was attributed to lack of transportation to convey samples to the laboratory* (Lopes et al., 2016:3-4).

The article also indicated that visual identification of macroscopic lesions on carcasses can lead to the removal of about 5% of carcasses potentially infected with sub-clinical TB[75] (Lopes et al., 2016). The authors added that further tests such as microscopy or bacterial culture do not necessarily take place or, when they do, do not always validate the presence of the bacteria in removed carcasses (ibid). This proves that in Ghana, inspection of meat followed by the condemnation of suspect meat is crucial for food safety. Yet, vets participating in my study struggled to find support in the veterinary legislation to impose inspections in slaughterhouses:

> *The VSD does not have the authority, as required by OIE standards, to manage meat inspection activities. The Disease of Animals Act of 1961 does not include public health authority for meat inspection. A draft meat inspection law has been in existence since 2004 but has not yet been enacted. Under the current system, the Ministry of Health (MoH) has the primary authority for this function.* […] *To achieve the stated strategy the following activities and tasks are necessary; MoFA to effect the speedy enactment of the drafted meat inspection legislation giving the VSD the authority to execute meat inspection functions.* (Diop et al., 2011:31)

Many legal texts, such as the 1961 Disease of Animals Act (83), were too antiquated and insufficient to meet the new needs of animal health and veterinary medicine. Yet, a later important legal text, the

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[73] Source: MoFA website: http://mofa.gov.gh/

[74] Interview with one of the trainers using the NTP Training Manual and personal examination of the document (GHS, 2012).

[75] TB that is non-detectable at inspection on live animals before slaughter (ante-mortem)

Public Health Act (851), voted on in 2012, gave veterinary officers legal authority to stop vehicles for medical examination, to carry out meat inspection, and to order post-mortem examinations (of persons being suspected of having died from a communicable disease), disinfection, destruction of potentially infected buildings and animals, among other actions (Government of Ghana, 2012). The act mandated that vets work in collaboration with medical officers (human health) and environmental health officers to carry out many of these activities.

The role of vets in food safety and in collaboration with other professionals on the ground has also been highlighted in other policy texts. Such role feature for example in the Manual for Integrated Foodborne Disease Surveillance from the WHO AFRO (WHO, 2012) and was also mentioned in a draft of the National Food Safety Policy (MoH, 2013), developed with the technical and financial assistance of the WHO and the FAO and which was officially 'adopted' in 2015 at a meeting chaired by the director of the VSD.[76] The draft of a Meat Inspection Bill (2004), mentioned in the quote above, seemed to still be under review at the time of my fieldwork.[77] Despite the existence of these legislative and policy texts however, vets found they were not implemented and did not provide the support they needed to act in the field where they contended with constraints including low numbers of veterinary staff, challenging relationships with public health officers, a lack of resources and challenges associated with lab work (I elaborate on these in Chapters Four, Five and Six).

The fact that legal texts were not enforced also had a negative impact on the ability vets had to carry out other important veterinary activities. For example, in a press article on a rabies outbreak in Brong Ahafo region in 2013, Dr Gbeddy, a senior vet, highlighted that '*stray dogs in the communities were dangerous and should be captured and killed under the assemblies' bye-laws,* […]*, people were dying* [of rabies] *because of non-enforcement of the bye-laws'*.[78] He added, however, that vets had little power to make community leaders enforce bye-laws.

Vets also felt disempowered and unable to act because of the lack of legislative support for quarantine controls. During an informal discussion, a district vet told me that quarantine stations in his region did '*not really work anymore'* and that the movement of animals coming from other countries, like

[76] The text is available at: http://www.acfs.go.th/FileSPS/Text%20SPS%20GHA%201.pdf while the WHO website relates the story of its adoption here: http://www.afro.who.int/news/ghana-adopts-food-safety-policy
[77] See www.mofa.gov.gh and informal discussion at a regional abattoir #57
[78] Article from the 12.06.2013, available at https://www.ghanabusinessnews.com/2013/06/12/rabies-outbreak-kills-two-in-brong-ahafo/ (last visited on 24.05.2017).

Burkina-Faso, were not being controlled.[#61] This vet felt he had no power to stop herd owners from moving from one place to another if they did not meet quarantine requirements. He said: *'If I call the police, I'm sure that they will come but the farmer will bribe them and they* [the police] *will let them go'.* On the same issue, at a meeting addressing the need for new legislation, a participant complained: *'The legislation has to be enforced. So, I took the 1961 act to the police and they said it wasn't enough for them to do something'*.[#4] The policy gap linked to endemic zoonoses is therefore also linked to a legal gap.

Moreover, even diseases which have garnered substantial policy attention in the past – such as AI- can eventually fall from agendas as they tend towards endemicity (Fasanmi et al., 2017, Leach and Dry, 2010). In 2006, AI was causing outbreaks in Ghana's neighbouring countries and represented such a serious international concern that research, surveillance and preparedness were quickly put in place in Ghana. The necessary resources to search for AI in poultry were quickly mobilised as '*the scare* [had] *raised its public health importance*' (VSD, 2006). However, after the outbreaks of 2007, AI (virus H5N1) had become enzootic in Africa (Fasanmi et al., 2017, OIE, 2017) and the Ghanaian veterinary services has notified new AI cases of highly pathogenic strains (like H9N2) in poultry to the OIE in 2015, 2016 and 2018.[79] AI may become a source of human infections that render the disease endemic in Ghana and, in turn, cease to be a priority seen as worthy of necessary resources.

At the time of my enquiry, vets regretted that the policy momentum given to AI did not persist after attention from the public and the media died down. Targeted surveillance was not continued as hoped. As one of my participants indicated: *'After being able to control H5N1, we should be able to carry out active surveillance twice a year, and because of H7N9 in China now, we should check all* [strains] *at once along with passive surveillance'.*[#19] Schiffer et al. (2009), as part of a project funded by the Department for International Development (UK), identified persistent obstacles that could undermine the early detection and control of future outbreaks in Ghana. These obstacles revolve around uncertainties about the compensation system for farmers who lose their poultry to disease or culling, the '*double edged role of the media, being both the motor of the bird flu scare (and resulting collapse of poultry market) and the distributor of valuable information'*, '*low coverage (1 per 5000 farms) of animal health technicians linking rural farms to the rest of the agricultural system',* and the lack of a traceability system to follow birds along the value chain (Schiffer et al., 2009:iv). Left

[79] OIE website, WAHIS interface: http://www.oie.int/ and PROMED website: https://www.promedmail.org/post/5705853

unaddressed, these obstacles will contribute to under-diagnosis and under-reporting of zoonotic diseases in Ghana in the future.

Moreover, in 2014 animal health management in Ghana remained fragmented for many of my participants. Dr Osei Tutu, a vet working at a regional lab, gave a presentation on OH and rabies at the 20TH Congress of the Ghana Veterinary Medical Association, GVMA#40 in which he stated that 's*trategies and mindsets in the control and prevention of rabies have always been tailored to a sectoral and uni-disciplinary approach*', implying that animal and human health approaches were siloed (GVMA, 2014:38).[80] On the same note, a senior public health lecturer, and fervent supporter of OH whom I interviewed, declared that there were '*two separate surveillance systems in Ghana: one human and one animal*'.

Two of my participants (in both human and animal medical sectors) reported that collaborative activities around the prevention and control of bovine Tuberculosis (bTB) had been very limited over the past few years with vets briefly taking part in bTB campaigns organised by the Ghana Health Service but rapidly '*opted out*' without a particular reason and were no longer involved in the most recent campaigns.#70 If human public health officials noticed an increase in collaboration between the human and animal health sectors since the emergence of AI in 2007, they qualified the process as 'slow' (MoH, 2016).

In reaction to this policy and legislative gap, and slow progress in collaborating with other sectors, in 2013, under the initiative 'VET-GOV' (Reinforcing Veterinary Governance in Africa) supervised by the AU-IBAR, vets began meeting with a variety of public and private actors concerned with livestock health to discuss, as put by the director of the veterinary services, '*issues that are pertinent to policies, legislations and regulations'* (MoFA/AU-IBAR, 2013:3). In parallel, when I was in Ghana, the deputy director of MoFA[81] was a veterinarian, and this represented a huge opportunity for vets to influence national policy. One senior vet from the VSD HQ affirmed that vets were *'lucky to have a vet as MoFA minister'* and that this was a chance for vets to see their interests promoted.#19 I discuss this further in Chapter Four.

[80] Presentation on *'One Health approach to the control et la prevention of rabies in human and animal: overcoming the barriers'*

[81] She was in charge of livestock, one of the two components of the ministry. Livestock and the other component, 'crops', represented animal production and plant production in agriculture respectively.

The VSD had understood that changing national policy on specific issues (like establishing free nation-wide vaccination, for example) firstly involved empowerment through legislative change. I attended a stakeholder consultation on the new livestock production and health policy.[#4] And although this meeting, in its organisation, involved the consideration of multiple stakeholders around the formulation of this policy, the authors of the draft (national vet surgeons and legal consultants) foresaw that potential conflicts of interest would disappear as soon as the legal status of the VSD would change. Indeed, much of the conversation was directed towards the point that the veterinary services were going to be more independent, as the VSD adopts the legal status of '*authority*' through a new legislation that included the recentralisation of regional and district vet units (see Appendix G). The VSD became an authority and independent from the local government at the local level at the start of 2015.

Conclusion

This chapter investigated the institutional context in which public vets in Ghana have found themselves over the past nine decades or so, in order to situate my enquiry in 2014 and subsequent research findings.

It argued that the veterinary services in Ghana were created and sustained for purposes and interests beyond veterinary concerns and that this determined the VSD's institutional position within MoFA and distanced from health-related frameworks. This, coupled with neoliberal reforms enacted over the last 30 years which aimed at decentralising and liberalising the veterinary services, led to an institutional context which has privileged economic growth and under-prioritised veterinary public health functions.

In 2014, the veterinary services were composed of few veterinary officers, mainly technicians, organised within a very hierarchical system across district, regional and national offices, and all playing a role in the management of animal diseases. The surveillance, prevention, and control of animal diseases, including zoonoses, by the VSD, involved clear pathways through these vet offices at different levels but also through various non-veterinary, government or non-government agencies, and international organisations, district assemblies and private labs.

Taking a closer look at national agricultural policies over the last twenty years, vets and animal health have been cast as playing a role mainly in the protection livestock for food security and in increasing production of animal products for economic growth. In parallel, in human public health policies, vets were given an unprecedented role in emergency preparedness around emerging zoonotic viruses with pandemic potential. Although this role was limited to times of crisis (avian influenza and Ebola scares) it provided vets with greater visibility and significant resources not available from MoFA.

In both the agricultural and human health sectors, vets and animal health have appeared important but have really only represented a means towards achieving wider sectoral interests. For vets, this situation represented a policy and legislative gap concerning their concrete roles for public health, and most notably around not-yet-emerged zoonotic pathogens and endemic zoonoses that may already affect animals and people in Ghana. As a result, in 2014, public vets in Ghana found themselves in an institutional context that did not support a routine, clear, mandated and funded role for them in zoonosis management. It thus became important for public vets to work closely with actors from both agriculture and human health sectors to tackle zoonotic diseases in a more effective manner, beyond the objectives of livestock production and the quelling of occasional pandemic threats, and to influence these sectors in ways which filled the perceived institutional gap.

The next chapter explores what public vets in Ghana can actually do, within such an institutional context, to participate in animal disease (including zoonosis) management through their local routine practices of veterinary medicine.

Chapter Three: Practitioners, Settings and Practices in Public Veterinary Medicine

Introduction

In Chapter Three, I demonstrated how Ghana's vets felt about their institutional and policy context, which they saw as having failed to enable the veterinary profession to play a significant role in zoonosis management in recent decades. How does this situation, stemming from the national level, translate into vets' daily practices and what discretionary power is left to them to participate in zoonosis management? To answer this question, it is crucial to understand field vets' day-to-day activities and main practices of disease management, which I address in this chapter.

Knowledge of practical settings is necessary for understanding medical and veterinary practices. What I refer to as 'settings' in this chapter are the grounded contexts where practice takes place. They are characterised by two essential components: 'actors' and 'material context'. Lounsbury (2008) and Everitt (2011) point to the importance of actors in our understandings of medical settings and ultimately the diversity of professional/organisational practices taking place in these settings. Actors are not limited to medical practitioners themselves, but also include their patients or, in the case of veterinary medicine wherein patients are non-humans, patients' owners. In this chapter, I offer an account of the actors populating the clinics studied, and how vets and clients interact.

I also depict practical settings through an emphasis on materiality, an approach taken by recent social science literature, including ethnographies. For instance, work place research, such as that done by Balogun et al. (2015), study the social environment of frontline workers and the physical features of a material context to show how low-level employees influence organisations. Orlikowski (2007) similarly argues that material context plays an important role in understanding the logics behind people's workplace practices. Material context, as defined by these authors, includes the physical environment, spatial arrangements, built spaces, objects, and artefacts (Balogun et al., 2015, Orlikowski, 2007). Studying material contexts has also been shown as important to understanding practical veterinary issues, such as in the work of Bardosh and colleagues, who examined biosocial

dynamics around a zoonotic parasite in Moroccan slaughterhouses where they found material realities to be *'intimately related to wider socio-political processes*' (Bardosh et al., 2016:S101).

However, the specificity of veterinary practices requires me to extend the definition of practical settings to include another component, namely animals. Hamilton argues that, animals, as non-human entities, are neither *purely* 'actors' nor purely 'material objects' when vets interact with them (Hamilton, 2013). In this regard, she shows that there may be differences in how vets consider the animals they deal with; livestock for instance, may be viewed under the frame of financial loss in cases of disease while pets may be viewed more in terms of their personalities as individual animals. Hamilton suggests that: '*animals (and their bodily products) inform the subtle ways that identity and organizational culture is moulded and experienced by human actors'* (Hamilton, 2013:269) and therefore play an important role in veterinary practices.

To examine the main veterinary practices involved in regional and district animal disease management in the selected region, I researched practical constraints which influence disease management (especially zoonosis management), and the coping strategies – such as discretion mechanisms – vets develop when facing such constraints. According to Lipsky (1980), the fewer resources available, the more discretion street-level-bureaucrats must employ for service delivery. As resources coming from the national-level government are difficult to access or secure for field vets (see Chapter Two and later in this chapter), it is reasonable to assume that they would develop alternative ways of filling these needs, outside of formal channels, in order to deliver veterinary services.

I have organised this chapter as follows: in section one, by presenting five different veterinary clinics in southern Ghana, I explore the diversity of vet practitioners, material contexts, and animals constituting the settings in which my field vet participants were embedded. Then, I identify five main practices underpinning the delivery of veterinary services and disease (including zoonoses) management in the selected area. These practices include discrete behaviours and derive from the interaction between local settings (presented in section one), individual district vets' decision-making, and the wider professional and institutional context explored in the previous chapter.

Five clinic settings

In this section, I present five different government veterinary clinical settings (clinics) in Southern Ghana. I consider government veterinary clinics as any unit of practice around animal health care –

including meat inspection – which involves at least one graduate of animal health (surgeon or technician) who is fully employed by the government of Ghana. The data presented below come from five different locations – a regional pet clinic, a regional abattoir, and three district clinics located in different districts.

Regional pet clinic #25,#36

Doctor D oversaw the government pet clinic in the region's major town, located in the building of the regional veterinary office. According to him, when the privatization policies set up by the World Bank in the late nineties were being implemented in Ghana (see Chapter Two), the government began closing government clinics situated near private clinics to encourage the latter to thrive. Dr D's clinic had been closed for this reason, but he told me that, following its closure, he had continued '*fighting for it*' to be re-opened and had been successful. '*I'm not going to be here and do nothing*', he said, and then added that the private vet across the street was not fulfilling the demand for veterinary services in the area. For him, the quality of services clients got from the government clinic was, without doubt, better than that offered by the private clinic across the street. Despite this, animal owners often were unaware of the existence of Dr D's clinic, but according to him, once they discovered it, they tended to switch their allegiances. One factor in this trend was, according to him, that the private veterinary team across the street was not as skilled as his own.

Dr D officially retired in June 2014, but prior to that, had reached the position of *veterinary deputy director,* a very high grade in the veterinary profession in Ghana (see Appendix D), and thus associated with a long and thriving career. In 2015 however, he was still working full-time at the regional clinic to '*help with pet surgeries and to teach students'* from one of the new veterinary schools. He was highly involved in the development and promotion of the recently-opened vet school (described in Chapter Two), as clearly indicated by the pile of mail with the school's stamps on his desk during my visits. Dr D maintained that he had not continued working for money, and indeed, insisted on emphasising to me that he did not have any contract with the vet school and did not receive a salary for his teaching. Instead, he was very proud to be needed by his field and saw his daily work as moral and obligatory devotion to his profession. He was however, paid for his work in the clinic, which is a high-profile clinic serving expatriates and wealthy pet owners looking for quality veterinary care. Its government funding was more secure than that of remote, rural clinics serving disenfranchised and politically-disempowered farmers (described below).

The clinic was very well equipped and modern in comparison to all the other government clinics I visited in Ghana and quite similar to the private clinics I saw. While proudly showing me various devices and installations dedicated to animal care in the clinic's various rooms, Dr D informed me that such a setting allowed the vet team to perform surgeries of all kinds, implying that such capacity was rare in the country. For example, there were metallic veterinary tables adapted for animal care: easy to clean, with a gutter to collect liquids (rinsing water, blood from surgeries or wounds, urine, diarrhoea, etc.) and with adjustable height.[82] In addition to these sophisticated pieces of furniture and devices, a back room served as a hospital with cages for animals needing constant monitoring to be kept overnight.

Dr D supervised four technicians and two or three veterinary students on clinical rotation who assisted him in performing treatments and surgeries. All wore white gowns when in and around the clinic. During times when there were no pets to care for, there was a relaxed atmosphere in which technicians had lively discussions with students. Once, with the exception of Dr D who was in his office dealing with paperwork, everyone sat outside – on the benches installed for pet owners – sharing stories of friendship and romance and joking around.

The next example explores a second type of regional-level veterinary office at the local abattoir, where vets operated in a totally different setting and delivered a different kind of clinical service.

Regional abattoir #51,#57

To access the abattoir, I had to pass through a meat market. It was very busy and there was blood everywhere. The smell was quite strong, and butchers were cutting meat – including some bush meat (bats or monkeys) – all around. When I arrived at the building, Dr M was standing in front of the abattoir, wearing a white gown, chatting with the abattoir manager and a couple of other people. He introduced me to the abattoir manager and said that I was lucky to meet him because he did not come every day. Before we went inside the premises, Dr M commented on a couple of bare-handed butchers who were transporting fresh meat to the market on trailers, with the meat placed directly on the wooden trailer beds. Similarly, there were many others, bare handed and without specialist equipment, waiting in front of the abattoir's entrance for their own chance to purchase and/or

[82] The adjustable height is useful in that it is possible to place a heavy animal on the table at a lower height and then to raise it for examination.

transport and sell meat. Dr M remarked that '*it should not be like this*' and showed me the refrigerated vans which were off to one side (and not directly facing the entrance), indicating that they were the right transport method.[83]

Inside the abattoir, we passed a few offices and a corridor and were soon in the main veterinary office. Dr M told me to wait and he went through another door which led to an outdoor courtyard, to gather all the members of his team to be introduced to me. By order of grade (from low to high), the veterinary team encompassed: two national-service[84] employees in charge of collecting payments from butchers/traders, eight vet technicians (seven vet technical officers and one animal health officer); and one vet surgeon (Dr M). In the past, there had been only one technical officer who was the oldest on the team and called 'chief' by the others as he had been working at the abattoir for 20 years. Dr M thought that the six full-time veterinary staff were still not enough as they struggled to '*inspect everything'*. For all the live animals (ante-mortem inspection) and their carcasses (post-mortem inspection) to be seen, one of the technicians claimed that they needed at least two more people.

As we walked around, Dr M explained that the abattoir was one of the largest in Ghana, with about 200-300 heads of cattle, 150 small ruminants, and 50 pigs slaughtered each day. In principle, the abattoir '*should receive all cattle to be slaughtered in the region'*, but Dr M was aware of illegal cattle slaughter practices happening outside official facilities such as this. With the exception of national service employees, all staff carried out ante-mortem and meat inspections, and upon finding something of interest, would inform the animal health officer or Dr M, who would subsequently take a decision about what to do[85] and record relevant information into a register. Staff duties also extended to meat inspections at other locations within the region: at two pig slaughter slabs, three small ruminant slaughter slabs, one bush meat market, and one trading post for hides used for 'wele', a local delicacy.[86]

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[83] I was not able to find out who owns these trucks, why they are not being used and whether they had to be rented or not. However, the literature (Adzitey et al., 2011) mentions butchers transporting meat on foot or using bicycles and push trucks in Ghana.

[84] The national service is a mandatory one-year period in which all Ghanaians of 18 years and over must take part in national development activities prior to pursuing employment in their elective careers.

[85] Actions possible if the veterinary team members saw lesions on a carcass were to either condemn the whole carcass; keep it frozen for a while and then allow consumption; condemn only the damaged part of the carcass; or freeze only the damaged part of the carcass. The decision depended on the type of lesion identified and whether it was likely to infect the whole carcass or not.

[86] 'Wele' refers to salted and dried cowhides which are consumed as meat-snacks.

While the abattoir was owned by government bodies and associations of butchers,[87] Dr M referred to it as a '*private company'*, insisting on the fact that the main goal for shareholders was the production of as much meat as possible, often to the detriment of public health. As we watched the people circulating around us, Dr M explained that the company running the abattoir had its own staff, easily recognizable by their dark blue overalls. Four of them were called 'killers', who Dr M explained were '*Muslims so that they can slaughter the Halal way, except for pigs*'. We proceeded further inside the facility where the slaughtering was taking place.

Inside, the smell was not as strong as in the market, but the atmosphere was oppressive and chaotic. The sound of machines and people shouting forced us to shout as well. Dr M warned me to be careful not get hit by carcasses held on the lines which circulated rapidly across the building. In this particular setting, the vets looked out of place, as they struggled to find the necessary time and space to examine carcasses in the middle of constantly moving meat, people and machines. Therefore, there was a strong sense that material items, including the circulating animal carcasses, and the places where they were slaughtered were very much the property of the abattoir company and its butchers, not that of the vets.

Outside the main building, where animals were received, we could see carcasses of pigs and small ruminants from a slaughter that had taken place earlier in the day. One of the meat inspectors was sitting at the payment desk, having a relaxed chat with the two money collectors. She was in charge of pig slaughtering and told us that there was no activity that day. Dr M also showed me where some of the cattle carcasses were burnt.[88] There was also a large area where animals were kept before slaughter. Dr M pointed out that some of the cows were standing on steep concrete, which he thought was not good for the animals' welfare. We witnessed three dozen cows being transferred from one big truck to another for transport to Accra. Dr M explained that the cow traders needed to stop at the abattoir to secure a necessary movement permit.[89] One of the transporters said the cows came from

[87] The abattoir shareholders are: the Social Security and National Insurance Trust (largest non-bank financial institution in Ghana), the Metropolitan Assembly, the Ministry of Finance and Economic Planning, and six or seven associations of butchers.

[88] This practice produces what Ghanaians call 'smokies', unskinned carcasses that are burnt with a blowtorch. This is considered a delicacy as the 'smoking' technique confers a particular taste to the meat.

[89] When livestock owners want to move herds from one region to another in Ghana, they need a certificate from a veterinarian to prove that their animals are healthy and do not present a high risk of transmitting disease to new areas. This however, happened quite rarely as farmers had to ask for it and vets did not feel able to enforce this regulation without the farmers' consent

Mali, and that they had a three-day truck journey ahead of them, but they would be released from time to time and given food. Dr M showed me that there were no dead cows in the first truck but together we found many sores on their legs and hips, which, according to Dr M, indicated poor transport conditions.

Beside regional veterinary offices, I visited district clinics, more numerous and spread over the region. The next example, and the first district clinic I present, follows the 'ideal' model of the Ghanaian veterinary district office with one vet surgeon leading a team of technicians and interns.

District clinic 1[90]

Dr B, a veterinary surgeon trained in animal medicine in Ukraine, led this clinic. He started his career as a vet in a district in Accra metropolitan where he served for a year before moving on to another district in the Volta region, and then was finally transferred to this region. He was the first vet in the district when he arrived ten years prior. During my visit in 2014, he was supervising a team of four people, including two female technicians and two young male interns.

The main activity of this clinic was drug administration (treatment) through injection following consultation with animal owners, and associated animal examinations. Additionally, the veterinary team also gave advice and sold drugs to farmers who came to the clinic without their livestock (see animal care product and medicines piled on one of the desks on Figure 6). According to the vets themselves, this clinic was seen as one of the 'best' in the region as indicated by the many animals brought to the clinic each day (see Appendix H for an example of the number of animal cases handled over the course of one month).

[90] Dates of my visits to District One (as well as subsequent Districts 2 and 3) are in Appendix A.

Figure 6. Photo of one desk in the technicians' office at District One clinic where most of the clients were received.

However, being there all day, I noticed that a lot of time passed wherein nothing apparently work-related happened. One of the interns estimated that he spent no more than 40% of normal clinic hours caring for animals.[#47] When interns were not performing or assisting in veterinary care, they frequently ran errands for the technicians and Dr B, buying them phone credit, food or other things at the nearby market. During quiet times with no clients, the interns played on their phones or read veterinary handbooks, the two technicians napped at their desks, Dr B attended to his personal affairs, and I read articles.

The clinic was also a place where transactions, completely unrelated to animals, took place. There were cardboard boxes filled with eggs and plantains on the floor of Dr B's office, and many visitors stopped by to try and sell things like lamps, watches, and Kente (Ghanaian fabric) to the vets. When vets were out of the office, they were either at home (Dr B for instance stays in Accra one day a week to take care of his poultry farm and be with his family), shopping at the local market, talking with people working nearby, sleeping, getting food, eating food, buying from visiting sellers, or organising other activities on the phone.

Each day, vets spent time interacting with people working in the other MoFA units in the building (see more about this in Chapter Five) or with visiting friends. After transactions with farmers or pet owners were over, and if the vets were not busy, they would often hang around with their clients, chatting about life in general. The staff would often come and go several times in a day and finish at around six in the evening.

Dr B and the technicians also spent significant amounts of time dealing with paperwork. The most common paperwork, done every time one of the vets delivered care to an animal, was related to the associated financial transaction, with the service being written on a register that was always close at hand. In addition, the surgeon and technicians provided receipts, vaccine certificates and moving permits to their clients.

The hierarchical position of each member of staff was clearly established and noticeably defined who did what, where and why. Dr B delivered care to animals, unless he was already busy with a client or out of the building. Dr B and the technicians performed surgeries (like wound care or sterilisation) and everyone (including interns) carried out basic animal care. At times, there were moments of tension in the office during which Dr B asserted his authority over the technicians, and the technicians asserted theirs over the interns. For example, once, a technician, an intern and I took a twenty-minute taxi ride to a private home to vaccinate two dogs against rabies and parvoviruses, and to administer routine deworming. As we neared the home, the technician realised that the intern had forgotten the vaccines, and subsequently become very angry at him for causing us to have to make a costly return to the clinic and start the journey over again.

Unlike in District One, in District Two, the vet clinic was only composed of vet technicians and I described my observations of this setting below.

District clinic 2

Afia was the district vet officer in District Two and the most senior member of staff, coordinating two other technicians. With her, I had a very different experience and saw another side of veterinary service in Ghana. She invited me to stay at her place for the few days I would spend at the clinic. She made sure I was alright and helped me make the most of my stay.

She came from the central region, had moved several times from one district office to another, and had never worked alongside a vet surgeon. She was happy about this independence as she could learn technical veterinary skills and be autonomous as a vet. At the time of my visit, at age 57, she was looking forward to retiring in a few years. Even though she spoke about her job as '[her] *life*', she regretted never getting married, as she felt this was expected of her as a woman. Marriage was '*not for* [her]' and she thought it was '*too late*'.

Being considered valuable as a vet surgeon was important for Afia, not only because she had years of experience and practice, but also because of her education and qualifications. When telling me about her studies, she explained how her education closely paralleled that of a vet doctor. She had studied animal health at the Pong-Tamale Veterinary College before the unification of MoFA (early nineties, described in Chapter Two) when crop studies were not yet included in the vet technicians' curriculum. At the time, according to her, vet technicians were trained thoroughly in disciplines similar to what one would find in contemporary veterinary schools, such as pharmacology and anatomy. After Pong Tamale Vet College, Afia did a two-year course at the University of Ghana in Accra to be an animal health officer. After that, and years of practice, she enrolled in a Bachelor of Science (BSc) degree in Agricultural Studies (which included general subjects like 'economics' and 'adult learning') at the University of Cape Coast.

Afia's clinic, in a town about an hour from the region's major urban centre, was a small dark room of around $15m^2$ (see Figure 7) where clinical activities took place. The office was located in a government building (where citizens came to pay their taxes). It was originally occupied by government environmental officers but they had relocated to the local hospital. In the past, as vets in District Two did not have an office, they would sometimes stand in the stairwell and wait for cases for hours. But eventually, thanks to one staff member's connection to the District Coordinating Director, whose cattle he had treated for a decade, the vets were offered this office.

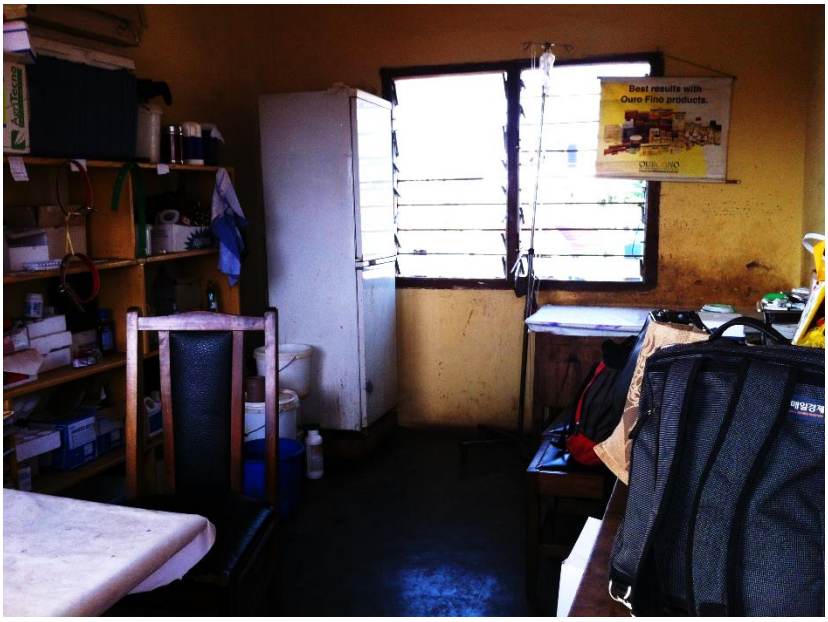

Figure 7. Photo of the clinic's only room and window in District Two

(I digitally increased the light in the photo so as to make it easier to identify objects).

In this clinic, the mornings being mainly dedicated to pet consultations and care, and the afternoons to farm/house visits, the vets were always busy. In contrast to District One's clinic, the vets here did not take much time to chat and hang out. Instead, each case was dealt with efficiently, and owners thanked as soon as possible to free space for the next client. There was often a queue of people with their pets waiting outside the clinic room, especially in the mornings.

Despite the clients' impatience, there was a pleasant and relaxed atmosphere which seemed to come from the three vets' relationships with one another. Indeed, they had remarkable tacit knowledge on when to occupy space and when to get out of each other's way, guessing from their colleagues' subtle cues when to help hold an animal, or when to come back with food for others who were too busy at lunchtime to buy their own. A typical day ended at around 4.30 pm, when Afia, often the last person in the clinic, locked up.

Perhaps even less 'ideal' to function as a veterinary clinic, the next example of the clinic in District Three is interesting as it was only composed of one veterinary technician.

District clinic 3

This district clinic was unique in the sense that, besides having only one vet working for the district, it was not attached to a specific physical space. Bernard, a kind middle-aged man, ran this one-person mobile clinic. After being trained in Pong-Tamale, like Afia, and having started his career in another part of the country, he arrived in 1990 in this village but was transferred to the neighbouring newly-formed district in 2005 because the VSD '*wanted someone there'*. He 'finally' came back to work where he was living in January 2015, while I was there. After offering to place my savings in his cows, he proudly explained that he had encouraged the local population to invest in livestock and set up veterinary activities whereas there was not much interest in these activities before he arrived.

What Bernard said and did was illustrative of the fact that he highly estimated the value of veterinary knowledge for his local community. He had been to Germany to visit a vet friend and wanted to apply methods and ways of practising he had seen here. For instance, he explained that he was trying different types of feeds on his poultry to see what gave the best chicken growth. He also encouraged some farmers to buy footbaths as to prevent diseases to enter their premises, which was unusual in Ghana.

Bernard circulated around two districts with his bag full of basic veterinary equipment over his shoulder (see Figure 8). He had received this bag from the Ghanaian Veterinary Technician Association at a national meeting a few years prior. He had lost his previous bag which contained a German stethoscope and 2000 GHc (around 350 pounds Sterling) due to its falling off his motorbike while going around a curve, and someone subsequently stealing it. Bernard had been really pained by this loss, as it represented almost everything he required for his clinical work and important paperwork.

Figure 8. Photo of the bag in which Bernard stowed most of the veterinary gear he used to deliver animal health services.

Bernard woke up at four or five a.m. every day, and spent an hour feeding and taking care of his poultry in a building as large as his house and which stood just a few meters from it. Contrary to the other vets presented earlier, he had no set schedule and no regular office hours, so work overlapped with his free time. He was respected by his clients and well-known as the community vet, and all around town, people referred to him as 'Doc'. Being located in a rural area with steep, low vegetation fields and a savannah-like landscape, cattle were the primary livestock Bernard treated.[91]

Because Bernard himself travelled to people rather than them visiting him, his advice seemed more valued by his clients than that of the vets in the two other district clinics. This also meant that administration of drugs was less systematic than in district One and Two where clients, having made the effort to go to the clinics themselves, fully expected such treatments. Bernard was wary of the risks of creating drug resistance in animals – and thus indirectly in humans – through the overuse and reliance on drugs like antibiotics.

To sum up, this heterogeneity of settings offers a glimpse of the diverse veterinary practices in Ghana. One notable consideration is that, even though official policies require vet surgeons to serve as the

[91] In this region, this landscape has emerged from forest vegetation which has been damaged by '*human activities and bushfires*'. It is favourable for breeding specific types of cattle (source: www.ghana.gov.gh)

heads of district clinics (this official system is described in Chapter Two), most senior district positions are held by technicians. In this region, for instance, there were only five surgeons amongst a total of 86 vets at the time of my field research.[92] Similar proportions have been observed in other regions of Ghana.[93] As a result of this dearth of officially qualified personnel, technicians, therefore, represent the vast majority of animal health practitioners and local managers on the ground and act as frontline decision makers.[94]

Although vets usually work in teams in clinics, we have also seen, such as in Bernard's case, that working alone is also a possibility. Bernard, the vet regional director confirmed, was not an exception in this region. Having a team requires a certain organisation and division of labour, which, as we have seen, is sometimes very clear and hierarchical. This was the case in the abattoir, in Dr D's regional clinic, and in district clinic One, but other times, relations between colleagues were more natural and synergistic, as was the case in district clinic Two.

Time management practices also varied across different clinic settings. Bernard stood out in that he did not have a precise client schedule (apart from his regular morning visits to the local slaughter slab). Rather, when a client called requesting a visit, he decided whether and when he had the time based on the urgency of the case, the location, and visits he had already planned. Other vets were expecting clients to come to their clinic and only planned ad hoc farm or household visits when their clients could not make the trip.

Finally, the levels of rapport between vets, their physical spaces, the materials available to them, and the animals they cared for also varied across clinic settings. In Dr D's regional pet clinic, there was no lack of space, the equipment was modern, and animals came in one by one. This brought a certain dignity and freedom to the vet practitioners. In the three district clinics however, space and material devices were often lacking or unusable. In District Clinic Two and in the abattoir, animal movement in restricted space created some stress for the vets who did not feel free or entitled to do their work the way they wanted to (this is described in more details later in this chapter).

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[92] Source: document from the regional office, on the 18.02.2015

[93] Source: document from the VSD administrator on the 24.04.15

[94] As there are 30 districts in this region, technical officers (low grade technicians), in addition to surgeons and animal health officers, also worked as 'district vets' – those most senior persons in charge of clinics, such as in the case for my participants in Districts Two and Three.

In the next section, I elaborate on observations I made across these clinical settings as well as from a few additional sources. I do this through five main practical situations, or 'practices,' in which vets have to take decisions which impact on disease management, namely: establishing and maintaining a clinic; getting around; giving to and taking from clients; protecting oneself; and dealing with informal practitioners.

Five main practices of veterinary medicine

Practice One: Establishing and maintaining a clinic – practice as operational space

> Female district veterinary officer at a regional veterinary meeting: *'Give me a clinic and you will see how much* [money] *I raise!'*#75

The availability of good clinic space was important for veterinary practice in Ghana. For Ghanaian district vets, a good clinic space meant that offices should be spacious, well-located, well-equipped, and secured for the medium to long-term future. These essential qualities were present in regional settings as well as the first district I visited, but field vets from Districts Two and Three had little such satisfaction from their own clinic spaces when I met them.

For example, the local MoFA had previously allocated no clinic space at all for Afia's team. At the time of my fieldwork however, her team had been given one room (see Figure 7) in a government building, but this space was not guaranteed very far into the future because of government plans:

> Field notes extract from visit to District Two: *'They* [the local Assembly] *announced that they would destroy the building for enlarging the road but now we don't know anymore. It's not coming' said Afia. I asked about the adjacent office that was empty. She replied that the people using the office left because of the announcement of destruction of the building. She had been asking the Assembly senior staff for permission to use it but had not received any answer. She added: 'we painted the walls last year. We used to keep the place clean but now we stopped because the building is probably going to be destroyed and built again'.*#60

The fact that Afia and her team did not know if their clinic space would remain available in the future affected their ability to invest in improving it. If allowed to use the adjacent room, they could separate the 'office space' (desks and chairs to receive clients and do paperwork), from the 'clinical care space'

where animals were examined and treated (animal table, all medical equipment and drugs). As it was, one technician complained to his regional vet officer that his office was *'not an office*', that it was *'too small'* for good veterinary practice.#75 Indeed, the four of us frequently struggled to move or sit without bumping into each other. Add the presence of pets and their owners expecting attention and one can imagine how chaotic it got, making it almost impossible to conduct several consultations simultaneously. Under such busy conditions, as was often the case between 9.30 and 11.30 am, consultations and treatments in Afia's clinic often took place in the corridor on the first floor of the Assembly building, with this sometimes blocked access to other government offices on the same floor. Extending the current clinic space into the vacant next room would also allow the team not only to stop disrupting other business taking place in the building, and to set up a hygienic corner in which to eat their lunch, away from where animals were examined and treated. Another benefit from more space would be to mitigate the risks (to both vets and clients) of being bitten or scratched by pets reacting to manipulation or treatments as there would be more space in which they could retreat to get away from upset animals.

Bernard also reported experiencing challenges with the lack of space for his practice. He had access to, but did not make use of his allocated office in the district MoFA building because the location did not make much sense for him (see next section on mobility), and he would greatly benefit from a better-located office. I came to understand this when we discussed the reposting he obtained at the end of my stay:

> *Bernard was really happy to be formally moved to the district in which he and his family lived. At the time I visited, he was planning on developing the available office in the district into an operational vet clinic. A few days before Bernard's official transfer, we went to see the office together as he was really looking forward to this new and more convenient base for his practice. It was about five minutes from his house by motorbike, located in the MoFA building, near the district police station. It was spacious and empty of any furniture or decoration and the walls were painted green. The fridge did not work and there was no table or other material for conducting consultations, which Bernard complained about. He shared his worry about having to find the necessary equipment to make the place operational and attractive, since neither the Assembly nor the local MoFA, according to him, could fund the renovations.#65*

The examples from Bernard and Afia demonstrate how crucial sufficient spaciousness, ideal location and temporal security of their clinic spaces are to vets' abilities to operate adequately, and yet, the actual material circumstances of many are far removed from having these essential characteristics. From Bernard's account especially, we see that despite the emergence of an available and promisingly

well-located space, he still struggled to outfit it with the necessary equipment (discussed further below).

Despite government veterinary practice being seriously resource-limited and lacking the sophisticated medical devices found in private clinics,[#26] basic medical care still requires a minimum of equipment which district vets cannot forgo. Thus, they have been forced to develop strategies to acquire and maintain this basic gear for veterinary care, and these strategies vary across districts. Vets often used private resources to compensate for the lack of support coming from the government. A few years ago, Afia had to invest her own money to purchase an infusion stand, which is indispensable when animals are too weak and need rehydration by fluid infusion. She made the point that pet owners often called her as a last resort, after waiting until their animals' health had deteriorated so critically, that she had to be able to carry out emergency care like infusions. Beside the infusion stand, another example of personal investment is the big block of ice that Afia brought from her own home fridge every morning. This was to preserve vaccines and other products that need to be maintained at cold temperatures in the clinic's fridge since there was no electricity in the building where Afia and her two colleagues worked. The company in charge of providing electricity had cut it off months ago because, according to Afia, '*the people in charge of the building have not paid their bills*'.[#54]

Vets cannot purchase everything they need using private funds and sometimes, the lack of diagnostic devices, such as blood analysis kits, X-rays and ultra-sound machines, prevents vets from delivering any treatment at all. When it is a matter of life and death for an animal, vets also consider their own reputations. Letting an animal die is not something owners forget and, sometimes, it is better for a vet not to act if he or she lacks the necessary equipment to save an animal's life as owners may accuse them of poor care (see below). Diagnostic equipment can provide evidence to support vets' decisions in these cases, but without this, it can be difficult to make a case that an animal is too weak to survive and justify non-treatment through intuition. As the salaries of vet surgeons are much higher than those of technicians[95], there are significant disparities in the investment capacity between clinics held by these different practitioners and thus higher chances of technicians experiencing such difficult choices.

Paperwork constitutes an important part of veterinary practice and is an activity greatly facilitated by the provision of basic technology equipment. In Ghana, vets must submit reports of their activities to

[95] I did not have access to the actual numbers.

regional office coordinators as well as visit banks in their respective nearest towns to deposit the money they had collected from service charges on a monthly basis. Writing a report may seem a trivial task in high-income settings, but it is more of a struggle for Ghanaian vets. One of Afia's vet colleagues had recently acquired a personal laptop shortly before my visit. Afia suggested that this was a hugely positive development for the clinic because this staff member could now type up these monthly reports on his computer instead of one of them having to go to an internet café. However, Afia regretted that they did not have a desktop computer and printer in the clinic, which would allow everyone to complete a portion of the report at work, and print it directly.#59 Dr B also had a laptop, but a broken printer meant he also needed to print elsewhere. Bernard mentioned that he used to ask an administrator at the MoFA office of his district to type and print reports for him, but this administrator had since left, and thus he also had to go to an internet café, which was very inconvenient for him. If there were good internet connections, vets could send their reports via email, perform corresponding online bank transfers, and spare themselves a monthly trip to town. Instead, these tasks are difficult for vets based in remote areas, who are far from town and information technology. Not only do these difficulties impact vets in their local contexts, but they also have consequences at higher levels. A senior officer working at the VSD HQ asserted that district vets' struggle to transmit data to the regional office on time and that this often delayed the whole chain of reporting to the HQ and to international organisations (like OIE and AU-IBAR).#85

If investing in expensive material was out of question for most district vets, recycling small artefacts was a common strategy. Syringes and needles are good examples of basic requirements for a clinic to operate as injections were one of the most frequent acts of care. The staff of District One and Two clinics recognised that they had no choice but to keep used syringes, clean them with water and re-use them. They had all learned that ideally, one would dispose of individual syringes after use, as there is a risk that germs could be transmitted via the same needle from animal to animal, but they could not afford the 30-40 GHc per week for the approximately 10 injections they delivered each day.[96] In contrast, at the regional government clinic in town, all sterile material was used only once and thrown away.

As we can see, setting up and maintaining a clinic as an operating space is a big part of practising as a vet in Ghana and is the foundation of vets' abilities to safeguard animal health. The lack of diagnostic

[96] Average estimated from my observations at clinics of District One, Two and Three.

equipment and of basic facilities especially impedes (zoonotic) disease identification and management. As discussed in the next section, vets also demonstrate discretionary practices when reaching out to, and making themselves available to, farmers and livestock.

Practice Two: Getting around – practice as mobility

If there is one thing I noticed as a veterinary student during my internships in French vet clinics, it was that we spent as much time driving in the car as doing actual medical work**.** Farm animals are often too big or difficult to contain and be taken to clinics and, in rural areas, people live far away from each other which means vets must be mobile. The same is true of Ghanaian district veterinary practice.

For Ghana's district vets, owning a car is unanimously perceived as the best way of getting around. Indeed, it is optimal for going anywhere at any time and for transporting the necessary medical material. Because vets can be called at late hours and to remote places, they argued that they should not have to depend on public transport which rarely operates at night and does not circulate everywhere. Further, they expressed concerns about safety. Afia was, for example, concerned about women vets needing to walk back to *tro-tro* [97] stations and wait there alone at night after house visits. She reported personally trying to avoid this kind of situation, as she was scared of getting lost or being assaulted by men.#59

Dr B had had a car in the past, but after he stopped receiving funding for fuel from MoFA, he left it in Accra with his wife. He had since been using *tro-tros* and, more rarely, taxis. For him, motorbikes were too dangerous. A technician at the District Two clinic also shared this reasoning as he had heard about a vet colleague who was killed on the road while doing his rounds on his motorbike.#60

However, vets' reliance on public transport options like *tro-tros* and taxis is also problematic because it limits their reactivity in cases of an outbreak. One of Afia's colleagues gave me an example of how the lack of an immediately available vehicle could impact early outbreak interventions:

> *'Because of the shortage of staff and no vehicle, we might* [only] *be able to go to the farm the next day. And, if we have to stamp out* [a disease]*, the farmer would sell the animals before we could do it'*.#56

[97] Mini vans owned by private businesses to transport people around Ghana

Not being able to get to farms before sick livestock were sold was worrisome for vets as this could lead to transmission of disease to other animals and to people – both on and off the farm.

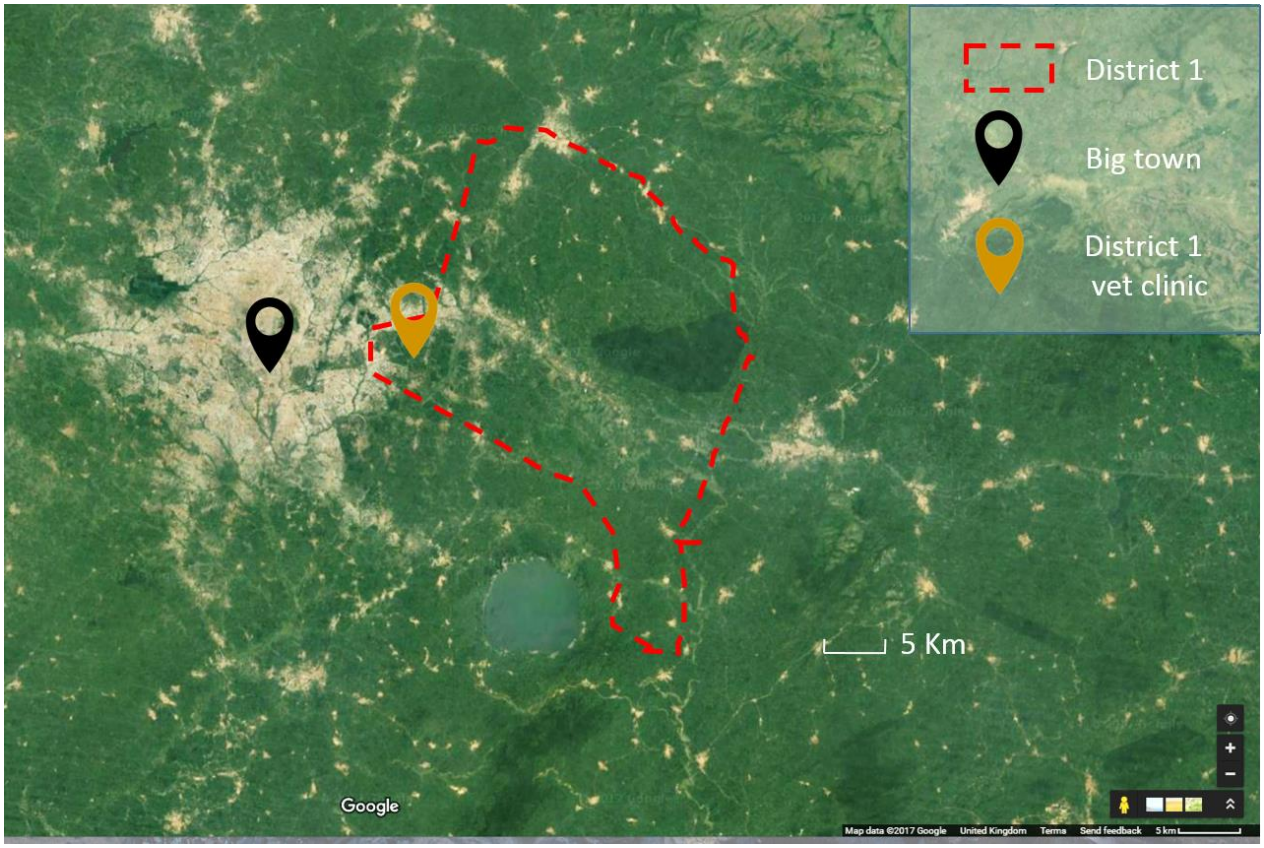


Figure 9. Map situating District One and its veterinary clinic.

(Made from: Google Maps)

The map in Figure 9 offers an idea of the distances that vets of the District One clinic must travel in order to cover all 246 square miles of their district. Note the limited presence of roads (beige lines) where cars can circulate relatively easily. This is why, in reality, the vets rarely travel further than a few miles away from their clinic.

In more rural places like District Three, veterinary practice seemed virtually impossible without owning a vehicle. *Tro-tros* were relatively frequent, but they did not usually serve remote areas where most livestock are located. This is in keeping with Turkson who had shown that the greatest constraint to veterinary work in Ghana was the lack of transport means (Turkson, 2003).

This remoteness is why Bernard had always kept a motorbike (see Figure 10). Indeed, his motorbike was the primary tool by which all of his work was possible as Bernard did not use the office made available in his allocated district – a decision he made for two primary reasons.

Figure 10. Bernard at home in his front yard, getting ready to go for a field visit on his motorbike.

Firstly, the office was too far from people's homes, so no one went there for consultations. A government-based webpage indicates that in this region, '*the nearest* [public] *facility is located more than 10 kilometres away*' from most households.[98] Secondly, Bernard had been living in a house in an isolated village with his family for a long time, and had developed a clientele around the village (far from his allocated office), where it was convenient for him to circulate. Although travelling by motorbike meant not being restricted by the availability of public transport, it did not imply that Bernard could go anywhere. He paid for fuel out of his salary, and when he was asked to go too far, he tried to arrange for the requesting farmers to pick him up half way.

[98] www.ghana.gov.gh

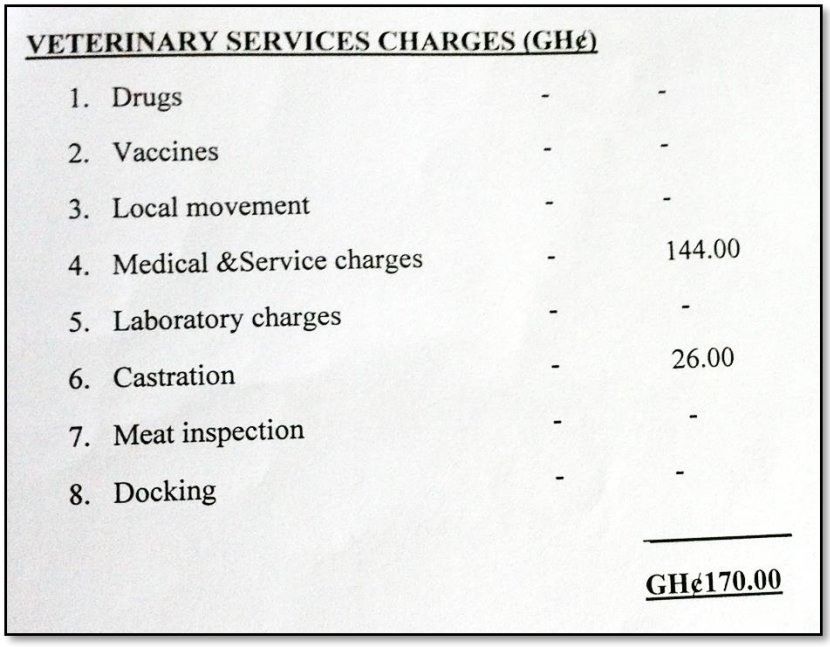
To sum up, all these district vets had to make choices about how much time they spent in urban offices and how much they engaged in rural operations. These choices were informed by a wide range of contextual (office space, location, type of animals in the area) and personal (salaries, gender) factors and by the vets' own sense of duty and prioritisation. Each choice included trade-offs which ultimately shaped and continue to shape the vets' potential to move across space and monitor livestock and other animals for zoonotic diseases. Individual discretion is also, as shown in the next section, an important part of vets' exchanges with clients.

Practice Three: Giving to and taking from clients – practice as transaction

Veterinary field practices are not simply the delivery of veterinary care *from* vets *to* animal owners, but are a context-dependent negotiated activity. Everitt argues that such negotiation in veterinary clinics involves many factors such as owners' financial resources and the perceived value of the animals (Everitt, 2011). What vets do, therefore, is not only preventing or treating infections per se, but navigating both their own interests and motivations and those of the owner.

However, in Ghana, what animal owners/handlers want is often not aligned with what public vets are inclined to do given their professional interests and responsibilities. Firstly, frontline vets feel they have a duty to generate money from their services to 'save' the veterinary department at the national level (this is explained later in Chapter Three). The monthly amounts of money raised by each vet is publicly shared and judged by colleagues at regional veterinary meetings, as I once witnessed during my fieldwork. The regional director also compiles this monthly reported data (see Figure 11) and measures veterinary activities (number of acts performed) and the revenue generated per district and in the region as a whole.[99] In his eyes, revenues generated by district vets served as indicators for estimating the quality of public veterinary service delivery in each district.

[99] Observations at a regional veterinary meeting (#48). The regional vet director said: '*Let me give you the money the VSD has lost for* [name of region] *from January to July 2014: We were supposed to receive 125 952* GHc *and only collected 2620* GHc*. In [name removed] region, they collected 30 000 instead of supposed 120 000, you see? There is a big difference! We need to bring more money to the basket*'!



VETERINARY SERVICES CHARGES (GH¢)

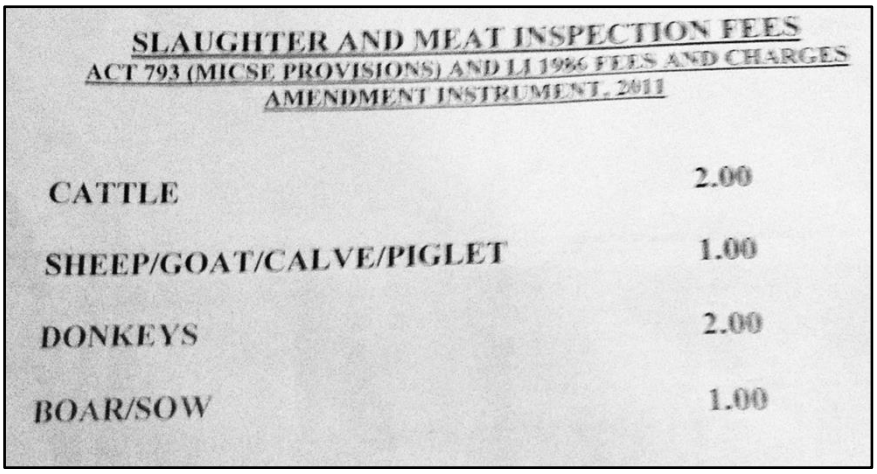
1.	Drugs	-	-
2.	Vaccines	-	-
3.	Local movement	-	-
4.	Medical &Service charges	-	144.00
5.	Laboratory charges	-	-
6.	Castration	-	26.00
7.	Meat inspection	-	-
8.	Docking	-	-

GH¢170.00

Figure 11. Example of veterinary revenue generated by one district over a month.

(from a district vet clinic monthly report for Juy 2014)

For public vets, collecting money from clients is difficult because the latter sometimes refuse to pay for services received. This usually happens for two reasons: either because clients do not value the service (they do not consider there is a problem to be solved) or because they cannot afford to pay for it. At slaughter sites for instance, butchers may refuse to pay for meat inspection (see Figure 12) because this service is imposed on them by government regulations and, according to vets, butchers do not value nor need inspection for selling their meat.



SLAUGHTER AND MEAT INSPECTION FEES
ACT 793 (MICSE PROVISIONS) AND LI 1986 FEES AND CHARGES AMENDMENT INSTRUMENT, 2011

CATTLE	2.00
SHEEP/GOAT/CALVE/PIGLET	1.00
DONKEYS	2.00
BOAR/SOW	1.00

Figure 12. Inspection fees from a letter from the VSD (Accra) sent to all district vet clinics as a reminder in September 2014.

As butchers can sell meat without certificates accounting for its safety, they are unlikely to seek them unless forced to do so. According to vets, this leads to some of the butchers trying to '*get away without paying*' for meat inspection:

> *Butchers who brought animals for slaughter had to pay about 35-40 GHc for the abattoir service, two GHc per animal for veterinary inspection and sometimes dues to butchers' associations. Dr M mentioned that the butchers sometimes refused to pay inspection fees. His strategy was to try and persuade the butchers to pay as much as possible. The revenue coming from the abattoir was essential for the survival of the VSD. Dr M told me in a proud tone 'last month the vets collected 7 000 GHc'. He said he believed that they could do 10 000 in the future.*[#51]

Some district vets, like Dr M in the example above, still provided certification for inspected animals for which fees had not been (fully) paid because of their concern for appropriate disease control procedures and an interest in retaining working relationships with the butchers. In doing this however, the vets often opted not to officially declare the animals slaughtered as this would free them from having to account for the associated lack of revenue. Already identified as a problem for vet practice in the early 2000s (Turkson, 2004), in 2014/15, vets also often struggled with clients who refuse to pay for drugs and treatments or diagnostic laboratory tests, as they either cannot afford the official prices, or think such services should be free. This happens because, according to some of my participants, some drugs, vaccines, lab tests or veterinary services were free of charge in the past. However, Ghanaian district vets must now buy drugs and vaccines – except in the case of provision through large-scale funded prevention campaigns – in pharmacies which sell human medicines, or in

shops selling agricultural products. Drugs in these establishments are not subsidized by the government. Sometimes, clients' refusal to pay in full forces vets to negotiate prices with them. I witnessed a few such negotiations with clients when I visited the district clinics.#47,#55 Vets made their final decisions around price on a case-by-case basis and took into account clients' views and financial situations. Thus, in the end, services delivered and prices paid differed across clients.

Although negotiating prices was an opportunity for vets to exert discretionary power after these transactions, vets would, most of the time, have lost some money for having sold a drug for less than its initial cost. Nonetheless, vets had yet another opportunity to exercise discretion after such transactions. They could decide not to declare to higher levels of the VSD that the treatment had taken place, nor to report the related service charge. In this way, the service charge paid by the client might compensate for money lost on the drug, as the vets would not send these funds to the bank.

District vets reacted differently to this opportunity. One of the vets described above did not leave much space for negotiation and occasionally paid (using his own money) in entirety for diagnostic tests[100] or drugs in cases of zoonoses, which he found too important to overlook.#33,#50 Another chose to declare all service charges, sending the right amount of money to the bank (Ministry of finance, see diagram in Figure 2) every month, no matter how much was collected from clients. This vet therefore, had to contribute personal monetary resources. Another however, declared what he received only when he had recouped his investment which, as a result, meant that only about half of his activities were declared. Such choices have the effect of under-representing the number of veterinary activities happening in the country, and thus the presence and prevalence of disease itself in national-level data.

After generating money, the second responsibility field vets have vis-à-vis their profession is to manage outbreaks. Reporting an event or the presence of activities commits district vets to being accountable for them. I witnessed however, that a certain number of actions that should have been reported were left undocumented precisely to avoid creating situations in which the vets would be held accountable for given problems, but for which they did not have the resources to deal with appropriately.

[100] The same day we had this discussion, he had paid for a TB diagnosis test in a herd we had visited since the farmer refused to pay.

District vets were often careful with the amount of responsibility they claimed when overseeing inspection at slaughter facilities in their districts. For example, Dr B indicated in a monthly report to the regional vet office that there was no slaughter slab in his district, even though there was at least one. This was because, as Dr B told me himself, he needed to first get the butchers on board for meat inspection. If he reported the slab's presence, it would mean that he would be accountable for visiting it and inspecting its animals and meat in accordance with the rules. But, in the absence of an established agreement with the butchers, he could not inspect the slab and thus would not report its presence so as to avoid being blamed for not doing his work or for any outbreak which might arise from there. Similarly, a vet in District Two refused to inspect a local slab in his own district because of the lack of hygiene there. He explained that it was highly likely that he would be blamed for meat-related illness in people consuming meat from the slab even if he did the inspections well.

Taking responsibility as a field vet also meant being accountable in the event of an outbreak in one's area. Once, when I saw Bernard take organ samples in small plastic bags from the local abattoir, I expected he wanted to run some tests on them. I was surprised when I learned the actual purpose: he explained that the samples were not for testing, but to prove that he had indeed inspected the cow. In the case of an outbreak, and of an associated possibility that he would be suspected of having missed an inspection, lesion-free organs would serve as proof that he did his work properly. If he did not take such samples, he could potentially face the blame of the entire community for failing to diagnose a case of zoonosis and in the process, lose his community's trust (I discuss the importance of trust from vets' clients in Chapter Five).

The lack of power vets had to enforce regulations (described in Chapter Two) meant that district vets had to persuade their clients to change their behaviour, which often was in vain:

> *In the cases where butchers refused to pay inspection fees, Dr M explained he was 'supposed to prosecute' them but that he would not do it because it would create a climate of conflict between them and would make the situation in the abattoir much worse. The lack of hygiene in the abattoir also broke regulatory requirements (organs were cut and washed on the floor and faeces from the intestines and the blood often came into contact with the meat), but there was 'no way' to sanction the company because, according to Dr M, the legal texts supporting related regulations had only been discussed but not voted in parliament and therefore no enforcement was possible. He also reported that he saw butchers unintentionally spit on the meat. Only butchers working for the abattoir company were supposed to enter the building but other butchers liked 'to follow their animals all along the chain and check that the workers are doing well' which created an atmosphere of tension and made the space difficult to access for vets. Dr M felt powerless about this. According to him, the butchers and the abattoir company did 'not care much about the*

quality' of the meat vis-a-vis good levels of animal welfare and hygiene 'but only the quantity' of meat that could be produced.#51

This section shows that veterinary practice in Ghana can entail financial exchange that involves negotiation with animal owners or handlers, in order to act upon animals. Vets struggle to meet their clients' needs because public health interests (as specified by their profession) and clients' interests are often in contradiction. Vets deal with this by using their discretionary power, by deciding when and how much to charge, when to report, when to bear the costs themselves, and when to forgo intervention. These decisions and the exercise of this discretionary power are ironic in that while they make it possible for vets to continue to work in these local settings, they sometimes simultaneously undermine vets' ability to manage and control zoonoses. The next section explores how, in such contexts, vets look to minimise their own health risks.

Practice Four: Protecting oneself – practice as an occupational hazard

All my participants expressed concerns about the possibility of infection through their contact with animals. The first example of a zoonosis representing a threat to vets' own health is rabies. One of the first things that marked my introduction to vet practice during my training was a series of three rabies vaccination shots. As veterinary students, we were guaranteed to get scratched by cats, and faced the possibility of being bitten by dogs and other creatures, probably a dozen times, even after mastering the art of contending them. Yet, rabies was not prevalent in France, and only a couple of cases of imported rabid pets had been reported from 2013 to 2018, but no human case.[101]

In Ghana, however, rabies was endemic (see Chapter Two), and cases steadily recurred across the country. During the two-year period 2014/15, there were 46 human rabies cases and 36 reported deaths.[102] Despite the presence of rabies, vets were not routinely vaccinated nor reimbursed, should they opt to get vaccinations. Conversations with Afia revealed how she saw zoonoses, as occupational hazards (Dutkiewicz et al., 2011), would affect her and her practice. She was afraid of being infected with a zoonotic disease and she was ill-prepared for this aspect of her job, even in her late-career stage. Once, she had been bitten by a dog after she administrated a deworming pill. As she was advising his owner, the dog, still on the treatment table, had easy access to her arm.#55 Afia told me

[101] Source: OIE website, WAHIS interface
[102] Source: OIE website, WAHIS interface

that vets had complained about the absence of systematic and free vaccination for them from the government years ago and had not been heard. She was also worried about mange mites in cattle and a syndrome[103] she regularly recognised in dogs, as illustrated in these two accounts:

> *One morning as we were in the office, Afia asked me if mange mites were zoonotic agents, that is to say, if humans could get infected like animals do. She was asking because she had heard from a colleague in another district that mange infections had been detected on livestock and on the farmers who owned the livestock. I started to Google an answer on my phone but did not find a clear explanation and felt unhelpful. What I found was that mange was usually specific to animals but that accidental infections could occur in humans in close contact. These accidental infections seemed only to cause damaged and itching skin. But I knew that diseases evolved, and when one day they are mild, the next their epidemiology (either their distribution in species or geographically) or pathogenicity (the degree to which they affect the body and create symptoms) could change to cause much greater damage, and in this way, they can suddenly become significant problems. I wondered if mange – which had never really been a problem, creating only mild skin irritations in farmers in the past – could now be emerging as a bigger issue in Ghana and also perhaps in other parts of the world. The answer Google provided was definitely not satisfactory.*
>
> *We were talking about bad experiences that Afia had had as a female vet and I could see she had tears in her eyes when she told me the following story. It was a Sunday, and she had been called by a client and had to leave a funeral ceremony very suddenly. The client was a man who owned the shop just below her clinic. She felt compelled to go, even though she had not eaten the whole day and was really tired. She told me how she infused the 'poor dog' and had to stay alone with it for an hour and a half and hold its paw in which the infusion was posed.[104] To maintain the infusion, Afia was sitting on the floor, but the dog's blood was all over her arm as the state of the dog's veins had led to a leak at the connection with the catheter. 'What if it was a zoonosis?' she asked me. I asked if she was wearing gloves, she replied no. She explained that she had to go back the next morning to do the same again, and all that 'without even asking the owner for money'. After the dog's death, the owner blamed her for not saving his dog and said she was 'useless', which upset her. She expressed frustration at the fact that animal owners often think she is incompetent even while she does 'everything* [she] *can' with the limited resources she has at her disposal. This man never asked for her services again – not even when he got a new puppy – and he stopped greeting her when she passed his shop every day to go to her clinic. But another perhaps bigger frustration for her was that such cases seemed to be occurring in waves in her district, making her suspect a common infectious source. However, dog owners 'never want to pay for a necropsy' at the regional veterinary lab, so the cases cannot be investigated and the pathogen cannot be identified. She worries that it may be a form of hepatitis that can be transmitted to humans, which would put her and the people in her district at serious risk.*#60

[103] A syndrome is a group of symptoms without a named disease.

[104] In the absence of a very steady infusion set, dogs, unlike people, move unexpectedly and this can dislodge the infusion. In cases of emergency (I remember doing it myself at vet school), vets often have to hold the infusion by the dog to make sure it keeps steady.

These two accounts demonstrate the absence of an official system for vets to source information about occupational hazards, leaving them wary of, and yet unable to protect themselves against emerging zoonotic infections.

Afia was not alone in recognising zoonoses as hazards in veterinary practice. A vet from Northern Ghana reported similar sentiments in an interview with a journalist:

> *Unlike most other public workers whose work limits them to files and talk and hence no dangers, in my work I use dangerous drugs. For example, most of the vaccines we use for treating rabies and anthrax are live. They can be dangerous to the user, especially when one has a cut. Unfortunately, the service lacks adequate equipment such as protective clothing, Wellington boots, laboratory coats and gloves which we need so much for protection.*[105]

Vulnerability to zoonoses (Khattak et al., 2016, LeJeune and Kersting, 2010, Otupiri et al., 2000) in veterinary practice in Ghana may vary across practitioners. Indeed, some veterinary technicians see themselves as being at just as much or even greater risk than vet surgeons, given their presence at the frontline and the large amount of their time spent in close contact with animals and associated biological hazards. These technicians also feel that they are not sufficiently financially compensated for these risks. Charlton Asher, a Ghanaian vet technician interviewed by a journalist for an article in the newspaper *The Finder* talked about this injustice:

> *We support Veterinary Doctors on the field but since 2010, we have been pushing to get our market premium but to no avail. When you go to the abattoir, we Veterinary Technicians are the front liners, we also quarantine animals before they come or leave the country, Mr Asher noted. He said their job is very risky because they are exposed to rabies, anthrax among other diseases in the course of discharging their duties* (PeaceFM online, 28 October 2015).[106]

This discussion shows how district vets in Ghana are concerned with the health risks and occupational hazards associated with their work. However, they usually have neither the knowledge nor the resources required to mitigate their concerns. This remains a source of frustration and worry, especially when treating unusual cases. In the next and final section of this chapter, I examine the competition between vets and informal practitioners in Ghana.

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[105] http://web.cgu.edu/faculty/wickera/veterin.htm

[106] Article available here: http://www.peacefmonline.com/pages/local/social/201510/258837.php

Practice Five: Dealing with informal practitioners – practice as competition

In addition to the heterogeneity of formal practitioners in district and regional veterinary clinics (discussed above), 'informal veterinary practitioners' also add diversity to the spectrum of veterinary practices in Ghana. Informal practitioners are people who deliver veterinary services outside of official government approval (position, area of affectation, or qualification). In this section, I demonstrate how two main types[107] of informal practitioners compete with local field vets who, while officially in charge, are challenged in their practice of veterinary medicine by the former.

The first type of informal practitioner are livestock farmers or farm personnel. Farmers occasionally gain a minimum level of veterinary knowledge through vets or NGO programmes such as on what products to buy and how to administer them. These may however, not always be medical products, and they may not always enhance their animals' wellbeing. Once, in District Two, I walked through an industrial poultry farm with Afia where we witnessed the hatchery keeper vaccinating hundreds of chicks against Marek disease. Afia asserted that only veterinary officers were legally authorised to vaccinate chicks. Afia firmly disagreed with this but felt that she had no authority to stop it and wanted to continue working with the farmer (that day, she vaccinated his dogs).

On a visit to a farm with Dr B, we saw pigs that seemed to have black skin. Dr B informed me that these pigs were not naturally black but had in fact been '*bathed in dirty engine oil*'. The farmers did this to rid the pigs of mange mites, he explained. Sometimes, he continued, pig farmers would mix an acaricide (medicine used against mange) with the oil before applying it on the pigs to enhance the medicine's action. Dr B considered this practice to be painful for the pigs, as the oil penetrated their skin. I asked what an alternative might be, and Dr B replied that he would inject them with Ivermectine which is a famous anti-ectoparasite drug. I asked if Ivermectine was perhaps too expensive. '*No',* he said*, 'they* [farmers] *just don't know and they want to manage things themselves'*. On another occasion, I accompanied Dr B to a cattle farm where he treated some cows with antibiotics that the farmer had kept in a chest full of drugs (picture in Figure 13).

[107] I identified a third type of informal practitioner - a senior vet who practised veterinary medicine outside of his management duties. However, I treat this case of informal practice in Chapter Five, as it is less problematic for district vets on a day-to-day practical level than the two cases described in this chapter, and is more relevant to the sharing of information in veterinary networks.

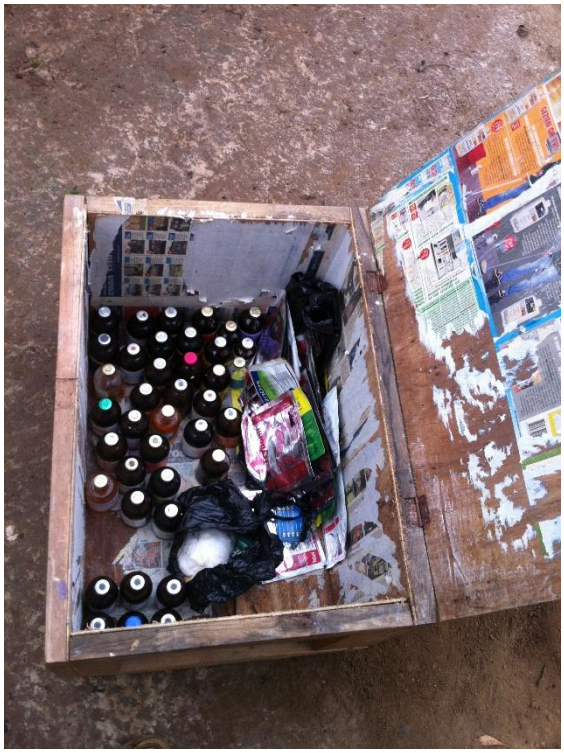

Figure 13. A farmer's chest, full of medicine bottles, some of which were used by Dr B to treat the farmer's cows.

The second type of informal practitioner are lay people who have received minimal levels of veterinary training. In the same way that farmers attempted to apply what vets taught them, vets knew that Community Animal Health Workers (CAHWs) and Agricultural Extension Agents (AEAs) often continued delivering a wide range of animal health services after training programmes (which were generally focused on preventing a specific disease through, for instance, targeted vaccination) were over and supervision by vets in rural and semi-rural areas ceased.

In rural Ghana, the FAO has carried out many projects aiming to boost animal health services in poor areas by training community volunteers (CAHWs) in primary care for livestock and by distributing basic drugs, and vaccines for specific campaigns. The rationale behind training CAHWs is that they represent an '*outreach component of vet clinics and pharmacies*' (Catley et al., 2004:225). In Ghana, such training, provided by international organisations like the FAO, has occurred regularly over the last decades.[#89] A senior coordinating staff member of the FAO in Ghana confirmed that CAHWs were

aimed at compensating for the shortage of vets in the country.[108] For him, the ratio of the number of vets to the number of farmers was too low and thus the workload for vets too high. He said: *'farmers lose interest in vets who don't come'!* At the time of my fieldwork, there were still some CAHWs in the northern part of the country (Mockshell et al., 2014) and the FAO was planning on training new batches of CAHWs. #89

AEAs (agricultural extension agents), who make up the largest workforce in agricultural services, cover much more territory than vets do.[109] Some vets believed that, like the CAHWs, AEAs also learned how to execute basic animal care via international-funded occasional projects and that they would continue delivering these services even after they were not officially required or expected to do so.

A senior regional official #77 for MoFA explained to me why he thought these AEAs or CAHWs were credible as animal healers in the eyes of the general public. The first reason was that training programmes often taught them how to carry out simple veterinary acts (such as wound-dressing, dealing with ecto-parasites like ticks, fleas, mites and or basic sterilization surgery), giving them and the public confidence that they possessed the necessary skills to replicate veterinary procedures. The second was that they live locally and could easily get to farms and homes in areas where vets were not present. A third reason was that they usually wore white gowns, as did most official vets, and fourthly, they often promised to provide certificates to make official what had been done to the animals.

However, for district vets, these programmes represented illegitimate competition as well as a public health hazard. Notably, I remember Bernard being very anxious about AEAs because they sometimes '*tried to solve problems with farmers directly'*, and thus short-cutting vets. Similarly, in a policy review from 2014, senior officials from the VSD described CAHWs' roles in remote areas as illegitimate:

> *CAHWS work in remote communities in the regions; they are not paid for services rendered by livestock farmers and they are not included in government structures and are not recognised by the Veterinary Council of Ghana. CAHWs were introduced in by the World Bank under privatisation but the system did not also work [sic] in sedentary areas where some did work up to the level of full vets (Luseba, 2014:32).*

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[108] CAHWs were generally taught how to administrate deworming, antibiotics in the water (for poultry), and first aid care. They also learned how to recognise symptoms or lesions that were signs of disease and which affection it was likely to be (for the most common ones). #89

[109] *'The coverage of Animal Health Technicians, who specialize, per farmer was described as relatively low with 1 per 5000 farm households, while the agricultural extension officers tend to be cross purpose specialists covering corps and livestock and described as being 1 per 1,500 households'* (MoFA/AU-IBAR, 2013:4).

Because of the activities of these unqualified animal health workers, most vets, including Bernard, always recommend the post-exposure vaccine following bites from pets, even if the owners report that the animals have been vaccinated. In Bernard's opinion, all dogs and cats should be assumed to harbour rabies so that vets do not '*take any chance*' of letting the disease infect someone, which would be fatal. Indeed, according to him, if an informal practitioner delivered the said vaccine, it might have been administrated improperly or with a 'fake' product. Bernard would systematically refer the person who had been bitten to a medical professional right away to receive the post-exposure vaccine.#62

This perception, that unqualified animal health workers are inept and are damaging to the veterinary system, is widespread. Yet, this system is reinforced by the fact that, in Ghana, drugs and some vaccines are available in pharmacies (which are officially registered or not) to anyone (as discussed in Chapter Two). Members of the public can get their own products and administrate them to animals without much regulation or any control system.[110] For this reason, the spectrum of actors involved in animal treatment at the local level is much broader than is assumed by the formal veterinary system. In addition to employed district vets, as promulgated by legislation, in reality, the system includes a considerable variety of people – such as farmers, (former) CAHWs and AEAs – who carry out veterinary acts without official qualifications and outside the mandates of their jobs.[111]

A senior lecturer at one of the faculties of vet medicine pointed out that informal practitioners undermine the economic viability of veterinary practice in rural areas:

> *Private practice is for urban areas. You cannot survive in a private practice for livestock because of the presence of 'quacks' [112] and because the farmers inject themselves. Drugs should be controlled and authorised only on prescription. But for this to happen, we'll need a strong motivation from the veterinary council.*#76

[110] Once, Bernard sent me to buy an antibiotic for him in the nearby town and I was not asked for any prescription

[111] My intention is not to point out illegal or illegitimate activities and label them as such, but to show how the boundaries of veterinary practice extend beyond the formal system.

[112] This word was used by my participants to talk about informal veterinary practitioners in Ghana. The labelling of people offering local informal services for animal health as 'quacks' is not new. The literature on veterinary practice in Europe centuries ago confirms this; see for example Curth (2010) where the expression '*dangerous quacks*' refers to informal healers portrayed as degrading the health of animals due to their being unqualified for veterinary practice.

According to him, private vets who attempted to work in rural areas would fail because it is not an economically sustainable environment for them. For him, this is due to the existence of this parallel system of animal health service delivery by informal practitioners. He added that this short-cutting of the official veterinary system is dangerous because it can mask the circulation of a disease, can lead to losses when treatments are inappropriate, and can result in drug resistance in animals and humans. He argued that it is also bad for the profession as the poor results of drug administration by non-experts portrays to the public a negative image of vets.

I could not approach or contact any of these informal practitioners. The phenomenon was presented to me via my research participants, who themselves did not know these people, and had only heard of them through their clients, or suspected their AEA colleagues of carrying out such practices. It was tricky to talk about this problem without being able to really see it, but it came to my ears so frequently that I could not ignore it. Because the vets did not often – if ever – encounter these informal practitioners face to face, it seemed as if they found them to be easy scapegoats; targets to blame for issues occurring in vet field practice. Indeed, vets depicted them as people who circulated from one village to another delivering animal health services illegally and hiding like ghosts to avoid getting caught. They were seen primarily as being out for money (mainly through the sale of drugs and vaccines) rather than being motivated by public health goals.

Providing resources for continuous official veterinary supervision of trained volunteers during and after programmes may be critical to avoiding the development of competition between district vets and informal practitioners. Frontline livestock volunteers can enhance animal disease surveillance in that they offer more widespread coverage for disease detection in remote areas, but, only on the condition that there is a solid system of regulations which guarantee that volunteers/CAHWs continue to be supervised by veterinarians after programmes are over (Catley 2004). Yet, such continuity of supervision has not been taken into consideration in Ghana, as one interviewee coordinating FAO volunteering programmes declared that it was the responsibility of district vets themselves to carry out follow-ups.[#89] However, considering that field vets are overburdened with their current workloads, and experience a lack of support and the inability to secure financial and material resources, vets become more and more reluctant to collaborate with the FAO in new livestock volunteer training programmes.

This section has shown how district vets are forced to compete with informal practitioners, whom the vets perceive as threats to their professional establishment and sustainability, which affects their role in (zoonotic) disease management.

Conclusion

In this chapter, I examined the local settings and practices of veterinary medicine in different clinics delivering services in one region of Ghana. I sought to understand how veterinary staff were organised, which types of animals and medicine were prioritised, and the characteristics of the physical spaces and local socio-political contexts in which they operated. With this presentation of five government clinic settings, I found that, while some things were common to all vets, a lot differed. The ways district vets organised their time, and the backgrounds and main activities of staff members all presented some variability and reveal the extent to which government vets exercise agency – within their institutional constraints and material conditions – to organise their practices and determine how things might work at a local level. This suggests that the landscape of veterinary practice across Ghana is very heterogeneous, even at the district level.

Across these different settings, I identified five main practices that explain vets' intervention in animal health management on the ground: practice as operational space; practice as mobility; practice as transaction; practice as an occupational hazard; and practice as competition. These five practices represent dilemmas in that they exist at the interface of 1) institutional constraints, 2) professional strategies, and 3) the clinical setting of each clinic and its local district/regional context. In other words, I argue that veterinary practices in Ghana are not so much determined by what vets are meant to do, but by what is actually possible on the ground as well as what is perceived as good for the profession.

This chapter has shown that elements of clinic settings do not straight-forwardly lead to appropriate or expected decision-making and practices. Instead, settings and practices shape each other in a range of ways. In each case, the ways different vets make their jobs workable is through seeking to manage their settings, which in turn allows for certain practices to happen. This results in wide-ranging diversity and heterogeneity and sometimes makes vets' work less visible and unaccounted

for as not all cases they see or treat are reported to higher levels of the veterinary services due to local dynamics.

Returning to the overarching research question of this thesis, which seeks to interrogate the influence of veterinary practices in the scope for OH, this chapter has also shed light on key challenges for vets in engaging in zoonotic disease management in relation to the main veterinary practices I identified in the region. It has shown that some interventions are impossible, either due to scarce resources (such as the lack of an operational space or a vehicle) or – considering the many informal practitioners competing to deliver services – the lack of access to animal owners. While animal disease management in general is difficult, zoonosis management appears a luxury. If interventions are possible, they are not necessarily the best options for vets as they struggle to balance clients' interests and perspectives, their own duties to generate revenue and meet their own costs, and their own health risks; all while being accountable in cases of outbreaks.

Nonetheless, despite all these limitations on the ground, vets are situated in a professional context that may support a greater role for them in zoonosis management, with the rise of the OH concept bolstering this potential. In the next chapter, I explore the main perspectives of veterinarians and ask how vets in Ghana see their professional role in relation to zoonoses and OH.

Chapter Four: Veterinarians' Perspectives on the Veterinary Role for Zoonosis Management

Introduction

After examining veterinary practices, in this chapter, I explain how vets in Ghana frame their role in zoonosis management through the identification of key values and interests in vets' perspectives. I build on the assumption that vets have specific interests, developed through building their professional identity, in taking part in zoonosis management, and that these interests are key to understanding and designing the scope for OH (see Chapter One).

The first section of this chapter addresses the importance vets give to animal health and especially zoonoses. In the second section, I present vets' perceptions of an existing gap between their ideal role and what is possible from their actual institutional position. The third section examines the strategies vets employ that allow them to envision a greater role for themselves in zoonosis management routines in Ghana. In this chapter I use the word 'vet' or 'vets' in a general sense to refer to my study participants who qualify as veterinarians according to the definition put forth in Chapter Two (see methods). Because my participants are only a sample of all vets in the country, their perspectives may not represent those of all vets in Ghana.

A holistic approach to animal health and veterinary services

Four main interests lie behind veterinarians' broad aim of benefitting society in Ghana. They are: the promotion of animal health and welfare; the safeguarding of livestock and advancement of animal production; the recognition and meeting of public health targets and ensuring the development of veterinary knowledge. All of these interests appear in the oath taken by all veterinary graduates:

> *In as much as I have been registered to practice veterinary medicine and surgery by the Veterinary Council of Ghana, I PROMISE and SOLEMNLY DECLARE that I will use my scientific knowledge and professional skills for the benefit of society, through the protection of animal health, the alleviation*

> *of animal suffering [1], the conservation of livestock resources, the promotion of animal production [2] and of public health [3] and the advancement of veterinary knowledge [4] (Ghana vet council, 2016).*[113]

In the section that follows, I discuss each of these four interests in turn, beginning with '*the protection of animal health,* [and] *the alleviation of animal suffering*'. Vets' concern with animal health is grounded in an empathy for animals, with a growing ethical interest in protecting animal welfare, as shown by significant progress in legislation and advocacy over the last century (Kimera and Mlangwa, 2015, Magnani et al., 2017). In high-income countries, most vet students manifest a passion for animals, and veterinarians are seen as having a mandate from society to ensure animal welfare (Magnani et al., 2017). Woods in Wathes et al. (2012) holds that treating animals ethically and thus limiting or alleviating their suffering means placing them into 'veterinary care', which implies that animal welfare highly depends on the veterinary profession.

Wanting to protect animal welfare can be linked to altruism, mentioned as a core value of the veterinary profession (Roder et al., 2012). The idea of acting altruistically in the professional veterinary context implies that caring for animals is not necessarily beneficial to the carer. For instance, vets are duty bound to care for stray animals even in the absence of financial compensation or appreciation from anyone. As an example of this altruism in Ghana, I recall Afia mentioning that animal owners sometimes do not pay her when an animal dies after receiving treatment from her. This annoyed her but she insisted on assisting suffering animals, even if she foresees their death and the possibility of not being compensated for her time and expenses. This kind of altruistic behaviour, in which vets offer service to animals knowing they may receive limited or no compensation occurs frequently in Ghana. In a specific instance, I witnessed Afia spend three hours operating on an injured goat in pain, only to be remunerated for the cost of a short routine clinical assessment as the owners could not afford to pay her enough to make a profit.[#54]

Although I rarely enquired directly about animal welfare when I talked to vets, many shared welfare-related concerns with me. For example, vets working in abattoirs complained about the way livestock was transported and handled before and during slaughter. This vet technician told me about the problem of pregnant animals brought to slaughter:

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[113] Document no longer available online, last visited on 23.06.2016.

> *He told me he was angry to regularly see the practice of slaughtering pregnant livestock still happening in Ghana as he said he knew this is forbidden in Europe and North America. He wanted to get sponsorship and write a book about pregnant animals slaughtered here in the abattoir. 'They [pregnant animals] should be allowed to deliver before!' His supervisor, a vet surgeon added: 'It's not in the law so there's nothing I can do about it'.*[#57]

In November 2014, while I was in Ghana, a '*detailed fact finding and training needs analysis mission*' was performed involving UK consultants from two NGOs (Royal Society for the Prevention of Cruelty to Animals and International and World Animal Protection/Animal Welfare Training Ltd). Their report highlighted Ghanaian public vets' demand for knowledge on how to protect animal welfare and their struggle to make their concerns heard by others involved in animal industries, such as butchers, who the vets see as insufficiently mindful of animal suffering (Whittington, 2014).

Vets' motivations for protecting animal health go way beyond individual animal welfare. Looking after animals also represents a means to protect and improve people's income. Therefore, the second interest with which Ghana's vets strongly identify with is *'the safeguarding of livestock and advancement of animal production'.* As the Ghanaian government sees the livestock industry as key source of income for farmers, livestock production is vital to the development of farmers' livelihoods (see Chapter Two). And, by ensuring levels of health necessary for production of and from animal bodies, Ghana's vets play an important role in protecting the livelihoods of people who depend on animal production as their main source of income.

Ghana's veterinary services have always been strongly connected to livestock production. As discussed in Chapter Two, when veterinary services emerged in Ghana under the British colonial system, the need to care for animal health was tightly linked to developing a strong livestock industry. In this strategy of investing in livestock production for national economic growth, which is still prioritised today (see Chapter Two), animal health and husbandry go hand in hand. Specifically, animal production involves allowing livestock to gain body weight (for meat production) or to produce to a maximum capacity (eggs and milk, offspring) through minimising constraints like stresses and diseases that affect animal growth or development. Below are three short accounts that demonstrate how important animal husbandry is in the lives of local vets like Bernard and Afia.

> Informal discussions with Bernard, District Three: *Bernard attaches much importance to developing industrial livestock production in his area of practice. He himself breeds chicken, guinea fowls, and cattle. Because of his knowledge of husbandry, he is called to check up on farm animals regularly, mainly by chicken farmers. For example, we went to visit one farm that he helped develop, advising the owner on facilities that would help the animals grow well and avoid diseases.*

Bernard pointed to the footbath at the entrance of the poultry building, a feature which he had recommended so that people did not bring germs inside. There were two flocks, the broilers on the ground, looking prostrate and abnormally dirty which is sign of illness. After a brief look at them, Bernard gave his diagnosis: Newcastle disease. Bernard knew that the broilers had received a first shot of vaccine against the disease, and realised that they must have been infected before becoming immune and he was aware of some chickens having died before our visit. Above the broilers, the layers were housed. These birds looked much healthier and more active. Bernard confirmed my observation and indicated that they had been properly vaccinated before arriving on the farm.[#63]

Informal discussion and observation in District Three: *Bernard helped in the development of another farm in a nearby village. The woman who owned this farm had called him and, while we were passing through this village on our way to a pig farm, she met with Bernard to give him a big broiler. It had been selected from amongst her biggest animals so that, as Bernard shows the chicken around in his village, it will serve to advertise the sale of her chickens. Bernard always showed great enthusiasm when talking about the farms he had helped to develop, saying that he felt rewarded when he saw how big and healthy the animals were. Once he explained to me how important cattle were for economic development. He hoped to invest even more in his cattle so that one day he would be able to produce profitable, value-added products like yogurt.*[#65]

Informal discussion with Afia, District Two: *For the end-of-year project of her Bsc (see Chapter Three), Afia developed rabbit breeding guidance for vulnerable people who had left school too early and who subsequently struggled to find jobs. Afia explained that rabbit husbandry allows a quick revenue after investment so it was appropriate for people who were in difficult financial situations and who needed money to survive. Moreover, rabbits are small animals and so can be accessible for people who do not own large pieces of land. She was inspired by this project because it showed how, as a vet, she could really make a difference in people's lives through teaching people simple animal production techniques. She would have liked to remain involved in this project but could not afford, in terms of both time and resources, to regularly travel to Cape Coast and she felt frustrated that she could not find enough support to carry out a similar project where she was now.*[#59]

From these excerpts, we can see that Bernard has become a local reference person for animal husbandry advice and development. This is best represented by his carrying of the biggest broiler chicken of a client farmer around the area. Afia's identity as a vet developed through training herself in husbandry techniques and acquiring a broad agricultural knowledge in which animal health is one component and which is used in a meaningful way for developing vulnerable peoples' livelihoods. Therefore, local veterinary knowledge and skills related to animal health, animal husbandry and people's livelihoods are often intertwined and applied together.

The third interest – strongly informed by the zoonotic nature of some animal diseases – is that of *protecting human health*. This represents a huge concern for vets in Ghana. However, their concern for human health was not defined exclusively by their interest in animals. When asking my participants

what was most important, preventing human deaths from acute zoonotic epidemics or preventing chronic debilitating zoonoses less visible in the media, I failed to ascertain a sense of rank or prioritisation. It became clear that the vets I met did not value one disease over another, or one type of health versus another. Rather, the common attitude among my participants was to ascribe high importance to all causes of animal ill-health and to advocate for policies tailored around distinct issues and diseases. In other words, vets' motivations and interests in caring for humans are complementary to, rather than in competition with, the interests of the Ghanaian veterinary profession. Vets tend to consider zoonoses as, not only a threat for human health, but as also involving collateral damages for animal welfare and human livelihoods. Human health as an interest for the veterinary profession encompasses vets' other interests, namely care for animals and the importance of livestock for production and livelihood purposes.

This makes zoonotic diseases, and especially emerging zoonoses like AI, of serious concern for vets. For instance, an official report on AI edited by government veterinarians, states:

> *This situation should inform all of us, especially the authorities and officials who are charged with responsibility of taking measures to prevent and control the disease, to appreciate the gravity of the distress that would come upon poultry farmers and their dependents if the disease is allowed to enter and thrive in this country by default of adequate and appropriate measures to deal with it* (VSD, 2006:15).

In a press article on AI, a vet epidemiologist warns the public about the threat posed by the disease:

> *Dr Paul Nomuka Polkuu, a Deputy Director of the Veterinary Services Department (VSD), said at a stakeholders' meeting in Sekondi [involving representatives from the GHS and NADMO] that the spread of the viral disease could negatively impact local and global economies and affect international trade.*[114]

In the first quote, we sense the recognition of the grave potential threat to human lives posed by AI in 2006, just before the first outbreak in poultry in Ghana. In the second quote, ten years later and amid new outbreaks affecting Ghana, vets' concerns remained very serious.

Further, vets were conscious of the fact that zoonoses were a global matter[115] rather than nationally bounded, and that they were not only a health threat but also a socioeconomic and political burden

[114] Published on the 01.05.2016 and available at https://www.ghanabusinessnews.com/2016/05/01/156594/

[115] I found evidence of this in several abstracts of the proceedings of the GVMA in which the theme was emerging and re-emerging zoonotic diseases: at page 16 - '*the increase in zoonoses* […] *has been experienced* […] *at the global level over the past 40-50 years*'; at page 17 – '*Brucellosis* […] *remains the commonest zoonotic*

for Ghanaians (GVMA, 2014). My data therefore attests to vets' perception of the scale (in a globalised world, diseases do not stop at national borders) and scope (the long-term impact on livelihoods and economies) of the manifolds risks posed by zoonoses.

The examples of AI pandemics over the past decade or so and the Ebola epidemic in West Africa in 2014/15 have stimulated vets' fears of new disease emergence in the near future. For instance, a district vet I interviewed [#29] explained that he knew that the Ebola virus emerges from a spillover between bats, monkeys or antelopes and that the highly pathogenic influenza virus affecting people comes from exchanges between pigs and poultry. Knowing this, he said he would not be surprised if a disease such as African swine fever, so far confined to warthogs, pigs and boars,[116] was to mutate and spillover to humans. Like influenza and Ebola, African swine fever is perceived by Ghana's vets as a plague, which swiftly wipes out animal lives with high mortality rates. Thus, if it were to spillover to humans, the consequences could be dire.

Furthermore, once emerged, zoonoses are likely to continue to affect future generations as eradication is almost never possible, especially in low and middle-income countries where the mobilisation of necessarily huge financial investments is difficult (Blancou et al., 2005). As shown in Chapter Two, endemic zoonoses, which have a long-term impact on people's health and their livelihoods, also represent a big problem for vets in Ghana.

All this shows that veterinarians frame zoonotic disease as a new and serious issue with impacts beyond national borders and beyond immediate threats to human health, and as an issue which needs to be addressed to ensure that societies prosper in the long run. This framing is consistent with a view of animal health and veterinary services as global public goods, a view enshrined in discourses propagated by the World Animal Health Organisation (OIE). For instance, on the OIE website, we find displayed: '*A Global Public Good benefits all countries and all generations to come. Prevention and control of animal diseases constitute a Global Public Good*'. And, in the OIE peer-reviewed journal, we find statements like these: '*Good veterinary governance is considered to be a global public good'*

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disease worldwide'; at page 31- '*the global combat against infectious diseases*'; '*human and animal populations remain vulnerable to health threats caused by emerging* […] *diseases* […] *[and] global and national disease surveillance strategies [are] costly and ineffective* […]*, especially in developing countries*'; at page 38: '*Rabies* […] *remains one of the most important global public health problems worldwide*'.

[116] OIE website at: https://www.oie.int/fileadmin/Home/eng/Animal_Health_in_the_World/docs/pdf/Disease_cards/AFRICAN_SWINE_FEVER.pdf (last visited on 17.04.2018).

(Schneider, 2011:326), *'the actions of Veterinary Services and the OIE deserve to be recognised as a global public good*' (Éloit, 2012:585). In Ghana too, this '*public good*' perspective has been used to frame zoonoses, such as with the following statement in a response to a parliamentary query written by some vets at the national level: '*The control of both anthrax and rabies is of public good'* (Anonymous, 2014:3).[117]

The fourth main interest of vets, which complements their motivations to address animal welfare, livestock production and livelihoods, and human health, involves the '*advancement of veterinary knowledge*', a concern related to the development of the veterinary profession. It is important for vets in Ghana to develop their profession and zoonotic disease represents an opportunity to do so. Nowadays in Ghana, studying zoonoses and the OH approach (which developed essentially in response to zoonotic disease risk, see Chapter One) can be seen as the 'normal' evolution of a veterinary practitioner's career, as indeed it was for this vet:

> *The vet explained to me that he had gone to study a Masters in One Health in Edinburgh because he was 'tired of practicing' in a clinic. He was working part-time as a researcher with the veterinary school, still in cooperation with Edinburgh and trying to go 100% research. For him, zoonoses are the reason why 'we need One Health'. He is working on streptococcus for which different strains cause mastitis in cattle (an economic issue), neonatal mortality in humans (a public health issue), and fish mortality (economic and environmental issues). He also participates in a project which attempts to map out the presence of streptococcus strains in Africa to identify risks for livestock, wildlife or people.*#102

Professions seen to contribute to the public good are often associated with high levels of prestige (Walker and McLean, 2013). In high-income countries, the veterinary profession is generally very prestigious. In France, where I qualified, this prestige begins with university training which takes place in elite schools (Hubscher, 1999). In 2005 in the United States, veterinary education was the costliest to pursue among all medical professions (Marshak, 2005). The literature suggests that what lends the veterinary profession its prestige is the fact it is seen as being very difficult. Being a vet requires high academic skills as well as non-technical competencies (Hudson et al., 2009), but also systems thinking (Knopf, 2011, Leighton, 2004). This comes from the fact that vets must treat a wide range of species and be 'poly-specialists' (Armstrong, 2011). Thus, in addition to the inherent prestige that comes with

[117] The document was shared by one participant and used by national vets (although I could not determine the name of the author(s)) to get support from district assemblies to carry out vaccination campaigns and awareness raising activities.

saving lives, being a vet is sometimes seen as harder – and thus more distinguished – than being a human doctor who treats one species (Leighton, 2004, Mills, 2016).

Occupational prestige can be defined as '*the relative honor or respect given to a profession by society*' (Leitch, 2014:55). (Haug and Widdison, 1975) identified a profession's '*relevance to society*' as one of the key criteria for how prestige should be attributed to medical professions in the USA. They noticed however that, in their study, whether a profession was relevant to society did not actually explain much of a profession's attributed prestige. To the contrary, Ghanaian vets consider their jobs as increasingly relevant for society through the new challenge of zoonoses and OH and that is why they think they should benefit from high prestige. This claim for increased recognition and professional status occurs despite, or perhaps because Ghanaian vets have been facing an ongoing process of 'downgrading', and have witnessed the prestige of their profession diminish over the past two decades. Indeed, this was recognised and voiced by all my participants, as illustrated in the excerpt below, and accompanied by an associated discontentment.

> Interview with a senior veterinarian, former head of the veterinary council of Ghana: *I asked him what he thought of the evolution of the veterinary profession in the last 20 years. He said: 'It has been going down'. During the period when he was a veterinary technician (1978-1982), 'it was very nice to be a vet, it was a high-esteem job which involved working hard.' The government recognised the profession as a catalyst for livestock production to increase. But, according to him, the change of governance shaking the country (there was a coup d'état in 1979) along with national economic problems led to a downgrading of vets' status. In addition to this national situation, he explained that* the *unification of MoFA and the Veterinary Services in 1992 increased the number of vets while resources were decreased, so this was difficult to manage for the VSD.*#21

The vets I met expressed a strong wish for regaining the prestige they felt had been lost, but making this a reality had been proving very difficult. For veterinary surgeons in Ghana, one way to regain prestige was by transmitting this value to the next generations of veterinary professionals:

> Observation: *While I was spending time at the regional veterinary office, a senior veterinary surgeon invited some veterinary technician students who were doing their end-of-school internship in the region to participate in a conversation.* After welcoming them to the region, the vet surgeon discussed what it is to be a vet with the interns '*Medics are treating human beings, we [vets] are treating human kind*', *the vet said twice with pride to the young students. He said to us that he had been taught this expression in Russia where he had been trained in veterinary medicine.*#79

The opening of two new vet schools in the 2000s was seen as a great opportunity to instil a sense of prestige in future practitioners, and also to train the young technicians who represented the majority

of the veterinary workforce at the time of my fieldwork. The standards for admission to these highly selective schools were steep and included requirements of validation in many bachelor level subjects.[118] An article in the press covered the inauguration ceremony of the new national veterinary school in Kumasi:

> *Dr. Raphael D. Folitse, Dean of School of Veterinary Medicine at KNUST[119] noted that the veterinary service was a noble profession and future aspiring veterinarians must keep to the ethical standards of the profession. He said the profession exists to serve and save humanity through careful and thorough study of animals so that diseases from their origin do not get to man* [sic] *which could be very deadly.* […] *He therefore urged all students of the school to help build a vibrant GVMSA-KNUST [student vet association] chapter which would have a great impact on the university and the country at large.* […] *Dr. Albert Quansah Filson, the Ashanti Regional Director of Veterinary Service Department charged the students to promote the core values of the veterinary profession* (The Ghanaian Times Online, 21.04.2015).

For vet surgeons, teaching at these new national veterinary schools allowed them an opportunity to instil a sense of professional prestige in new Ghanaian veterinary graduates.

However, vet surgeons in the country note that becoming a vet is no longer as attractive as it was a few decades ago. A lecturer of one of the two faculties of veterinary medicine[#76] confided in me that the school had struggled to enrol enough students in the 2013 recruitment round. According to him, this was directly linked to the lack of resources allocated to the veterinary services, making students fear that they may not get jobs after graduating. This concern was confirmed to me by a vet intern at the first district clinic I visited.[#32] Another element related to this lack of prestige is evident in the fact that, according to a retired vet, the veterinary profession now tends to receive those students who wanted to go into human medical studies but were unable to do so because of inadequate marks.[#21] One lecturer from the a vet faculty in Ghana told me that each year, some of the students selected to enter actually change their minds at the last minute, opting to study for other professions instead.[#76] This suggests that the perceived low status of the profession means that many prospective students choose to be veterinarians as a last resort.

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[118] Requires: *Senior Secondary School Certificate or West Africa Secondary School Certificate; A) Passes in Core English, Core Mathematics, Integrated Science and Social Studies; and B) Passes in three Electives in Biology, Chemistry, and either Physics or Elective Mathematics. Bachelor's degree holders in Biological and Allied Science or Animal Science may be considered for admission to level 200. Holders of a Diploma in Animal Health (with distinction) who also satisfy the minimum requirements for admission into the University of Ghana may be considered for admission to level 200 subject to passing an interview.* http://svm.ug.edu.gh/entry-requirement

[119] Kwame Nkrumah University of Science and Technology which is the University of Kumasi in Ghana

After graduation, the veterinary professional community can maintain prestige through its institutions, such as veterinary associations and councils (Leighton, 2007). In Ghana, the Veterinary Oath is an illustration of how the council is involved in promoting prestige:

> *I will be faithful and loyal to the Council by maintaining the interests, honour and dignity of the veterinary profession. I ALSO PROMISE that I will pursue the work of my profession with uprightness of conduct to ensure the welfare of animals committed to my care. I FURTHER PROMISE that ethical considerations will be paramount in my interactions with fellow professionals and also with my clients* (Veterinary Council of Ghana, 2016).

However, a certain number of vets have lost faith in the ability of the Ghana Veterinary Medical Association (GVMA) to promote the profession:

> *After I interviewed this vet surgeon, I asked him about the sticker of the GVMA I had seen on his car windscreen. He explained that he no longer attended GVMA congresses nor did he pay his membership dues. This is because he had the impression that the GVMA had been spending more money and energy to organise get-together events than what, in his opinion, the association should be dedicating money to, namely, enhancing the public's awareness of veterinary activities and animal diseases.*[#102]

For this vet, the GVMA should be promoting the profession by advertising its societal contributions outside the veterinary community, and thus enhancing visibility. Indeed, I observed that about half of the vets I visited in the region had stopped paying dues to the regional branch of the GVMA. Payment reminders coming from vets working at this regional office, accompanied by warnings of membership cancellation, did not seem to have an impact.

The Veterinary Association and Council's promotion of the veterinary profession and enhancement of members' sense of prestige is complicated by the small number of surgeons and the fact that technicians are excluded from membership. Being a vet technician is not considered on par with being a professional vet and thus not included amongst the 'elite' of the country. Vet technicians and especially low-grade ones[120] are aware of their exclusion from the status surgeons benefit from and, while they may not care about formal demonstrations of prestige such as ceremonies,[#56,#75] they do care about the lack of visibility they suffer in their districts. One vet technician complained, at a regional meeting,[#75] about the lack of visibility she has, as a vet in her district: '*We need a common*

[120] Who I call low-grade technicians are technical officers (several levels of training are available at Pong-Tamale Vet College) as well as animal health officers (those with an additional degree in animal health) without much experience and who have not yet been promoted.

uniform', she argued. This was followed by appreciative noises in the audience as many vets seemed to support the idea.[121]

Although Leitch (2014) does not consider prestige as being dependant on the salary one receives, vet technicians in Ghana do care about the significant differences between their own salaries and those of surgeons, and they believe this difference confers on them a lower level of prestige. Since district vet officers often use their personal money for basic service delivery, a difference in salary means a difference in purchasing power, which in turn affects the ability of technician-run district clinics to operate adequately (see Chapter Three). So while these important technicians carry out just as many skilled technical tasks as the small number of qualified vets (surgeons) in the country (see numbers in Chapter Two), their lack of access to necessary material resources, and the lower levels of prestige they are accorded, ultimately degrades the prestige of the profession as a whole.

Senior vet surgeons based at the VSD HQ have developed tactics to improve the image of the profession. This mainly comes in the form of showcasing and advertising the work of experienced veterinary surgeons. Examples of such tactics include the reposting of senior vets (surgeons or experienced/extra-qualified technicians) to important districts (which contain urban centres) and promoting private veterinary services. A first wave of reposting of district vet officers was announced in the region I visited in January 2015 and a second wave was planned for mid-2016. I was present for the first wave and attended the meeting during which the names and posts of reposted persons were officially broadcast to the regional vet community.[#75] One by one, and to enthusiastic cheers of '*Congratulations!',* the regional vet director called up the district officers to present them with official letters stating their new roles. One reposted vet officer shared with me that she had been in her clinic for 10 years and that she was quite happy about moving on to a more prestigious posting and assuming a more senior role. For her, it was a promotion. While reposting brought some prestige to government veterinary officers, for others it was the work of the private veterinary clinics that helped bring prestige to the profession:

> Informal discussion with a senior vet working at the VSD headquarters: *We were talking about improving the public's view of veterinary services and veterinarians. According to him, the development of private clinics must be supported because private vet practices are well-equipped, clean and therefore would present a positive image of the profession as a whole if they were more*

[121] The idea of providing a uniform for district vets, so that they may be identified as such, regardless of whether they are surgeons or technicians, is something veterinary associations and councils could possibly support and fund.

> *numerous around the country. He expects that such a phenomenon would incite high positioned people in the Ministry of Finance to allocate more funds to the VSD as a result.*#71

However, because of the limited number of surgeons, even private veterinarians must rely on low-grade technicians. At a regional meeting with all veterinary district officers present, a retired vet surgeon raised the need to integrate technicians by saying:

> *When the people* [district vet officers] *were introducing themselves [at the beginning of the meeting], we could see that most of them were high-position chief vets etc. but we need TOs* [technical officers, who correspond to low-grade technicians]*! In ten years' time, the organisation* [the VSD] *will be dead if we [vet surgeons] don't integrate them* [technicians]*! Let them* [technicians] *learn from you* [surgeons]*! There has been a bad habit before just to test people to see whether they are good or not... You* [surgeons] *should share knowledge so that when you leave, you leave your knowledge. If you* [addressing vet technicians] *said* [to a client] *that the vet* [surgeon] *told you to do that way, you will have authority.*#75

This retired vet remarked that most people attending the meeting received higher salaries and were senior in experience (surgeons or technicians) and that the absence of lower-grade technicians was a symptom of the failure of the profession to adequately integrate them. He was widely applauded for these remarks, and went on to encourage the vet surgeons to train technicians constructively (warning against patronising styles) for the common good of the profession, while emphasising teamwork rather than competition which seemed, at the moment, to be the prevailing characteristic of interaction in the profession.

Despite this enthusiasm, some vet technicians remained firmly opposed to deeper integration between surgeons and technicians. For instance, one senior vet technician complained that the idea of reposting district vet officers was unfair to technicians as it was they, rather than the surgeons, who were expected to move. He found this in contrast to the human medical sector: *'it's always doctors who move and nurses stay'.*#71 Moreover, technicians did not find private practice attractive:

> Informal discussion during visit of District Two: *I asked John what he thought about privatisation. He explained that the shift toward private practice started in the early 2000s and that technicians had not been 'included' in the process. 'I don't want to work for a vet doctor [in a private clinic]', he said, 'because I would have to do everything like he does when he would be away but I still wouldn't be well paid for it!' I asked if he knew of any technicians who had tried to open their own private clinics. He replied that it is strictly forbidden for technicians to do so, even though he has heard of some doing it, and those were reprimanded and had to stop.*#60

As shown above, nowadays there is less potential to convey prestige linked to the veterinary profession through the activities of the Veterinary Council and Association. The public sees a skewed

representation of the veterinary profession with, on the one hand, technicians in rural districts with very limited resources and capabilities and, on the other hand, surgeons in cities in wealthy private practices.

There are however other opportunities for vets to boost their profession, particularly through One Health-related events like workshops or trainings. These can provide resources for vets, offering them opportunities for international travel, building networks with non-Ghanaian veterinary professionals, increasing their knowledge on potential threats to Ghana and providing them with research and publication opportunities. All these activities enhance vets' prestige and status while allowing them to advocate for more official recognition from the government:

> Observations, OH Next-Gen[122] workshop: *I asked two vet participants from Ghana how useful they found the workshop. They explained that they were getting an accreditation that would allow them to teach other professionals about zoonoses and OH. Also, they appreciated the economic tools used in research to measure the cost-benefits linked to OH because they can use these to advocate for more investment for zoonoses and veterinary activities at the national level.*#84

In addition to OH-related activities, vets also take advantage of major disease events to promote their profession and increase their prestige, as such events can put some of them in the spotlight. As I already hinted in Chapter Two, the AI epizootic in 2007 represents a striking example of this. In addition to the fear of tremendous economic loss from poultry deaths and culling, people's sudden reluctance to eat chicken further damaged the entire poultry farming industry while this public fear of animals' potential to infect people, coupled with the risk to public health, meant that this period was rather empowering for vets. Organisations based abroad but working on projects in Ghana, such as the Centre for Disease Control (CDC) in the USA, sent an unusual amount of resources (mainly money, vehicles and protective equipment). Similarly, during the recent outbreak of AI (2015-ongoing), the FAO (along with the World Bank, the United Nations Command and the United Nations Children's Fund) have provided significant amounts of money to support the VSD in disease detection. As one media source put it: *'*[…] *FAO's response was in the form of an approval of an 'LoA' [Letter of Agreement] for $ 25 000-rapid procurement of laboratory and field consumables; part of an overall USAID support of $ 100 000 to Ghana through FAO Headquarters'* (Modern Ghana.com, 20.09.2015).

[122] *One Health Next-Generation* was an F7P project (financed by the European Union), launched in 2011.

A few months after the first case in May 2015, the government decided to allocate a major proportion of its budget to fight the disease and to compensate infected farm personnel, as illustrated on the radio by the deputy minister of MoFA in charge of livestock:

> *The government of Ghana, through the Ministry of Agriculture has supplied 22 vehicles and 120 motorbikes for the control of the avian influenza. Government has also released GHc11 million to support the fight against the disease. Government of Ghana paid compensation to 25 affected poultry farmers an amount of GHc 1,067,365 representing 90% of the total current market value of GHc1, 185,928.*[123]

Such statements, of significant financial investment, work to bolster the status of both vets and technicians in the eyes of government officials and Ghana's public.

Moreover, during the outbreaks, other government officials listened to and respected the vets' opinions and the media provided them with more visibility by recognising their expertise for managing the disease. A senior vet working at the VSD HQ asserted that *'during the outbreak, names of veterinary district officers were cited in newspapers so that they could be called* [upon] *in case of poultry found dead and also for communication'.*[#9] Another, who had been part of an inter-ministerial group on AI in 2007 told me that after the epizootic of AI, professionals in the human public health sector more readily asked vets for help in developing preparedness strategies regarding the threat of the 2014 West African Ebola epidemic.[#16]

Similarly, a press article, reviewing a Veterinary Medical Technician Association (VEMTAG) strike calling for salary upgrades that took place in January 2016, shows how the Trades Union Congress considered the act of striking to be '*dangerous*' because of technicians' active role in mitigating threats such as Ebola and AI:

> *Given the strategic role our brothers and sisters in the veterinary services play in the general health delivery and surveillance chain, not only for animals but especially animal to human diseases such as Ebola and the Avian Influenza (bird flu) and the risk associated with it, for themselves and the general public, we cannot afford to have them remain on strike.*[124]

This shows how the threat of zoonoses can create public awareness of the important roles played by vets in society, and help elevate their status and secure resources for their work. Therefore, zoonoses,

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[123] Dr Bisiw interviewed on Peace FM online, 18.01.2016

[124] VEMTAG statement, related in an article available here: http://pulse.com.gh/health/ghanas-health-delivery-tuc-begs-striking-veterinary-technicians-to-resume-work-id4700623.html

a new and major challenge for vets in Ghana, as evidenced through the recent global concern with zoonotic disease emergence, constitutes an unprecedented opportunity from a professional perspective.

This opportunity is recognised not only in Ghana, but echoed worldwide, throughout the veterinary profession. As Baker and colleagues argue:

> *As a profession, veterinary medicine must accord* [veterinary] *career fields such as public health greater visibility, increased publicity, and higher respect and status than they have enjoyed for many years. These fields must be seen throughout the profession as enjoying the same status and prestige as other career choices, including private clinical practice* (Baker et al., 2003:168).

However, major events such as AI outbreaks are exceptional. Thus, building upon momentum initiated by such an event and making the veterinary profession more visible to, and appreciated by, animal and public health stakeholders and the general public on a more enduring basis is described by the vets as an endeavour they are passionately engaged in.

To sum up, through addressing zoonoses, vets' multiple motivations for protecting animal health should not be conceived as resulting in four mutually independent streams of activity which are tackled in isolation from one another, but rather as integrated activities, rooted in holistic thinking, which strive for the protection of animal health in order to benefit people in one way or another. This human benefit could be through improving animal welfare, enhancing people's livelihoods through livestock production or preventing infections in humans. Thus, through envisaging a greater role for vets in zoonosis management, and not only when major outbreak events occur, vets in Ghana see an opportunity to bring higher levels of prestige to their profession. However, as explored below, attempts to do so are often, in the vets' opinions, frustrated by the institutional misalignment of veterinary services within MoFA.

An institutional misalignment

In this section, I examine vets' perspectives on their institutional position, which I described in Chapter Three, and on the resources and policy support that vets felt was made available to them by the state in regard to pursuing a greater role in zoonosis management. The positioning of the VSD as part of MoFA was recognised in the 1990s as the '*most effective and cost-efficient organisational*

[institutional] *arrangement for Africa'* (Belino, 1992:113). Even before OH became popular internationally, this positioning set the scene for zoonosis control in Ghana to be tackled in 'collaboration' with other key ministries such as the MoH (Belino, 1992).

With OH, a new challenge has emerged for the Ghanaian Veterinary Services: to serve human public health needs, while being situated within MoFA, a ministry undergoing decentralisation of its technical units. This challenge has become more intense in the past decade because the VSD's institutional situation may have impeded its capacity to evolve and adapt to the increasing importance of emerging zoonoses globally. As noted by one senior vet surgeon of the VSD headquarters, *'The public health unit* [of the VSD] *has to be enhanced because all of what is going on is of public health concern'.*[#95] In this statement, the vet underlines that most disease issues faced by the veterinary services in recent years are not exclusively veterinary incidences, but have public health significance. He implies that the VSD must evolve institutionally to be able to address these new issues.

This is not a perspective restricted to Ghana, as authors like Baker et al. (2003) and Dissanayake (2012) have emphasized that the veterinary profession worldwide has become increasingly important, yet under-recognised, in meeting public health needs:

> *The potential contributions of veterinarians and of veterinary medicine are often not recognized, whether at the local, state, national, or international level. This lack of awareness is a consequence of the low profile of veterinary medicine in such areas as public health. Rectifying this situation will require a greater emphasis on areas such as public health by the entire profession, the public, and current leaders at all levels* (Baker et al. 2003:168).

> *Epidemic and zoonotic disease management is a primary role for public animal health services* […]*, even though EID* [emerging infectious diseases] *prevention or control often requires private actors working for the public good* (Dissanayake et al., 2012:203).

This increasing awareness of the role of veterinary professionals in issues of public health significance has led several authors to advocate for greater institutional support towards the veterinary profession so that it can adapt to new professional demands:

> *Good veterinary governance policies, and their implementation by national veterinary services, which are the very essence of a global public good, must be supported by appropriate veterinary legislation and sufficient human, administrative, managerial, technical and financial resources* (Schneider, 2011:326).

Like Schneider, other scholars also highlight the importance of adapting legislation and resource systems within countries, and argue that such adaptation will allow OH integration to become 'institutionalised' (Degeling et al., 2015, Mardones et al., 2017).

In Ghana, as suggested in the above section, most of my informants did not see this necessary institutional adaptation happening and instead believed the country to be heading in the opposite direction, with little potential for additional institutional support. Instead of increased collaboration, cooperation and coordination, many of my participants felt that they still worked in isolation from the medical and other relevant sectors (further developed in Chapter Five). The positioning of the Veterinary Services within the decentralised MoFA presents two limitations vis-à-vis vets' role in zoonosis management: 1) a lack of adequate resources and 2) a lack of adequate policy support. Given this, it has been very difficult for the VSD to better respond to zoonotic risks.

The first limitation is a critical scarcity of resources available to the VSD for animal disease management – including of zoonoses. This affects Ghana's ability to respond to these diseases. In 2008, Ghana requested the VSD to be audited by an independent OIE expert, as part of the PVS evaluation programme carried out in many low-and middle-income countries. The OIE-mandated auditors noted that, because of a lack of resources, Ghana was unable to comply with international standards in relation to zoonoses: *'significant weaknesses'* have been detected in *'*[the] *VS* [veterinary services] *capacity to undertake effective and sustainable epidemio-surveillance and disease control'* due to *'inadequate transport and insufficient operational funds*' (Diop et al., 2012:10). Ironically, my informants noted that these '*insufficient funds'*, which had steadily decreased over the past ten years or so, used to come from international sources. Moreover, they still saw themselves as relying too much on these funds[#84] and yet, problems had not been resolved:

> Interview with a high positioned vet: '*We have not been able to eradicate rabies, we know cases have been increasing lately. Before there used to be sponsors but how can you get support for mass vaccination?*' *For her, regular vaccination campaigns for rabies no longer attracted international funding and this was how it used to work in the past decades.*[#82]

The funding problems encountered by the VSD are also rooted in economic crises affecting West African states (Leonard, 1993), as well as national funding priorities. In Ghana, the decentralisation process, which affected MoFA and most other ministries in the late 1980s/early 1990s, led vets to feel as if they had to compete more and more with other sectors for resources. This can be explained by the fact that, in the decentralised and unified system, animal health-related budget decisions shifted

from being taken at the national level by the VSD to being taken at the district level, where decision-makers were not necessarily vets (see details in Chapter Two).

Dr B thought it was irresponsible not to allocate enough funding to the VSD in his district while he felt as Ghana, since AI, was facing zoonosis emergence. Like every vet I met at the district level, Dr B struggled to use his salary to cover his clinic's basic costs and new purchases, even though as a surgeon, he earned more than technicians and received twice as much in transportation funding (I discuss this in Chapter Five). When I asked him about the amount of money MoFA held for his district and how much went to his unit, he replied with a tone of indignation. According to him, MoFA in his district received 12 000 GHc per year and only 300 GHc of this went to the veterinary unit, which for him was highly unacceptable.[125] For Dr B, this problem was above all, a matter of principle – of injustice – and a serious mistake in terms of animal health governance. Having to use his own money was also problematic as the management of animal diseases should – he believed – not be a matter of individual financial resources.

This shows how the institutional context in which district vets – tasked with fighting animal diseases – are positioned, imposes a regime of money and resource management that relies on individual capacities and choice, and which contradicts the framing of animal health as a public good, wherein what benefits society as a whole, should be managed at the national and not at the local level (Éloit, 2012, Schneider, 2011). Furthermore, beyond problems of disease management locally, vets see this inappropriate budget allocation as threatening the operation of the veterinary services on a national scale. The deputy minister in charge of livestock, who is a veterinarian, told a journalist that in Ghana, the profession was at risk of '*dying*'.[126] When talking to my participants, it also sounded as if the VSD struggled just to survive as an operational institution and to deliver very basic services:

> Observation from my visit in District Two: *I overheard Dr B talking about his status of being a vet with someone while on the phone in his office: 'My department is falling apart' he said in an angry tone.* #31

> Interview with a vet technician: *They* [MoFA] *are killing the veterinary services gradually, nobody cares about vets anymore!* #17

[125] The remaining funding was allocated to other units such as Crop Services, Agriculture Extension Services, Plant Protection and Regulatory Services, Agricultural Engineering Services, Animal Production, Women in Food and Agricultural Development, Fisheries, etc. 30.09.2014.
[126] The Ghanaian Times Online, 21.04.2015.

> Interview with a former regional director of the veterinary services: *In a context of inadequate resources, the VSD found itself having to borrow money from the GHS.*#13

The PVS evaluation from the OIE (see above) also recognised the resource-related challenges associated with the VSD's institutional positioning. The auditors wrote that *'placing the veterinary personnel under the structure of the "Universal Extension System"* [127] *has seriously downgraded the capacity of veterinary professional and para-professional staff to deliver critically important clinical services'* (Diop et al., 2012:10). Thus, Ghana's vets have experienced this ever-declining funding and support – influenced both by the lack of resources flowing from international donors and by the unification and decentralisation of MoFA – as a serious threat to their profession.

In response to these declining institutional resources, vets who are highly positioned in MoFA and in the VSD often reach out to local vet technicians and focus on their potential to generate revenue through the provision of veterinary services (as discussed in Chapter Three). One regional vet, addressing his assembly of district vets, talked of the VSD as '*a revenue generation agency*' whose ultimate goal was to collect as much money as possible to maintain veterinary services in the country.#48

The lack of funds and the need to generate revenue was frustrating to vets, but even more galling is what the vets perceived as a gross imbalance between the funds they received, and those allocated to the MoH and GHS. These lopsided allocations were seen by the vets as being conspicuous in past outbreaks.

> Field note excerpt, visit of district clinic 2: *Reflecting back on the absence of recognition for vets after the bird flu outbreak had been controlled in 2007, Afia says that the medics received most of the resources (like pick-up cars). 'It's all about the medics...' she claimed. This support for medical services occurred even though vets believed that they had had a huge role in controlling the disease before human cases appeared. 'When they were culling poultry in Sunyani, district vets had to kill the chickens one by one and without the help of farmers since we* [vets] *were killing their animals. It was a huge work and vets were not even paid for that!' Vets did not get the credit they deserved for their role in controlling the outbreak.*#55

> Informal discussion, district vet 1: *'Why should we communicate with medics if they have all the attention and there's nothing for us*?' *said the district vet.*#29

[127] The Unified Extension System was aimed at regrouping all MoFA technical units under one umbrella at the district level. It was established alongside decentralisation processes in the 1990s (see Chapter Two).

> Interview with a retired vet surgeon: *'The lack of resources has also been a problem for human medicine but at least they have the advantage of being able to attract funds if people are dying.' He added that the VSD used to have the funds to make the rabies vaccine free (in the past, the State vaccinated people's dogs and cats nationwide every three years) but unfortunately, this is not the case anymore.*[#21]

Salman (2009), writing about the USA, shows that the prioritisation of human health is not unusual. He offers a comparison of the USA's National Public Health Programme (NPHP) on the human health side, with its Animal Health National Programme (NAHP) on the veterinary side:

> *Since most of the public attention is given to the NPHP it receives the bulk of the resources, while NAHP receives little attention and few resources.* […] *Far more resources have been given to detection and control of spread of HPAI* [highly pathogenic AI] *H5N1 in human populations with relatively limited resources dedicated to the animal side, even though the spread of the infection can be prevented on the human side if the focus is on the animal side* (Salman, 2009:286).

Salman (2009) claims that there is a lack of recognition of the NAHP's potential and actual contribution to public health. He added that this imbalance in funding is replicated in the USA's foreign aid and, despite an increase in international funding for animal disease programmes over the past two decades, the funds were '*mainly directed at specific high-profile infectious* [human] *diseases instead of animal diseases in general*' (Salman, 2009:287).

In addition to the lack of funding, there has also been a drastic decrease in the veterinary workforce in Ghana over the past three decades. This has largely affected public veterinary services and especially the capacity to carry out national preventive campaigns like vaccination:

> Excerpt of the Public Health Risk Mapping and Capacities Assessment in Ghana, Section on Zoonotic Events: *There are inadequate human resources in the VSD. Currently there are only 68 Veterinary officers in the country* (MoH, 2016).

> Interview with a senior vet working at the VSD HQ: *When talking about anthrax outbreaks in the northern parts of the country, he said: 'there wouldn't be enough vet staff to vaccinate even if we can produce the vaccine'.*[#8]

As discussed above, in response to the shortage in the veterinary workforce, Ghana has recently opened Veterinary Medical Schools at the University of Ghana and at the University of Science and Technology, with the first batch of students doing their internships at the time of my fieldwork (MoH, 2016). Also at the time of my fieldwork, programs were envisaged to facilitate the training of in-country formed veterinary surgeons, and to create new CAHWs positions in districts:

> Interview with a coordinator for the FAO: *He explained that, to respond to the shortage of vets in the country, the FAO is planning to train (in collaboration with vets) community volunteers that are experienced farmers to perform first aid on animals when the vets are unavailable. He added that the vets were reluctant to do that but that they had no better solution to fill the gap.*#89

However, as suggested by this FAO co-ordinator, Ghana's vets are not necessarily keen on training more CAHWs as they sometimes suspect them of carrying out medical care without veterinary supervision in rural areas (as described in Chapter Three). Additionally, senior vets worry that the young generation of vet surgeons trained in Ghana will not be able to secure employment as – with no increase in MoFA's budget – no formal posts are being created for them.[128] For example, the author of a blog on the presentation of the Pong-Tamale Animal Health Production College (Veterinary College) asserts that:

> *Students are graduating into a job market where there is a shortage of trained veterinary technicians and an increased need due to a government push for food security and increased protein consumption. Unfortunately, the government is unable to hire a significant percentage of the new graduates coming out of the college, which means that these graduates will be required to start-up businesses or join private veterinary clinics in order to make a living.*[129]

All this indicates that vets feel deeply affected, as a profession, by the lack of financial and human resources dedicated to them by their home ministry.

The second limitation to vets' role in the management of zoonotic disease is the lack of policy-related support. This limitation is particularly evident in the absence of national policies that would confer upon and define a clear role for vets in relation to public health. As pointed out in Chapter Two, mentions of animal health and veterinary services for zoonoses and public health remain limited in the policies produced by both MoFA and the MoH. Therefore, vets have developed their own guidelines and practices on what should be done by VSD to fight zoonoses, and feel that they are not supported by higher authorities and institutions.

This lack of policy support is especially salient regarding endemic[130] zoonoses in the country, which feature among diseases referred to as neglected zoonotic diseases. MoFA has developed no specific policy on veterinary involvement in the prevention and control of endemic diseases in Ghana (see

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[128] This was still the case in 2017, as proves an article in *The Ghanaian Times* of the 05.07.2017 available here: http://www.ghanaiantimes.com.gh/veterinary-graduates-picket-at-mofa-for-jobs/

[129] Available at: http://vetcogh.blogspot.co.uk/, post written on the 09.09.2012, webpage accessed on the 22.05.2017.

[130] Regularly causing outbreaks in an area

Chapter Two). Instead, MoFA focuses its policies, and hence vets' roles, on livestock production for economic growth. This means that not only have vets had to develop their own, informal guidelines on how to manage neglected zoonotic diseases, but have also had to prioritise well-known diseases such as AI, which may cause high production losses yet are not of immediate concern for populations. However, the vets are aware of a broader need in relation to endemic zoonoses as these also represent questions of social justice with underlying politics of disease management (Leach et al., 2010). For veterinarians, social justice may mean that '*the veterinary profession should, in the interest of fairness, provide equal opportunities for care to all clients*' (Roder et al., 2012). In Ghana, households and farms in very remote rural areas should have as much access to veterinary assistance as people living in or near urban centres. But the political processes which underlay the lack of attention to neglected zoonotic diseases, along with vets' lack of resources and the prioritisation of economic production make it difficult for vets to prioritise neglected zoonotic diseases, which primarily affect the poor in remote rural areas (Okello et al., 2015).

In addition to these constraints, vets also reported a serious incapacity to get existing policies on zoonosis control enforced in practice, while legislative texts concerning vets were too old or incomplete (excluding technicians), and very little planning had gone into the detection of emerging infections (see Chapter Two). Amstrong studying vets in the UK remarks that, compared to the human medical profession, vets' '*traditional authority is weak*' and that, when their authority is challenged, they need to turn to their '*legal authority'*, which, if poor, '*weakens* [vets'] *monopoly*' (2011:52-53). Applying this logic to Ghana suggests that the perceived lack of institutional support vets' see in Ghana is directly related to their perception of their 'low' status.

To sum up, veterinarians in Ghana express significant frustration in that their holistic approach to animal health, especially vis-à-vis fighting zoonoses, is not mirrored and empowered by the institutional and policy context in which they are embedded. Rather, it is constrained. This is because some of their motivations and orientations to protect animal health, also important in a OH framework, are not prioritised at the national level of the ministry and, as a result, vets feel they do not receive the necessary resources and policy support to do the work they believe needs to be done. For them, it is a vicious cycle wherein the lack of resources, their weak institutional positioning and the lack of understanding around the role that vets could play in human health combine and reinforce each other to limit the scope of their potential.

There is little vets can do about the lack of resources and their institutional positioning. OH, however, provides an excellent opportunity for vets to develop a holistic approach and address their four primary interests, namely the promotion of animal health and welfare; the safeguarding of livestock and advancement of animal production for livelihoods; recognising and meeting public health targets; and ensuring the development of veterinary knowledge. One way in which vets have responded to this opportunity, is by seeking to elevate the status of the veterinary profession in relation to medical and other OH stakeholders. The development of vets' professional prestige through zoonosis management is explored in the next section.

Envisioning a greater role for vets in zoonosis management

In this section, I explore the two main strategies that vets in Ghana adopt to address their constrained institutional context for zoonosis management. These two strategies are professional autonomy and professional dominance, both of which are based on professional difference through a comparison of vets to 'others' (non-vets) about who detains the essential knowledge on zoonoses.

Acquiring institutional autonomy

From an institutional point of view, the fact that veterinary services were considered of equal importance alongside seven other MoFA technical units at the local government level, was perceived by vets as unfair and unreasonable. Several of my informants reported a profound dissatisfaction around the processes through which the Ghana veterinary system currently uses – or rather, is constrained from using – its internally-produced knowledge to inform policy and take action for improving animal health, given the institutional misalignment described above. I asked my participants how they saw their influence towards 'policy makers' or others who had power to change the way animal health was practiced. There were, in my participants' answers, contradictory versions of who these powerful people were and who could lead change.

Some thought that the VSD had enough power to make change. A former senior officer of the VSD HQ offered the example of rabies as a long-lasting problem for vets in Ghana: '*Rabies control is not about politicians, it is about technocrats like the VSD director, etc. It's about the man with the stamp,*

you get things done faster'.[#83] He added that if he had been the VSD Director, he would change things for good because the title would confer on him the necessary power to do so.

Some, however, thought that only politicians had enough power to change the way Ghana reacts to and controls outbreaks. A senior vet and university lecturer told me he was convinced that MoFA, like for him the ministry was a separate entity, took all decisions related to disease control. He complained that the VSD Director actually had very little power even though the VSD was far more aware of the animal health situation in the country. He suggested that the norm was MoFA making decisions, and that these decisions were often inappropriate for the situations at hand.[#38]

For this participant, the fact that those making decisions were different from the people with the necessary veterinary knowledge, explains the mismatch between policy and the animal health challenges frequently experienced on the ground. When researching policies on disease management, it was very hard to identify who was in a position to bring about change. I was repeatedly told that these details were confidential and my encounters with highly-positioned vets were seldom and limited to greetings. The VSD was constrained in its ability to bring about policy change and its decisions focused on the management of endemic animal diseases as defined by its limited capacity and its scarce resources. Any new decision regarding an emerging or very serious threat would come from above the VSD and only after it had wrought considerable damage and garnered public attention (Waldman et al., 2016).

The most common approach for most vets, in their efforts to influence policy change, has been through proactive lobbying. In fact, government vets openly talked about exerting pressure on policy makers positioned higher than the VSD, but this did not seem to bear much fruit:

> A senior vet from the VSD HQ: '*We use friends of vets who are parliamentarians to push it* [policy and legislation in favour of developing veterinary services]' [#19]
>
> A veterinary surgeon: *I am complaining every single day! You have to lobby all the time!* [#18]
>
> Another veterinary surgeon: *Every time I have represented the VSD, we fight!* [#68]
>
> A National Disaster Management Organisation (NADMO) officer in charge of endemic animal diseases: *I want to buy some airtime on national radio and invite vets from the VSD* [HQ] *to argue about dog vaccination for rabies.*[#90]

Since constant lobbying did not lead to satisfying change, vets engaged in reforming their institutional status into an '*authority*' (discussed in Chapter Two) which they hoped would provide them with sufficient autonomy to play a greater role in zoonosis management. In June 2014, a lawyer consultant – who had been recruited to guide the formulation of a new livestock health and production policy (introduced in Chapter Two) – had drafted a workable text, following guidelines from international standards like the OIE Terrestrial Animal Health Code.[131] I attended the meeting where this text was discussed:

> Observations: *The VSD Director asked why new, stronger authority was being proposed for the VSD. The consultant replied: 'That way, when regulations need to change, there is no need to go to Parliament, the VSD can just amend the regulations'. Answering another question, he also declared: 'The VSD will be its own authority. Therefore, it must be enabled to act and not have to wait for all the authorisations coming from above in the Ministry. It will be a real public institution on its own and will be able to act easily and fast'. Another participant supported this idea, claiming that 'within an authority, heads are competent and not appointed like that', implying that the leaders taking animal health decisions at the time were not technically competent in animal health. Yet another participant asked provocatively: 'But when does the authority fall back to the Ministry so we avoid conflicts of interests?' The consultant indirectly replied: 'When an emerging issue is not covered by the Act'. The act here referred to the legislative text making the VSD an authority.*[#4]

It is interesting to note here that this meeting was part of a process of developing 'new policy' and not directly related to the legal or institutional status of the VSD. Yet the ensuring discussion, and the consultant's understanding of vets' needs, as reflected in the new policy, indicates the importance of gaining institutional autonomy through stronger legal status if vets were to have greater influence on both policy, and its implementation.

By fighting their way '*out of the local government*', like the MoH and the Ministry of Education had done previously, Ghanaian vets thought they were regaining their institutional autonomy (starting in 2015), after years of advocacy. Such phenomena carried out by professionals are not unknown nor unexpected. Currie et al. (2012) show that elite professionals in the health care sector – when faced with external threats to their privileged position and status – sometimes carry out '*institutional work*' to maintain the institutional arrangements which preserve their professional dominance, power and autonomy, often based on a pre-existing model of medical professionalism.

However, institutional change alone has not provided a satisfactorily adequate sense of autonomy for the vets, and they are still energetically fighting for this. This 'feeling' of a lack of autonomy at a

[131] Available at www.oie.int with a recent version updated in May 2016.

practical level is the result of decades of eroding prestige for the profession, which could not be made up for with one institutional change.

In 2014, while I was doing research amongst the vets, a promising narrative which emerged at the national level and subsequently relayed downward through regional staff went like this: once the vets were officially recognised as an authority in their own right, local veterinary budgets would increase significantly and vets would finally get the financial support they deserved. Like many other vets, Afia hoped that once the district-level VSD was officially autonomous, and '*out of the local* government' in 2015, she would experience some relief from the scarcity of resources she had long been dealing with.[#56] But, even after the law was passed in January 2015, district vets in the region I visited reported experiencing hardly any change, and the staff remained in precarious situations. For technicians and other less-qualified vets, the financial marginalisation of the veterinary unit strongly persisted, as illustrated in the following comment from John, addressing his regional vet director: '*You said that we were full officers now but the situation on the ground doesn't change*'.[#75] Moreover, from meetings I attended at regional vet offices, it was still unclear to district vets where they were to obtain resources to carry out their work.

In sum, regarding interactions with other stakeholders, autonomy for vets also means gaining the respect and financial resources they feel they deserve and ending the interference of non-vets in their work. Despite the newly adopted institutional arrangements, veterinary autonomy continued to be experienced as elusive, and very limited.

Professional dominance

In parallel with efforts to gain more autonomy, I noticed a sense of 'appropriation' of zoonoses by Ghanaian vets, in that vets felt they needed to be leading the fight against these diseases. This relates to the idea of '*professional dominance'*, which, in the literature on veterinary professionalism in the UK, refers to the notion that *'the veterinary profession should be in control of the delivery of veterinary care'* (Roder et al. 2012:2). In the case of zoonoses, one can find the boundaries of veterinary care ambiguous, since veterinary activities can be integrated into interventions which do not target animals (but humans), as suggested by the OH approach. Vets in Ghana, nonetheless, valued the dominance of their profession vis-à-vis zoonosis management.

Vets justified the need for their professional dominance by highlighting what they felt was their advanced awareness and knowledge in comparison to other professions (for more on how this

perspective plays out in interactions between vets and non-vets, see Chapter Five). Envisaging their role in zoonosis management through professional dominance entailed a model of OH operationalisation that prioritised their knowledge of zoonoses being taken into consideration and transmitted to non-vet professionals to improve the fight against zoonoses in the country. Notably, vets thought sharing their knowledge would be particularly beneficial. This was because other professionals may not know enough about zoonoses to be able to identify disease cases on the ground, vets could prevent transmission and alert upward authorities, and veterinary knowledge could fill this gap.

For instance, considering there is a shortage of vets in Ghana, and the fact that they do not have access to many sparsely populated areas, the human medical workforce, including community health workers (also called community-based surveillance – CBS – volunteers) and local doctors and nurses, who represent a much bigger and more widely spread workforce, could do a lot to increase sensitisation around zoonotic disease risks stemming from contact with animals. CBS volunteers and local health care personnel are likely to be the first to be alerted by local populations about suspected cases of zoonotic disease in human-owned animals and thus, according to my participants, need to be trained for this. However, the idea of vets educating local human health personnel about zoonoses had not yet been implemented:

> Informal discussion with a medical doctor working at the surveillance department of the GHS: *We talked about the community health workers in Ghana and he told me that CBS volunteers – as they were called – were numerous and reported weekly to the GHS. The data was then presented in weekly epidemiological bulletins available online. He confided that he wished the CBS volunteers were trained to identify animal (zoonotic) diseases as well but that it had not yet been a priority for the Public Health Department*.#94

> A senior vet working at the VSD HQ: *He explained to me that, because the medical staff did not know much about zoonoses, they 'did not educate the population about the animal sources of zoonotic diseases' and therefore did not encourage the public to signal suspect cases.*#9

> Another vet from the VSD HQ*: He told me that vets were trained to use PPE* [personal protective equipment] *since the AI epidemic in 2007 and the related national surveillance programme. For him, vets could easily 'teach* [the] *medical staff to use PPE' in preparedness for potential Ebola cases in the near future, but he felt as though vets 'were not considered* [reliable] *by medics' to provide such training. For him, this dismissal of vets' potential to contribute was a waste of available resources and it was a shame that vets in the country were not seen as the leaders in the fight against zoonoses.*#12

The knowledge considered by vets as missing in other health professions was essentially technical and generally concerned the epidemiology and pathology of zoonotic diseases, such as for instance, what species could be infected, how pathogens transmit to people or animals, what symptoms could be expected, etc. The argument was that, without this key element of zoonosis-related knowledge, human health professionals may be unable to identify cases of disease and associated risks. According to Dr B, medical doctors '*still check blood in order to detect rabies*' whereas he knew that the virus could never be found in blood samples.[132] Another vet working at the headquarters in Accra asserted that trypanosomiasis[133] was often confused with Malaria by medics when establishing a diagnosis at the hospital.#9

Another reason why vets felt that their knowledge should be central to zoonosis management, was that they considered their unique exposure to zoonoses, through their specific training and experience, as equipping them with crucial knowledge. And some field vets I met claimed a privileged position in that they knew not only about how zoonoses affected animals, but also how they affected humans. By bringing their knowledge to the table, field vets thought they could help recognise early symptoms of zoonoses in human patients. For instance, Bernard asserted confidence that he could be one of the first to detect a case of Ebola among pastoralist migrants from Burkina-Faso arriving in his district. According to him, he was one of only a few people working at the animal/human interface and thus he would be able to recognise symptoms in humans because of his regular contact with pastoralists in town (see Bernard's mobility in Chapter Three) and in grazing areas (he was also a cow breeder and hosted a Fulani[134] family that looked after his cows). For him, this was a unique advantage that medical doctors were unlikely to have since, according to him, pastoralists generally did not seek health care in the form of formal government service provision. Following such logic, field vets working with communities where intense animal/human interactions occur, and which see considerable migration of livestock, could act as sentinels for early case detection of emerging zoonoses. Along this line, Schelling et al. (2015) advocated for the synergetic potential of a joint information system between local animal health and human health practitioners because of the differences in developing various kinds of knowledge about zoonoses: '*People who work with animals*

[132] The virus can be detected in nervous tissue only (cf OIE guidelines: http://www.oie.int/fileadmin/Home/eng/Publications_%26_Documentation/docs/pdf/2.01.13_RABIES.pdf)
[133] Parasitic disease present in cattle which can be transmitted to humans through a fly (Tse-Tse).
[134] The Fulani people are a large community of pastoralists in West-Africa.

may understand human health concepts better when linked to their experiential knowledge of animal health and diseases' (Schelling et al., 2015:235).

For vets, veterinary knowledge about zoonoses was seen as being able to bring about more nuanced understandings of risk and enhancing public health professionals' knowledge in, for example, animal-to-human disease transmission. Veterinary knowledge thus needed to be shared with the medical profession and with the general public in order to help prevent panics, often set off by media's propagation of unjustified fears. For example, at the time of my fieldwork, the fear of Ebola transmission from contact with Ghanaian bat colonies was all over television and in newspapers, yet there was little attention to veterinary expertise on the disease. The veterinarian in charge of wildlife health in the country at the time, considered the risk of transmission from eating bat meat as real, but low:

> *Although Ebola in people has previously been associated with direct transmission from fruit bats* […]*, the risks from bat viruses are not new and immediate, but are long-established and of low probability. This needs to be reflected in the communication of the public health message. The current demonization of bush meat risks being counterproductive, as trust in authority will be lost when hunters and consumers identify the mismatch between public awareness messages and reality* […] (Suu-Ire, 2016:39).[135]

If vets were rarely called by journalists to communicate about the risk, they often proactively approached journalists to communicate their views on current disease threats. One day while I was at the VSD HQ, a couple of senior vets were discussing their visit to journalists following the circulation of 'rumours' about Ebola infection in pigs. Similarly, vets had been involved in communicating to the public about the safety of poultry consumption while outbreaks of avian influenza were occurring in 2016. As Dr Paul Polkuu, Deputy Director and head of the epidemiology unit of the VSD at the time, explained in a news article:

> *We are appealing to the media to make people more aware. We need awareness, not panic. When there is an outbreak of this disease, bird flu (Avian Influenza) in the country, we hear people discussing and giving wrong messages being transmitted and circulated in the media, which is not accurate […] Ghanaians, he said, are safe to consume poultry and poultry products, because the*

[135] Presented at a training workshop focused on Ebola organised by a global network of health and demographic surveillance systems in LMICs (25.02.2016, Accra), presentation available at: http://indepth-network.org/workshop/2016/presentations/ebola_feb_2016/dr_suu-Ire%20Bat%20Sampling%20Presentation.pdf

> *affected birds have all been destroyed, while adequate measures taken to prevent if not control the disease from spreading.*[136]

Vets thought that being more involved in publicly communicating on zoonoses would help prevent such panic in the public.

So how did vets envision the establishment of their professional dominance, and what outcomes did they expect it to lead to? They believed that institutionalising a system of educating professionals in the health sector early on in their careers would create recognition and appreciation of veterinary expertise, and that this would naturally lead to more collaboration between practitioners of different sectors, and thus to enhance OH in practice. Education was seen as a first step in the quest for vets to become the legitimate dominant actors in zoonosis management in the eyes of others. Many of my participants emphasised that this education-based strategy would only work and have long-term potential if it were done before health professionals began practicing. In other words, that it should be targeted at the university level, such as through the sharing of common courses. This idea corresponds to the concept of inter-professional education (IPE), as defined by Bode et al. (2016), and involves '*students from two or more professions learning together, about, and from each other*'. Bode and colleagues argue that IPE is necessary if future inter-professional collaboration is to happen. In Ghana, IPE as a premise for OH has already been adopted by veterinary lecturers at the recently opened national veterinary school in Kumasi (Folitse et al., 2014), and lecturers reported witnessing that IPE was happening in practice:

> Interview with a lecturer at the KNUST faculty of veterinary medicine: *'The vet school is linked with the Health Science School on campus', the lecturer said. He added that veterinary students attend common lectures with human medical students, especially on basic topics like chemistry. Lecturers from the Health Science School come to teach the veterinary students, but regrettably, the reverse is not yet happening. 'Yet, medics should know about animal diseases because of zoonoses'. He said that he and his team were 'developing a One Health approach'. As an example, as the veterinary science building was still under construction, vet students were using the medical school classrooms in the meantime, which for him was fostering the development of connections and familiarity between students of the two professions.*#25

Inter-professional education for better health service delivery has been increasingly advocated, notably by international organisations such as the WHO (Barr, 2002, Bridges et al., 2011). In Ghana, connections built during a OH-based Masters-level course at the School of Public Health in Accra (the FELTP) were sustained through platforms of information sharing like WhatsApp (see Chapter Five).

[136] http://announcernewsonline.com/dont-spread-panic-about-bird-flu-mofa-urges-media-p19275-121.htm

Through such social media accessible on mobile phones, biologists, medical doctors and veterinarians of the same cohort, as well as more recent graduates, shared information and knowledge about recent public health events.

This perspective, of starting with professional cross-fertilization in the career-education stage, is not consistent with the view that collaboration between fully fledged professionals is the entry point to creating opportunities for professional knowledge exchange and education of others, such as of human health professionals on zoonoses (LeJeune and Kersting, 2010). In Ghana however, such organic collaboration between vets and human medical professionals is unlikely to occur without vet-led efforts, and my encounters with people in both camps suggested that collaboration between them was still very limited (See Chapter Two and Five). This fact supports the vets' strategy to establish dominance vis-à-vis zoonoses early, during professional education, and their perspective that this may be more promising for future OH collaboration.

Moreover, human health professionals (here members of the Ghanaian MoH) saw OH essentially as a veterinary entitlement:

> Observation and informal discussion: *I met Dr A in the surveillance department of the GHS. I had tried to meet the Director, but he was overbooked. Despite the stressful agitation in the office, Dr A seemed interested in talking to me especially after I mentioned that my research was on zoonoses and OH. 'The Director is really involved in OH, he is pushing but vets are pushing more than physicians', Dr A asserted. One morning a few months later, I came back to the office. I was still hoping to meet with the director. However, Dr A told me that everybody had gone to a board meeting at Korle-Bu Hospital in Accra. We talked for a few minutes.. When I was leaving the office, he added: 'Maybe One Health will be here next year, you should come back next year'.* #20,#94
>
> Interview with a data analyst in charge of case records for the ministry of health: *'One Health shouldn't be only about the vets', he said. He had attended the OH Next-Gen workshop and expressed great excitement about the OH approach, but felt that the human public health sector should be more invested like vets were.* #91

In addition to the fact that veterinarians seemed to have a more important role in promoting OH in Ghana than human public health professionals, Dr A talked about OH as if it were an external approach and not something developed through his department and its professionals. This way of talking about OH is a manifestation of the veterinary narrative that medical doctors tend to support the concept but expect the change to be initiated by their veterinary colleagues. This perspective is reflected in the work of Alders et al. (2017:451) as well as by Stärk and colleagues: *'OH* [is] *neglected by policy*

makers of the health sector who think OH is veterinary-driven' (Stärk et al., 2015:124). This supports vets' strategy of dominance regarding zoonoses.

Vets' dominance-based discourse is related to a concurrent emerging narrative around the need to develop leadership in the veterinary profession by North American and British scholars. They argue that leadership has been neglected in veterinary training and that new challenges like OH require it to be part of vets' key competencies (Baker et al., 2003, Leighton, 2007, Vet-Futures, 2015, Willis et al., 2007). In Ghana too, vets have recognised that leadership skills are essential in realising their ambitions regarding zoonoses and OH. For example, a district vet interested in my research approached me and proudly told me that he had a Masters degree in leadership. He believed it was very important that such training become more prominent in veterinary curricula and with regards to the challenge of collaboration in zoonosis management.[#95]

Conclusion

Ghanaian veterinarians' main interests were consistent with a holistic approach to animal health through protecting animal welfare, ensuring the development of livestock production for securing livelihoods, protecting human health, and guaranteeing the profession's flourishing. Vets saw their role in fighting zoonotic diseases not only as a great opportunity to pursue and fulfil all these interests, but also to regain their professional prestige which has declined over the past decades, and yet which should, in their eyes, be much higher because of the OH challenge.

Thus, vets aspired to a greater role in zoonosis management, with regard not only to exceptional events linked to pandemic threats, such as avian influenza, but also as a matter of continuous, routine veterinary practices. And yet, Ghanaian vets have felt unable to fulfil this role because of a constrained institutional position which privileges only one interest – namely, livestock production – and for ensuring economic growth and less for protecting livelihoods. This has put them in a position wherein they feel they do not have access to adequate resources, nor the necessary policy support to fulfil their full range of interests. Rather, their material reality is in direct contradiction with vets' framing of animal health as a human public good.

In reaction to this situation, the vets envisioned a greater role for themselves in zoonosis management, through which they would gain 1) more autonomy from their constraining institutional

position and 2) dominance in leading zoonosis management. However, this proved to be highly ambitious as it required meaningful institutional empowerment – which, while intended, was not (yet) achieved by new legislation in 2015 – and building the legitimacy of their knowledge and profession in the eyes of the public and other professionals involved in zoonosis management.

This chapter has demonstrated how values that concern society, and underlie the concept of OH, like altruism, social justice, animal welfare, human health and livelihoods are inextricably mixed with values and interests that concern the veterinary profession itself including prestige, dominance and autonomy. I argue that identifying both types of values and interests is needed to understand veterinarians' perspectives on their role for zoonosis management and ultimately their position in relation to OH in Ghana.

Chapter Five: Veterinarians' Relationships and their Potential for OH Integration

Introduction

In the previous chapter (Chapter Four), I argued that vets in Ghana were situated and operated in an institutional context that did not give high priority to vets' interest to develop a stronger involvement in the management of zoonotic diseases and therefore OH. In this regard, the veterinary profession pursued a strategy that involved becoming more autonomous and more prominent in routine zoonosis management. This chapter asks, in turn, how such strategy is acted upon through relationships and how it interplays with local socio-political and power dynamics.

Given this, I examine vets' work-associated social networks, first by characterising network structure, and then by exploring the potential of these networks to promote collaboration through considerations of particular actors in specific contexts and the power dynamics at play (see Chapter One). I ask how do vets establish relationships with other actors at different levels and in various sectors for the role they aspire to play in zoonosis management and what are the key drivers of success in these relationships? To answer this, I use a combination of qualitative and quantitative data on interactions involving my study participants operating at the local, regional, and national level (as detailed in Chapter One).

In the first section, I characterise the participants' networks, using visual representations (network graphs); this provides information on which actors interact with vets in Ghana and how often. In this section, I also elaborate on the circumstances in which vets interact and form relationships with these actors as well as why they interact. In the later sections, I study the potential of relationships for vets and collaboration around zoonosis management across three key conditions identified in the literature (see Chapter One), namely: 1) Awareness, 2) Trust, and 3) Role Specification. I analyse how those conditions play out in Ghana with regard to the potential for OH collaboration involving vets.

In this chapter, I distinguish between relationships engaging vets at the local level and vets at the national level. I do this because of important differences in the way people interacted at these two

levels, and also because of power inequalities between vets of different position levels and qualifications.

Veterinary network structure and frequencies of interactions

Officially, the VSD declares itself willing to establish and cultivate relationships within its own profession as well as with other professionals; this is presented as one of the main functions of the VSD:

> *'To establish, strengthen and maintain linkages within the sector and other relevant institutions' (MoFA website, VSD page: Function of the VSD number 6).*

Vets were interested in establishing relationships with other professionals and, in so doing, implementing more reliable and systematic cross-sectoral approaches to zoonotic disease management. I was curious to explore if these relationships existed in practice. Using the results from the network survey (presented in Chapter One), I found that, indeed, vets were part of large and dense networks of work-associated relationships.

These networks were large because they included an important number of actors as shown in

Table 1, which displays all of my participants' connections, and as explained later in this section.

Categories of actors		Level of operation (L=Local; R=Regional; N/I=National/International)
Clients	Farmers	L
	Associations of farmers	L
	Pet owners	L
Veterinary services - Colleagues	VSDHQ	N/I
	Regional vet officers	R
	District vet officers	L
	Private vets (animal clinics)	L
Private lab	Noguchi Memorial Institute	N/I
International organisations related to public health	AU-IBAR	N/I
	FAO	N/I
	OIE	N/I
	WHO	N/I
	CDC	N/I
	Other international org	N/I
University departments	Schools of public health	N/I
	Schools of vet medicine	N/I
	Other University department	N/I
Professionals in other ministries	Ghana Health Service	L
	Other staff MoFA	L
	Medics in hospitals/clinics	L
	Voluntary health workers	L
	District Assembly – Local gov	L
	Military - Defense	N/I
Non-govt local leaders	Other locals (chief village)	L
	Religious leaders	L
Civil society	NGOs	N/I

Table 1. Twenty six actors selected for the network survey during the first phase of fieldwork.

Figure 14 shows the complex web of interactions through which vets in Ghana connect with various actors in different sectors and positions.

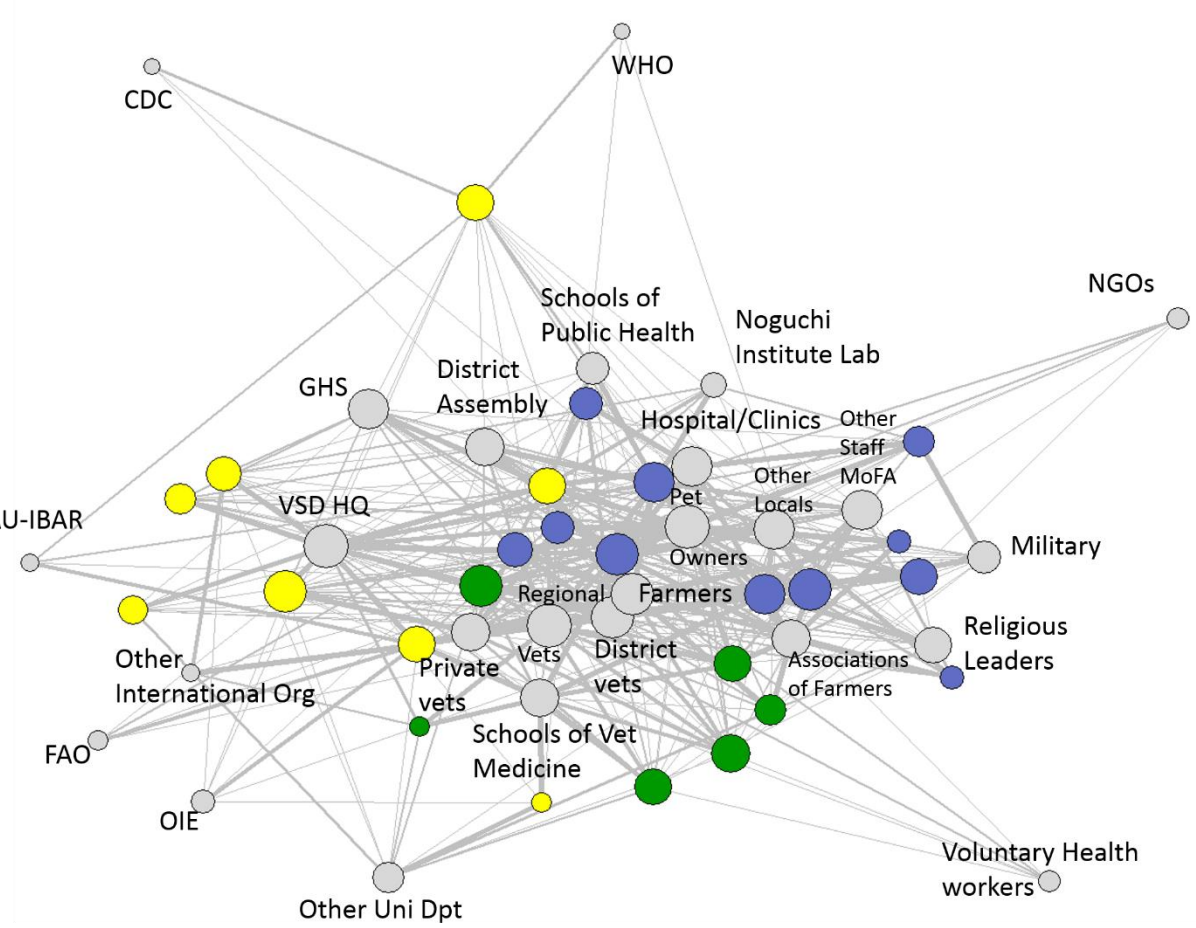

Figure 14. Network graph representing how survey participants (8 national vets in Yellow, 6 regional vets in Green, and 11 local vets in Purple) connect with other vets and other professionals (listed actors, grey nodes).

Information on the network given by the software: 2-Mode Network: Rows (vet participants)=25, Cols (listed actors)=26; Density= 0.53.

A network graph, like the one above, is a snapshot of the interactions of a definite set of actors at one specific point in time. Here, Figure 14 represents a visual of the zoonosis-related relationships my study participants considered they had with the main actors listed in Table 1.

The difference in size of the nodes on this network represents the variation of number of ties (called 'degree') from one actor to another. This is also an indication of network cohesion. The number of

connections my participants have varies from 5 to 24. However, there is visually[137] no significant difference in the size between coloured nodes by level. This means that my participants are connected with a similar number of actors (with an average of 14 connections) irrespective of whether they operate at local, regional or national levels. For the listed actors in grey, we can see a difference in node size: small nodes at the periphery and bigger nodes at the centre of the network. The peripheral nodes correspond to international actors or local actors likely operating within international remit (NGOs) and voluntary human health workers. These actors are connected with a very small number of my participants (for instance, the CDC and the WHO are both connected to only three vets). In the centre, however, most listed actors exchange information or knowledge about zoonoses with a similar number of vet participants. These actors have an average of 18 connections.

The strength of interactions corresponds to the frequency at which my participants interacted with actors. It is made visible in Figure 14 by the thickness of the lines connecting actor nodes, thicker lines indicating stronger interactions. We can note that some participants interact with some actors very frequently since many ties appear thick on the graph. On average, when the actors listed in the survey were included in their networks, my participants exchanged information/knowledge about zoonoses at a frequency of slightly less than once a week.[138] Moreover, on average my participants interacted with more than 5 actors (5.3) at least once a week (scores of 3, 4, 5 or 6).

Social-network studies have shown that work-related networks are rarely larger than 5-6 people, as humans cannot have frequent interactions and engage in significant support with more than that number (Podolny and Baron, 1997, Rogerson, 1997). All of this indicates that veterinary networks that encompass my study participants can be qualified as large networks.

The density of the interactions is evident from the fact that, on this graph, the actors are not separated into groups or isolated in the network, but rather each is connected to every other actor through interactions that include vets. Besides, the density of a network can be measured by calculating the actual number of ties (lines) in the network divided by the maximum possible number of ties. This is an indication of the cohesion or closure of the network (Burt, 2000, De Nooy et al., 2011). And in the

[137] No statistical analysis was undertaken due to the small number of people in each group (level).
[138] The average weight for occurring interactions was 2.7 (mean of the frequency weight attributed to 346 interactions) and a weight of 3 means interactions occur once a week.

present network, more than half (53%) of the possible ties between the actors are present, which suggest a dense and close network.

According to the official system, vets were to interact based on a hierarchical flow of information and resources, according to each vet's administrative level (district, region, national, see organogram of the VSD in Appendix I). In this system, actors transmitted information and/or resources only to the actors hierarchically immediately below and above them, and were not expected to interact with a large pool of other actors.[139] Yet, the interactions observed and displayed in Figure 14 occurred in a non-hierarchical and complex fashion.

Nevertheless, actors are positioned on the network according to their level of operation. As a matter of fact, the nodes of the same colour (representing the level) appear close to each other and coloured nodes tend to be situated in a specific area of the graph. National vets appear on the left-hand side on the graph whereas regional vets are in the middle to bottom right corner and local vets in the middle to top right corner. This is consistent with the fact that national vets tend to interact with actors situated at the national level, like the VSD HQ and international organisations who have national offices, these also positioned on the left-hand side of the graph. The difference between actors situated 'near' regional vets and the ones 'near' local vets is less straight forward as most local actors are spread through the right hand-side of the graph without any clear pattern differentiating actors close to regional and local vets.

Another way to visualise the same network is by grouping participants and listed actors according to their level of operation, as done on the graph in Figure 15. This graph shows that my participants, veterinarians from the district (purple nodes), regional (green nodes), and national (yellow nodes) levels interact with actors of their own level or with actors of immediate levels below or above them. This reflects exchanges of information and knowledge determined by the official system that operates the veterinary services. However, we also see a considerable number of ties between participants from the local level and national/international-level actors on the one hand, and between participants from the national level and locally based actors on the other hand. These interactions are the ones

[139] One exception to this was in case of an important outbreak that needed to be dealt with in emergency, district vets would contact the VSD HQ directly (see Chapter Two) but this rarely happened according to my participants and most information from the local level was shared in a bottom-up way via regional vets.

indicated by the red-dotted lines on the graph and account for what can be called cross-level interactions which are not set by the official system operating the veterinary services.

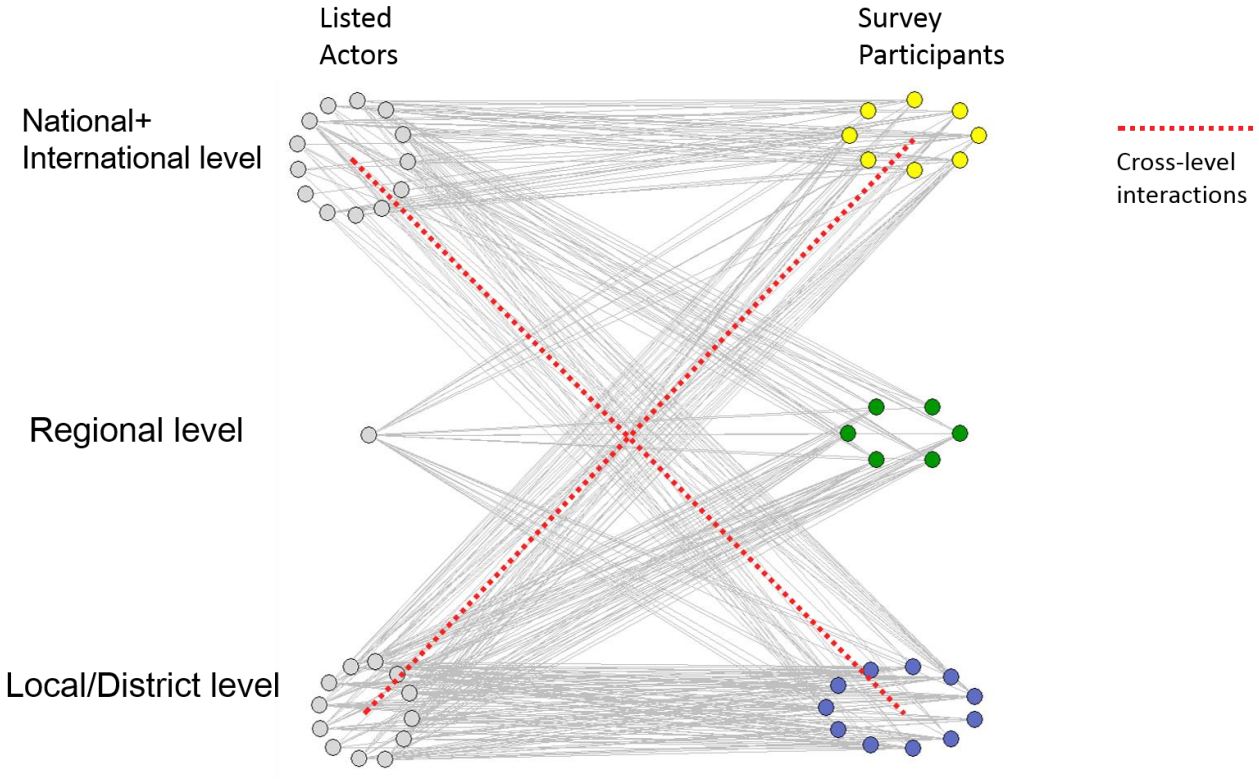

Figure 15. Graph of interactions between my participants and listed actors in the survey according to the level to which vets operate and existence of cross-level interactions (red-dotted lines).

Although the literature suggests that, in dense networks of work-associated relationships, information may circulate effectively and in a timely manner (Sonnenwald and Pierce, 2000), the official system of animal disease management (surveillance, prevention or control) in Ghana, presented in Chapter Two, did not promote this model of dense interactions between actors.

In order to make sense of this complexity in veterinary networks, I obtained information on when these relationships had been established and investigated why these interactions, which did not conform to the official system of disease management, were important for vets. I begin by looking at

vets operating at the national level (top horizontal lines on Figure 15), and how they establish OH relationships.[140]

Interactions at the national level

I found that national vets made use of official systems to create relationships. This is the case of the reporting of zoonosis outbreaks to the OIE, as illustrated by the ties between the grey node (OIE) and several yellow nodes (representing national vets) on Figure 14.[141] But the main way of establishing relationships with other professionals at the national level was through organised events[142] that aimed to coordinate zoonosis-related policy and management. These events took place in large urban settings, like the cities of Accra or Kumasi, in places such as ministry meeting rooms, universities, or hotels. Such events engaging vets alongside other professionals were of two kinds. Either they addressed a pressing issue of common interest for different parties (such as inter-ministerial committee meetings, policy consultation meetings), or they purposely aimed at building long-term partnerships in preparation for future issues that may arise and often had a OH label, such as training courses or workshops. These two main types of events created inter-sectoral bonds in different ways.

One example of a pressing issue leading to inter-sectoral bonds was the organisation of national campaigns of prevention and preparedness to zoonotic diseases threats through the creation of inter-ministerial committees. This happened in 2007 in regard to avian influenza, and also at the time of my fieldwork (2014/15) in reaction to the Ebola epidemic that was occurring in Liberia, Sierra Leone and Guinea. Along with national-level human public health professionals, vets from the VSD HQ in Accra worked to prevent Ebola from affecting Ghana and to prepare an efficient response in case it did (see Chapter Three). In both inter-ministerial committees, vets could voice their interests and influence decisions around budgets and preventive interventions, and offer their knowledge to help

[140] I only focus on the national level, and below on the local level, and do not expand here on how vets establish relationships with other actors at the regional level. This is because there was not any actor relevant to OH at the regional level (on the graph in Figure 15, we can see only one node which corresponds to the regional vet office). Although regional vets in my sample interacted a lot with both national and local actors, they mostly were experienced vet surgeons located in urban centres, and therefore interacted with these actors in the same way it is described in this section on interactions at the national level.

[141] The veterinary services of OIE member countries are mandated to report animal diseases outbreaks that feature on the OIE list of 117 notifiable diseases through the WAHIS interface.

[142] Events that do not occur spontaneously but are planned in advance and involve an official organisation of some sort.

streamline the government's communication message to the public in order to avoid confusion and panic.[#99]

Another example was the '*National Consultative Multi-Disciplinary Stakeholders' Workshop'* which I attended in Accra in August 2014. This meeting, already introduced in Chapter Three, aimed at collecting various viewpoints about the draft of a new livestock policy initiated by the VSD. Different parties sat around the same table with a spirit of discussing various perspectives of animal health policy and making the new policy inclusive of these perspectives. Various stakeholders attended, including representatives from the FAO, the United States Department of Agriculture, MoFA and the Animal Production Department, the VSD, associations of farmers, traders, and butchers, the Veterinary Technicians Association, and local government, as well as a legal consultant from the Attorney General's Office.

During the National Consultative Multi-Disciplinary Stakeholders' Workshop, there were lively interventions about anticipated difficulties in implementation of the newly proposed livestock policy (introduced in Chapter Three). For example, some participants said: '*I can see that there will be implementation issues';* '*Paraprofessionals should be represented by a person on the Board of Directors'*; '*Will these regulations be done across divisions or will each division manage* [their own]'? Numerous potential conflicts of interests between different stakeholders at the table, not yet addressed by the current draft of the proposed policy, emerged from the discussion including livestock and meat transportation, water access for slaughterhouses, the poor state of the meat market, meat inspection by environmental officers, enforcement of policies by the police, medical examinations for butchers, competition between grazing areas and crops (tomato), free livestock vaccination, and shortage of veterinary staff. Each event thus served as an opportunity for coordination.

Examples of events aimed at establishing longer-term inter-sectoral partnerships included training programs and university courses or workshops, and generally targeted active professionals. For instance, in 2014, the Masters FELTP (see earlier) had been offered for the 7th year in a row by the school of Public Health at the University of Ghana (actor present on the network in Figure 14). This course, funded by the CDC (also present as an actor in Figure 14) gathered together different health practitioners like vets, medical doctors and laboratory biologists, and this justified its label as a OH initiative.

Training workshops of a few days duration also happened in Accra and presented opportunities to build inter-sectoral relationships and to articulate a veterinary perspective. One senior vet from the VSD described the NADMO disaster management workshop she attended in January 2014 as a great opportunity for her to better understand approaches to dealing with disasters, but also to sensitise decision-makers at NADMO to emerging animal diseases as potential causes for disasters affecting human lives.[#85]

I attended a few sessions of a workshop called the OH Next-Gen Project which took place in Accra in January-February 2015 (introduced earlier). This workshop was funded by the European Commission and involved the training of 'One Health Practitioners' in the Anglophone countries of the Maghreb and Sahel by international experts, so that these trained practitioners could, in turn, train their younger and less experienced colleagues in their respective countries. The focus of the lectures and exercises was on prevention and control of the principal neglected zoonoses of the Sahel and Maghreb regions, to which human public health professionals were invited and which was supported by a web-based distance learning tool.

Therefore, interactions between my participants and national or international actors, as seen above, take place mainly through formal meetings or programmes gathering people from different professions and sectors around a specific issue or to build OH connections for addressing future needs. Other than these formal, organised events, there were few opportunities to interact and build relationships.

Interactions at the local level

At the district level (bottom horizontal lines on Figure 15), opportunities to create bonds with other professionals were different to those at higher levels. The district vets in my study interacted frequently with other local professionals, like MoFA officers or health officers. This was because the different sectors, including the vets, were physically located at the same government offices, which encouraged interactions on a daily basis. The opportunities to establish relationships between vets and other local professionals at the district level thus was closely linked to the geographical proximity of peoples' offices.

Often, district vets occupied an office in local assembly buildings, generally the building for MoFA, and thus shared workspace with agricultural agents (labelled 'Other MoFA staff' in the network in Figure 14). In District One for instance, entrances, corridors and meeting rooms in the MoFA building constituted common spaces where government officers, which included vets, often bumped into each other and talked. I also frequently observed informal discussions between vets and other MoFA staff members inside the vet office. For example, the district MoFA accountant was very often coming in and out of Dr B's office and joked with him. Sometimes, the accountant would even be almost impolite with Dr B, making fun of him in front of me or replying to my questions to Dr B before he could, with great irony. This attested of their very familiar relationship.

This close proximity represented potential opportunities for frequent information exchange about zoonoses and collaboration. Such relationships between vets and local agricultural officers were very important in terms of informing vets about disease events in a sensitive and timely manner. This could complement vets' own limited veterinary coverage of rural areas which impeded their ability to detect disease occurrences in their large districts (see Chapters Three and Four). Indeed, the shortage of vets and therefore their limited awareness of animal disease situations in areas they did not cover could be compensated by such exchanges with other agricultural field agents.

Yet, in an official review of MoFA, the auditor highlights that information sharing between MoFA agents (including vets) is limited in routine official procedures:

> *Effective internal communication, which is key for any organization, is essential for an organization like MoFA that operates all over the country, including the remotest areas. Nevertheless, the results of the review indicate that a culture of documenting and sharing information is not predominant within MoFA. This may be linked to a broader management culture in Ghana, which places more emphasis on personal relations and interactions than on institutional procedures. In fact, meetings seem to substitute for routine processes that could achieve the same objective. As a consequence, meetings and travel seem to take an inordinate share of the time of senior managers* (IFPRI, 2010:24).

Since routine communication between MoFA agents through official procedures is not the norm, links between vets and other MoFA agents in veterinary networks seem to be characterised by '*personal relations*', in other words friendships such as the one between Dr B and the local MoFA accountant.

Some district vets also interacted regularly with public health officers if their offices were close together. Dr B highly valued such interpersonal relations and he 'collaborated' with the GHS disease control officer of his district, whose office was located just 100 meters away from Dr B's. This situation was not unique and some other vets' offices were situated close to GHS disease control offices where

government doctors worked. A GHS district disease control officer I met stated that for him, collaboration between vets and medics at the local level depended on whether those had a good pre-established relationship:

> Interview field note: *When I asked more about his relationships with the vet, the disease control officer said that it was fortunate that the vet in his district had been working there for a long time. 'She lives near my office so she uses to come, greet the people there and sit with us for a while during the day. He explained that, because she was 'often around', when meetings were about to take place in his office, he and his team would tell her and invite her to join.'* #46

Such good relationships were not however always the case. During a regional meeting, one district vet asked his regional vet officer:

> *'We have been reposted and there was no copy [of the reposting document] to the people at the assembly etc. Are we gonna be introduced so they will invite us to the meetings about health, agric[ulture], etc.?' The regional vet officer advised the district vet to just drop by the assembly's offices to introduce himself, 'Once they know you, you will be invited to meetings'! However, I could see that the district vet did not have much faith in 'dropping by' just by himself and that he would have preferred being formally introduced first.* #75

These comments show that district vets could establish inter-personal relationships – acquaintance or even friendship – with GHS officers (present in the network in Figure 14), like with local agricultural agents, facilitated by their geographical proximity. However, this involved 'hanging out' and 'dropping by' offices repeatedly before bonds finally were established and seemed difficult for district vets to initiate on their own, as it required vets to invest their time and energy and it did not accord them the respect or status they felt they ought to receive.

Relationships between vets and MoFA agents as well as between vet and medics at the local level therefore seemed to first involve knowing and liking each other as individuals and were not necessarily motivated by the relevance of their work and potential common goals. Similarly, Anholt et al. (2012) argued that collaborations in OH started in the private sphere. I found some isolated illustrations of the benefits vets can get from formerly-established, personal friendships with medical practitioners which concern the sharing of human health resources and information for interventions around rabies:

> *In a district, a vet technician told me that her team's clinic would often get human rabies vaccines[143] cheaper than the regular price sold in pharmacies because the senior vet there was a friend of a medical doctor in the nearest city.*

[143] When a person had been bitten and had not sought or received a post-exposure vaccination against rabies in a human medical institution, the vets in this clinic would collect vaccines by themselves. The vets would then

> *A retired vet said that he had received money from the GHS for organising rabies prevention campaigns because he was a former classmate of the GHS director for metropolitan Accra.#22 A senior vet from the VSD HQ also mentioned that, to his knowledge, some money had been transferred from the GHS towards the vet services for rabies management in the past.#16*
>
> *A district vet confirmed that regular friendly encounters with some staff working at the hospital located very near his clinic gave him closer access to medics when needed, as he was part of the same 'community'. This was notably useful for rabies control, as compared to other vets in his area who had more difficulties with their human medical counterparts.#102*

Participation to research studies have been another relational entry point for vets into a OH approach to disease surveillance and control. In recent years, vets have been part of several published studies which included a OH protocol for surveillance and control of major zoonoses. Several studies found in the Ghana Veterinary Medical Association (GVMA) conference proceedings I attended in October 2014 involved multisectoral investigations of bovine tuberculosis, brucellosis, and rabies,[144] as illustrated by this excerpt:

> *We investigated an outbreak of rabies in Nyive Community in the Ho municipality of the Volta region of Ghana. We set out to confirm the outbreak, perform descriptive epidemiology, contain the outbreak and help implement control and preventive measures, where possible using the One Health approach* (Amemor et al. in GVMA, 2014:24).

Often, collaboration in animal health research projects on zoonoses between vets and other professionals was stimulated by training needs. For instance, the public health school of Legon (Accra) trains students to do research as a required component of their degree programs. Veterinary students who worked as district vets in the FELTP must 'collaborate' with their lecturers, many of whom having public health backgrounds, on a research project in order to write their Masters dissertations. Thus, research projects initiated or framed by public health often provide valuable opportunities for vets to participate in research on zoonotic diseases.

Unlike at the national level, where vets formed relationships with other actors through formal meetings directly related to common work interests, vets at the local level interacted with local actors through informal personal exchanges that were not, at first, necessarily work-related but closely

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encourage the person to find a nurse to administrate the vaccine rapidly and it helped for acting fast if the vet clinic already had the vaccine in hand.

[144] For bTB: see abstracts pages 23 and 36 (as well as other publications: Asante-Poku et al., 2014, Amemor, 2017); for brucellosis: abstract page 17; and for rabies: abstracts pages 24, 37 and 38.

linked to geographical proximity with these actors. As identified earlier in this chapter, a large part of the interactions that I identified between my participants and other OH actors around zoonoses took place between actors at the national/international level and actors at the local level. These informal cross-level interactions, responsible for the veterinary network's high density, offers the possibility for vets to shortcut formal channels of communication within the veterinary system as well as with non-vet professionals and, therefore, represent an important potential for OH, which I discuss below.

Cross-level interactions

Exchanges of information and knowledge between multiple actors from different levels therefore was common.

From conversations with my participants, I obtained various explanations for these cross-level interactions. Vets often were involved in veterinary activities beyond their official mandates. Some vets offered their services outside of regular office hours in private practice. Other vets, employed at the headquarters or regional offices also provided basic animal health services in their areas. For example, one regional director was directly responsible also for controlling mortality in broiler chicken farms where large economic losses due to outbreaks were at stake.

Sometimes, matters of national concern required direct interactions between the vets at the VSD HQ and local populations, bypassing local vets. The network data revealed that vets operating at the national level were, despite their management and policy roles, also interacting with the public. Vets working at the headquarters told me that sometimes they went 'to the field' to investigate the emergence of zoonotic diseases and their risk factors, as well as to raise awareness among populations at risk.

Cross-level interaction also developed through friendships that were maintained across career stages, as these friends settled in new places or took jobs in different organisations. Dr M, for example, kept in touch with a friend from an international organisation in which he had studied a post-graduate degree in Japan. The network data revealed that some district vets also were in touch with people working for international organisations (AU-IBAR, FAO, OIE, WHO, or CDC). However, these interactions were weak as they occurred less than once a month, in general a few times a year. Several participants mentioned having formed connections during their career based on temporary needs

and that subsequently had been maintained despite no longer being formally required in their current job. District vets valued these cross-level relationships with national and international actors, given that they often needed to follow the impact of their reporting of disease cases.

To sum-up, veterinary networks in Ghana offer their vet members the possibility to collaborate with professionals at other administrative levels and in other sectors for zoonotic disease policy and management. Beside the formal channels of information and resource exchange allowed by the official veterinary system, the analysis of my participants' network showed that there were significant opportunities for OH in vets' relationships with other actors at the same level of operation as well as across levels and in various ways.

This is consistent with the idea that actors in such networks benefit from accumulating social capital as a potential for collaboration (as explained in Chapter One). Yet, for Sonnenwald and Pierce (2000), actors in dense work-associated social networks may still experience challenges to collaborate. And, in Ghana, despite this potential for collaboration, vets perceived zoonoses to be mostly managed by one single ministry at a time. There was an implicit understanding about which ministry would lead the response to an outbreak according to whether the disease caused problems primarily in people or in animals. As this retired vet surgeon emphasised during an interview:

> *If a zoonotic disease is essentially causing deaths in animal populations and occasionally in humans, it is taken care of by veterinary authorities (like AI in 2007), and if it causes deaths in human populations after an initial animal-to-human contamination like Ebola would, the human health authorities would mainly handle the issue.*[#13]

When there was no obvious primary concern in either the animal or human population, the MoH and MoFA tended to react in sectoral, and separate, ways. An environmental officer, working in the metropolitan Accra unit of the GHS, explained that, in the case of diseases which create mortalities in both human and animal populations, like rabies or tuberculosis, both the veterinary services and the human health services established programmes of prevention and control in their respective populations with little joint action and information sharing. According to him, these separate actions are not coordinated at the national level.[#43] At the local level too, vets did not experience the degree of collaboration to which they aspired. District vets I met often talked about this lack of collaboration, which they linked to their counterparts in other sectors, in a negative way (discussed further below).

In the following sections of this chapter, I examine the main relationship challenges that appeared as key factors, beside the accumulation of social capital, to enable or impede the potential for collaboration associated with zoonoses in veterinary networks. To do so, I focus on relationships – or their absence – between specific people, going beyond the large categories identified in the network structure analysis above.

Absent relationships and relationships with a limited potential for collaboration

This section examines how vets feel about awareness, trust and role specification, conditions identified earlier in the thesis as critical for relationships – that favour collaboration – to be built. This focus remained even more relevant given that, as discussed in the previous section, my study participants' networks were characterised by closure. Indeed, by definition, it is more difficult for actors to join close networks and therefore I expected some relationships, potentially key for OH, to be absent from the network.

Raising Awareness for zoonosis prevention and control

The relationships I documented in veterinary networks suggested that collaborations happened only when there was strong awareness among the actors about the utility of collaborating with vets in the first place. The idea that 'others' lacked awareness and basic knowledge about zoonoses was common across all categories of vets, from the local to the national level and to research institutions, and was applied to many professionals who could, in the vets' eyes, do more to enhance zoonosis prevention and control.

Vets wished for a general public with greater awareness and a basic knowledge about zoonoses and their management so that society would attribute a greater importance to zoonotic diseases. Many vets in Ghana shared with me the concern that animal owners were not investing enough in their animals' health and not making use of official veterinary services and preventive measures. This resonates with Turkson who reports that vets in Ghana perceived farmers to have '*poor attitudes toward animal care*' and a '*lack of knowledge*' on how to improve animal health (2003:334,336). As is evident in the following extracts, the vets' views were based on their knowledge and experience of

vaccination against zoonoses and against a variety of other preventable diseases, which they saw as underutilised by livestock owners:

> Field notes excerpt, observation and informal discussion in District Two: *As Afia watched from the windows of her vet clinic, a man leading a goat make his way across the road and into the practice. While still watching him approach, Afia suggested that the animal had Peste des Petits Ruminants (PPR). She could see the tell-tale nasal discharge as well as traces of diarrhoea and these symptoms were classical for the disease. According to her, farmers were supposed to vaccinate their sheep and goats against PPR every year to prevent outbreaks in their herds as well as in the neighbouring ones. 'But they never do it!' she added, and 'when the outbreak comes, they end up paying more'! For her, farmers did not invest in vaccination because they could see that their livestock were healthy and, lacking more in-depth knowledge about PPR, as well as about other animal diseases sometimes zoonotic, assumed that spending money on vaccination would be a waste.*#55

> Press article about anthrax: *This article cited Dr. Yebuah[145], who was of the view that the farmers were not serious in protecting their investments. 'If a farmer cannot sacrifice an amount of GHp30 to vaccinate an animal that can fetch him or her an amount of GH¢200, that farmer is not worth calling him or herself a livestock farmer,' he said (The daily guide in modernghana.com, 9.04.2013).*

In both the above excerpts, the vets expressed the idea that farmers should care more about using preventive measures such as vaccination against animal diseases, not least because it is likely to be financially beneficial. They both show, echoing the thoughts of many of the vets I spoke to, that investing in animal health services in a preventive way was worthwhile for livestock owners and felt frustrated that they had not managed to convince livestock owners of this. As was evident in the first excerpt, underlying these failures to convince the general population was vets' perception that, if the public knew more about zoonoses, they would act more responsibly in relation to their livestock and make use of veterinary services for preventing disease. All this suggests that, even though livestock owners interact with vets for treating their animals, these relationships were insufficient to prevent animal diseases through owner-vet collaboration.

'Ignorance' of veterinary knowledge is also the reason given by vets for the high-risk behaviour of a range of professionals involved in animal handling, including butchers working in abattoirs:

> Informal discussion with a vet working at an abattoir: *For Dr M, whether butchers perceive zoonotic risks for the meat as well as for themselves and follow advice from vets (for instance, wearing gloves) depends, in part, on their literacy and education level. 'Before, most of them were illiterate but now they are more and more educated, but some listen and others still don't', stated Dr M. He recalled that, in the past year, a senior butcher in the abattoir, who had a persistent cough, had*

[145] Dr Yebuah was a veterinarian and lecturer at the University of Accra at the time of my fieldwork. Prior to this position, he used to work at the Epidemiology Unit of the VSD HQ.

> *died. At the autopsy, the doctors found that the man had died from Tuberculosis. But, according to Dr M, it was not enough for butchers to know about the risk of contracting TB from slaughtered sick livestock as such events happened only rarely. Rather, as Dr M stressed, every year the staff of the abattoir undergo health check-ups and last year about three percent was diagnosed with diseases like TB, Brucellosis or Hepatitis B. The problem for Dr M is that he cannot prove 100% that diseases such as TB or Hepatitis B come from animals since the pathogens can also be transmitted person-to-person. But for Dr M, for sure, there are contaminations from animals to people in the abattoir and people working in these facilities need to be more aware of this in order to take appropriate precautions.*[#57]

There is evidence to support the argument put forward here. In a study of Kumasi slaughterhouse, Otupiri and colleagues found that butchers had a very limited knowledge of zoonotic transmission to themselves of infections from the animals they handle on a daily basis (Otupiri et al., 2000). In addition to this lack of knowledge, the authors pointed out that butchers' religious beliefs regarding protection against diseases, and their culture of self-medication, contributed to make sanitary regulations (like wearing protective equipment) poorly implemented (Otupiri et al., 2000).

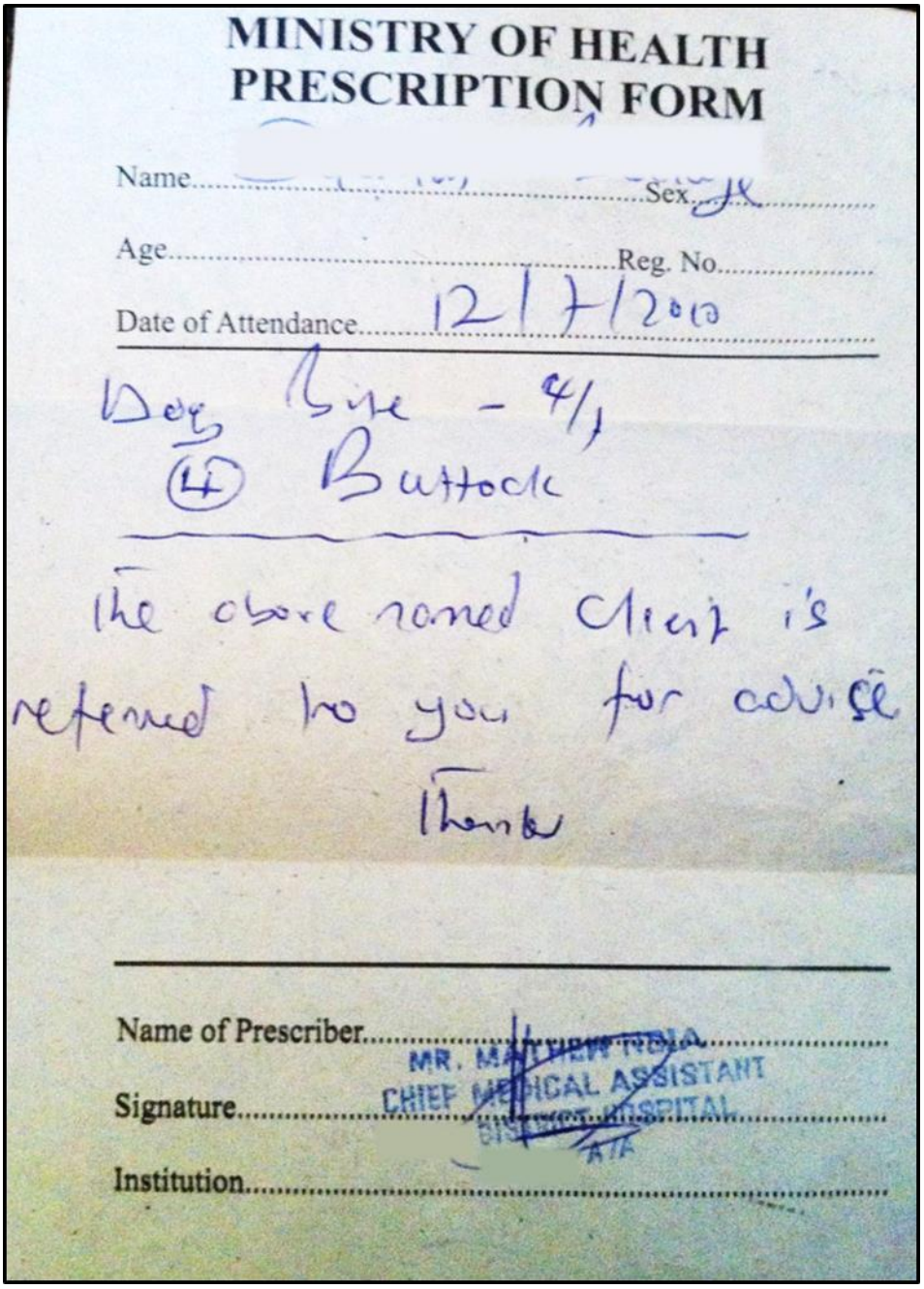
Another example of the vets' struggle with other professionals' apparent ignorance regarding zoonoses and their prevention was linked to the control of imported animals and animal products. The likelihood that imported infections could be zoonotic is increasing in parallel with the importance of globalised trade (Cunningham et al., 2017a). A senior vet I interviewed worked full time at the Accra international airport where he examined all aircraft cargo that contained live animals or animal products imported into Ghana. Because the workload was too much for him and his assistant, he missed some of these control checks. '*If you are not there, they don't call you!*' he told me, explaining that the customs staff working on cargos did not understand the purpose of his job and therefore did not find it necessary to notify him of cargo arrivals.[#18] This was problematic for him because some of these arrivals contained animals or animal products which could potentially introduce zoonotic diseases into Ghana. The limited ability for Ghanaian vets to influence other actors' understanding of zoonoses is seen by vets to impede important relationships that could lead to OH collaboration in zoonosis prevention.

Raising awareness in veterinary networks is also a means of ensuring collaborative and improved zoonosis control. However, this is another area where vets feel not enough is being done. Rabies is a notifiable disease in Ghana (see Chapter Two) and this is the classical example of a disease that requires close collaboration between vets and medics. This is because, once there is a suspicion of a

rabid animal biting a person, the animal needs to be monitored or put down and tested for the virus[146] in order to confirm the diagnosis of rabies (VSD, 2012). In parallel, the person who has been bitten needs to know that he/she can receive a post-exposure vaccination that, if administrated as soon as possible after the bite, will protect the person against the virus.[147]

Patients who had been bitten by dogs[148] and who may have been infected by rabies virus sometimes first went to the hospital, where they would see a nurse, a doctor, or a laboratory technician.#102 Since the person bitten needs to be put in contact with medical authorities, and the veterinary services need to be alerted about the animal, as soon as possible after the bite occurred, the first official to become aware of the situation – whether a vet or a medic – should pass the information on to his or her counterpart. The letter below (Figure 16), written by Bernard to his medical colleagues, demonstrates how this should ideally be done.

[146] Observation of symptoms, including the death of the animal. If the animal dies in the next 15 days following the bite, the diagnosis of rabies is established.
[147] See WHO website http://www.who.int/rabies/human/postexp/en/
[148] This is the most likely mode of transmission of rabies, even if the virus can also be transmitted from cat scratches or other kinds of contact with other mammals like bats.



MINISTRY OF HEALTH
PRESCRIPTION FORM

Name..... Sex.....

Age..... Reg. No.....

Date of Attendance..... 12/7/2013

Dog Bite - 4/1
(4) Buttock

the above named client is referred to you for advice
Thanks

Name of Prescriber.....

Signature..... MR. MATTHEW TEDIA CHIEF MEDICAL ASSISTANT DISTRICT HOSPITAL

Institution.....

Figure 16. Letter from a human medical doctor to refer a suspect case of rabies ('dog bite') to the local veterinarian (here Bernard) for monitoring the dog's health situation and protect the patient accordingly (names on the letter have been hidden).

Regrettably, vets in Ghana regularly noticed failures in this process and, as evidenced in the examples below, they saw this as stemming from a lack of motivation on the medics' side:

> Field notes from visits in District One: *This morning, I found Dr B sitting on the doorstep of the MoFA building, looking upset. He was waiting for a woman who had lost her daughter to rabies about 4 months ago. When the woman arrived, they talked in Twi, a local language, for a while. Then he gave her 20 GHc to buy health insurance and to get the post-exposure vaccine against rabies. I asked him what had happened to the little girl. He said: 'They [the medics] refused to treat the little girl who had been bitten because they thought a puppy could not transmit rabies*[149]*, they killed that girl!' He looked at me and asked, rhetorically: 'How can a doctor say that'? He continued with disgust: 'They do not care about human beings but only how to fill their pockets'. I was speechless and could see his frustration. He expressed so much anger with his words, and led me to understand that this was not a new problem for him. 'I have been applying for money for vaccinating people in a [rabies] case for years, nothing happens, they [the district assembly] don't care'.* #33
>
> *I had a look at the monthly report of September 2014 produced by the vets of the clinic to the VSD and which was printed and kept on a pile of papers in the technicians' office. In this report, Dr B had summarised a workshop on human and animal rabies which had involved 'heads of all health facilities within the municipality' and which had taken place in May 2014: 'It was well attended. The occasion was used to express the need for collaboration between the health sector and the veterinary services if we want to stamp out rabies in the municipality and the country as a whole'.* #30
>
> *'Even at the hospital, they don't have lab tests for rabies' said Dr B. A person in the district had recently died, potentially from rabies. Thereafter, Dr B had offered to carry out the diagnostic test (that vets routinely do on animals at the regional lab) on tissue from the dead patient so that the disease could be confirmed. But, according to him, the medical staff refused because no one was willing to pay for the autopsy to extract the right brain sample.* #31
>
> Notes taken during a district vet meeting at the regional vet office: *A district vet stood up and said: 'Two weeks ago, at the district hospital, it was clearly a dog bite case which I brought myself [to the local hospital staff]. We were directed to the pharmacy, etc. I had to give my personal money, 180 GHc for five doses [of vaccine] twice. The negligence of the hospital! They wouldn't have referred us [to the pharmacy] if we had not gone with two persons.'* #75
>
> Interview with a senior vet working in a military vet clinic: *When I asked him what he thinks of the medical profession's knowledge of rabies, he replied: 'Sometimes medics can be so ignorant!' For example, some cat owners came to see him one day to ask if it was true that 'cats don't have rabies', which they had heard from 'some medics'. He was surprised and made the owners aware that indeed their cat could transmit rabies and needed to be vaccinated. He asserted that when vets refer someone who has been bitten from a suspect rabid animal to medical doctors, the vets advise the doctors to disregard whether or not the animal was vaccinated in their decision to administer a post-exposure vaccine to the patient. This is because the vets know that, when pets*

[149] The fact that puppies (and kittens) carry rabies virus has not been always evident but is to be suspected and diagnosed (White et al., 2007).

> *are vaccinated, sometimes their immunity has not yet developed or was low at the time of vaccination, and, in both of these cases, the vaccine would not have functioned properly. Moreover, he remarked that sometimes the vaccines simply do not work, as the cold chain for preserving the vaccines' efficiency could not always be maintained. Therefore, for him, there was too high a risk for the patient to forgo the post-exposure treatment, even if the suspect animal was known to have been vaccinated. This senior vet was only too aware of how things worked in reality and believed that medics usually did not know about these complexities of animal vaccination and therefore placed too much emphasis on how things should, in theory, work when deciding how to treat the patient.*[#102]

All the above quotes and notes show the ways in which vets perceived medics to be negligent in their responsibilities. As shown in the final example, it is the vets' experience of how things work in practice, rather than the theory of veterinary policy and procedure, that concerns them. The underlined sections show how this negligence comes from what the vets perceive as the medical professions' deficient knowledge about zoonoses and how this affects animal health management; in this case, it affected the collaboration potential between vets and medical staff and ultimately influenced rabies control results.

While recognising that the level of medics' ignorance may be exaggerated by vets, the assumption that the medical system generally does not have access to enough scientific knowledge on zoonoses has been supported by OH scholars. Rabinowitz et al. (2017) showed that there was insufficient knowledge about risks associated with zoonotic diseases taught in medical curricula to support a OH agenda globally. This has ramifications for vets in their daily practice. For example, in the third district I visited, this problem was so important for Bernard, the district vet, that he took me on a short trip to the local Nursing and Midwifery Training College on his motorbike. Arriving there, we saw a man with a briefcase leaving the school. I thought he looked like a teacher and Bernard, who probably thought the same, intercepted him:

> *Bernard greeted the stranger, introduced us and asked if he taught at the school. The man replied he was indeed a lecturer at the school. Bernard asked him if he had a minute. The lecturer acquiesced so Bernard asked him to what extent lecturers in the school were teaching zoonosis-related material to future nurses and midwives. The lecturer replied that disease names were certainly mentioned during their studies but that he definitely thought that medics in general did not learn enough to fully consider zoonoses in their practice. This short discussion confirmed Bernard's intuition.* [#61]

Beside medics, other government officials, such as NADMO[150] agents, were portrayed by vets as key players for controlling zoonotic diseases. NADMO district field agents[151] also had knowledge of animal disease cases, and especially anthrax outbreaks, having been specifically trained to recognise the signs of this disease. Similar to vets' perception of medics' knowledge or the lack thereof, vets regretted not collaborating more with NADMO agents at the local level. NADMO agents had an official duty to warn the local vets if they heard about anthrax cases in communities, so that the vets could intervene in their capacity of '*animal health experts*'.[152] Yet, NADMO agents were not mentioned as actors involved in the study participants' work-related networks around zoonoses (they are not part of the list in Table 1 above). Nevertheless, NADMO was active in anthrax prevention and was advocating for an integrated approach to anthrax management, as illustrated in the following quotes from a newspaper article published on the 9th of April 2013:

> [The] *NADMO* […] *recently toured some communities in the three Northern regions to interact with livestock farmers, butchers, veterinary workers and agricultural extension officers on how to prevent a possible outbreak in these areas this year.*
>
> Dr. Twum Ampofo, chairman of the Pest and Insect Infestation Technical Committee of NADMO: *'One anthrax case recorded in an area is enough to cause an outbreak in both humans and animals if not handled well and in time. Thank God the anthrax case recorded at Tanzue in Bolgatanga was handled well and fast. If not, it could have killed almost half the population of animals and residents of the area and this is what makes the disease dangerous,' he said.*
>
> Musbahu Alhaji Ahmed, The Bongo District Director of Agriculture (local MoFA): *'Since the disease affects animals and humans, it should be seen as a development issue and be tackled with a multi-sectoral approach. No community can stand the rapid destruction of lives in both humans and animals by an anthrax outbreak,' he cautioned.* [153]

In these above quotes, the NADMO and MoFA officers insisted on the importance of intervening as early as possible when anthrax strikes in an area, yet this early intervention is dependent on staff from the different sectors working together. Concomitant deaths in human populations and their livestock

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[150] National Disaster Management Organisation of Ghana, introduced in Chapter three.
[151] They were also members of the local government and there were agents in each district of Ghana.
[152] Anthrax cases occurred mainly in small ruminants and could be passed on to people. Anthrax outbreaks were reported every year when the rainy season started, around March, and were concentrated in the Upper-East region, as well as in the two other northern regions. The first case is usually detected in animal populations, from which some people would get infected by eating dead animals' meat, no longer likely to be sold. If the animal dead of anthrax was of large size, people usually would split the meat into many pieces and distribute it to neighbours and friends, which could spread the disease very quickly.#90
[153] Article published in the Daily Guide and available here:
https://www.modernghana.com/news/457566/1/anthrax-outbreak-hits-bawku.html

justified the involvement of NADMO because anthrax outbreaks are seen as disasters which, as NADMO recognised, required collaboration between animal owners and handlers as well as local MoFA staff (including vets and AEAs).

Prompt reporting by NADMO agents to vets seldom happened however. For vets, the necessity to control the disease as fast as possible meant that they could not wait for information to come to them and therefore they desired to be the first to be made aware in order to avoid serious delays in the burying of animals. Anthrax control in livestock consisted of a specific protocol to follow in order to avoid the (further) spread of the disease to people. The infected animals (likely dead cattle, small ruminants or pigs) had to be either burned or totally buried in the ground at a minimum of six feet deep, along with the spreading of specific chemicals (like lime), and treating healthy animals with antibiotics (like Penicillin). Veterinarians, including technicians, were trained to carry out all these acts (VSD, 2012, #72). Yet in reality, vets too often were made aware of anthrax outbreaks relatively late, which, according to them, put in danger the communities in the concerned area.

A veterinarian highly positioned in MoFA went further and asserted that anthrax outbreaks usually were not communicated to vets at all. This was confirmed to me by a national NADMO agent I interviewed, and who blamed medics for not involving vets when they found out about anthrax cases.#90 A senior vet from the VSD HQ recalled a disturbing memory of an outbreak of anthrax in 2011, a year when Ghana experienced numerous outbreaks (Awoonor-Williams et al., 2016). He describes one instance when the government response left vets out of disease control, as the occurrence of human cases required urgent medical intervention for people: '*Health people took advantage of the situation. Health people sent pick-ups there without telling veterinary people'*! #9 For him, not including vets right away was not only a mistake undermining disease control, it was also an opportunity for medics to assert power over vets.[154]

One factor that may improve awareness and collaboration in veterinary networks is having an education shared with other relevant professions, like promoted by the concept of IPE (discussed in Chapter Four). Having students sharing training courses was recognised by some of the vets as playing a significant role in establishing a good awareness between future graduates and therefore solid foundations for future collaborative professional relationships. A military vet working in Accra

[154] It is uncertain whether, in this instance, non-veterinary staff took care of dead animals or if this was done at a later stage.

declared that it was very important for students at university to build good relationships with professionals in other sectors during their careers. He himself studied in Nigeria, where the veterinary school was situated very near the medical school and the pharmacy department, which he found gave him some respect for these professions, a key requirement for future collaboration. This situation established the foundations for maintaining respectful and friendly relationships with his human medical colleagues where he works now.[#102] There is some potential for more shared education between vets and medics, notably, as a senior vet confirmed, that new students trained at national schools sometimes shared courses with medical students.[#25] After awareness, trust also revealed to be an essential limitation to collaboration in my participants' networks and I discuss this next.

Building trust

Good communication between vets and other actors involved in zoonosis management requires more than just procedures or personal relationships. It also requires trust and long-term investment. Coleman (1990) argues that in close networks, people are likely to trust one another. Yet, what are the implications of this for vets engaging with others to sustain relationships that support their interest in having a more prominent role in zoonosis management? As discussed in Chapter One, trust seems to be a necessary element of sustained collaborative relationships. But this process of establishing trust between professionals was not straight forward in Ghana's veterinary networks, as shown by the examples below.

In Accra, where national-level actors are based, maintaining inter-sectoral relationships is a challenge. A public health officer who had worked with vets in programmes on Tuberculosis prevention and treatment in Accra found collaboration between medics and vets in cities like Accra very hard to maintain because vets and medics had to travel a significant distance in order to meet and therefore tended not to meet again.[#43]

> Field notes of my visit to the GHS national office: *Dr A was sitting at a desk in the reception room of the director's office in the Surveillance building of the Ministry of Health in Accra. I understood that he was a medical doctor assisting the director by providing organisational and administrative support. Once I explained to him what my research was about, he expressed his interest in Ghana moving towards the OH agenda and told me he had met one of my study participants, a vet working at the VSD in Accra, at a One Health meeting in 2013. He told me that, when he studied toward a Masters degree in Public Health in 2001, for which he worked on Ghanaian health policy, he had not yet heard of the One Health concept.*

> *During my second visit a few months later, I met Dr A again. We talked a little about the VSD and, despite his earlier expressed interesting in OH, he told me that he had never been to the VSD and did not know where the VSD was located in Accra.*[#20,#94]

In the above account, despite a first encounter with a vet working in the same city and an interest in working alongside vets, this doctor did not have a relationship with vets in Accra. It should not have been hard to develop such a relationship; however, Dr A did not find immediate reasons to do so and supporting the idea of a OH approach was not enough for this to happen.

While workshops with a OH theme provided the environment to initiate inter-sectoral relationships, if there is no follow-up plan to maintain these relationships, they are likely to dissolve. The OH Next-Gen workshop (introduced earlier) is a good example of this loss of momentum to continue relationships. Among pitfalls identified by the participants, during an open discussion to evaluate the workshops as well as in conversation with me, arose insecurities and uncertainties about what was going to happen next for the participants. The project's administrators were located in Belgium and this rendered it impossible to have a local computer platform with teaching materials in Ghana. Yet, this platform was needed because the internet connection was too weak and unstable to download the lecture files. Some participants, including Ghanaian vets, also felt as they needed more training before feeling confident to teach. Others were unsure how they would get the certificate that proved that they were qualified to teach and whether they would be contacted to teach. The organisers were not able to provide a clear plan and coordination between participants after the workshop. This suggested that the only inter-sectoral professional relationships that were going to persist after the workshop were those that already had been established before the workshop.

However, some vets and their cross-sectoral colleagues had overcome the problem of physical distance through the use of digital technologies to achieve regular communication after having met in person. One of my participants, a vet involved in policy at the national level, told me how beneficial the FELTP remained for him, years after he graduated with his Masters degree:

> *While we were talking in his office, his phone 'beeped' and he told me he just received a notification about a Cholera outbreak in Accra by a colleague medical doctor through his WhatsApp group of fellow FELTP alumni. He told me that their WhatsApp group was created after he graduated and included new graduate cohorts. He said that when a disease event happened, the whole WhatsApp group became aware of it immediately and could share information and advice about what was happening in real time.*[#11]

Even if meeting people in person was necessary initially to create inter-sectoral bonds, digital technologies like the social media application used here were a means to maintain the contact in the longer term. Other researchers have shown that the use of information technologies can increase the level on trust in relationships (Ryssel et al., 2004) and that communicating through social media applications can nurture inter-professional relationships despite time and space-related constraints (Cain and Chretien, 2013).

At the local level, trust was also important and especially so in the relationship between district vets and local animal owners. Such trust is the foundation of effective general surveillance for animal diseases, and is crucial for detecting emerging zoonotic infections (Jebara, 2004).

Although the Ghanaian surveillance system for animal diseases was well structured on paper – involving a clear chain of data reporting from the local to national and to the international levels – as shown in Chapter Two, vets often questioned its functionality and effectiveness. One of the most important concerns vets had in regard to Ghana's surveillance system was about the quantity of data produced locally and then transmitted to the national level.

A vet epidemiologist in charge of analysing and compiling the data on animal diseases in Ghana, perceived these data to be insufficient:

> *While I was talking to this vet, a district vet came into her office and asked her for all the data on PPR outbreaks in the region for the last year. He wanted to use these data to know more about the benefits of PPR vaccination. She showed him the data, which corresponded to a total of four outbreaks. He was very surprised as he thought there would have been many more outbreaks during this year, knowing that his own district was greatly affected by the disease. The regional director said that the data may not reflect the total number of outbreaks as some district vets may not have reported and that there was no other way for her to know what was really happening in the region.*[#85]

Similarly, evaluations of the anthrax surveillance systems in the northern parts of Ghana, published in the annual veterinary congress proceedings of 2014, show that some highly-positioned vets involved in research had noticed that district vets and community animal health workers were not able to detect and report all anthrax cases to higher levels of the VSD (GVMA, 2014). Although I have shown in the previous section that the control of anthrax cases relies on notification from other local professionals like NADMO agents or local medical staff, as shown below, trusful relationships with livestock owners were also key to detecting cases in animals before the disease could affect people.

A pre-requisite for zoonotic disease surveillance under OH is the establishment of good relationships between local vets and their animal-owner clients (Paul et al., 2015). According to the network survey, all the district vet participants talked to animal owners about zoonoses '*almost everyday*' (scored 4 or above). This suggests that, through these relationships, local vets should have been able to get information about the health of their clients' animals from all over their districts so they could transmit it upwards to the veterinary authorities and to other local public health practitioners if need be.

However, in reality, the reporting of disease cases from animal owners to local vets was not straightforward and unlikely to happen with each of vets' clients on a daily basis. Detection of animal disease cases requires animal owners to report health issues to their contacts at the closest veterinary office. In rural villages, reporting of cases happened only if there were frequent and regular interactions between local vets and animal owners, as was the case in district Three. Here, field veterinarians like Bernard benefited from trustful interactions with their clients and continuous information about what was going on in their areas. Creating such strong relationships with animal owners took time and involved pro-actively and physically visiting households and farms.[155] District vets had to build up trust and convince animal owners that they could improve the health of their animals. The need for vets to sometimes confiscate or cull animals before this trust existed, undermined the scope for building effective surveillance relationships. Most of my participants told me they had difficulties doing this, and that animal owners were reluctant to invest in animal health by employing veterinary services. For example, a senior vet, now a professor at a faculty of veterinary medicine, told me about the challenges he experienced when, as a young district vet, he sought to persuade local animal owners to come to him when their animals were ill:

> *For my first district, I was the first vet in the area. People didn't do anything for animals. So, I provided deworming for free for one year, to show them results. After a year, they compared themselves with owners whose animals hadn't received deworming. It worked!* #76

This vet gradually gained trust from the people in his work area so that his services would be requested. After he proved the advantage of treating pets and livestock against worms and demonstrated to them that he was not going to fine, report or cull animals unnecessarily, people started investing in veterinary drugs and care, and found his services significantly valuable to them. I

[155] During all my time accompanying Bernard, I witnessed someone bringing an animal (peacock) to his home only once.

witnessed another example of this with Bernard as we went to a meat market in his district to initiate contact with one meat seller there. Bernard did not inspect the meat, beyond a quick look at a few pieces of beef that were still yet to be sold, yet gave the seller an inspection receipt certifying the meat's safety for consumption in order to gain his trust.#74

Because this process of building people's trust in local veterinary services took time, energy and investment, it limited the territory that vets were able to cover, especially where farms or households were scattered over wide and remote areas. A veterinary technician student explained to me how interactions with a few helpful farmers were key to his personal confidence as a vet practitioner.#79 In rural areas (which represented 46% of the population in 2015[156]), recurrent contacts with a few specific farmers represented an important aspect of developing veterinary work in a district. However, this limited the vets' sources of disease occurrence information to only a portion of the area they were supposed to cover for animal disease surveillance.

When district vets moved to new districts,[157] they often lost their networks of people that were based on the proximity of their offices and had to find ways to enter new networks, which sometimes was difficult. In District Three, a month after a young vet had been reposted to another district, I witnessed him visiting households in his original district on his motorbike. This indicated that, despite the presence of a new and more experienced vet in his former district, he found it difficult to leave his clientele. He relied on these clients in order to remain active and to generate a revenue,[158] particularly as he had not yet established new relationships with animal owners in the district to which he had been reposted, and therefore did not yet have any clients.[159] All this suggests that, although local vets are interacting very frequently with animal owners as an actor category (see earlier), interactions are limited to a small set of people, with whom vets have trustful relationships.

AEAs (Agriculture Extension Agents), who cover a much more extended areas than vets (see Chapter Four) represent an opportunity for vets to compensate for missing trustful relationships between district vets and farmers. A senior officer of the Policy, Planning, Monitoring and Evaluation

[156] Number obtained from the World Bank: https://data.worldbank.org

[157] Vets in Ghana can be reposted to new districts every few years or so, either because there is a need for moving experienced vets to districts where their expertise is in demand (like I explain in Chapter Four/not sure), or because the vet desires to move often for family purposes. Some vets however stay in the same area for decades.

[158] I explain why and how vets generate a revenue for the VSD in Chapter Three.

[159] This information came from the new vet who replaced him in the district. #74

Directorate at the national MoFA declared that AEAs were officially mandated to call vet officers as soon as they had any knowledge of an outbreak and also to provide support to the vets to control the disease.[#101] Yet, as shown in Chapter Four, this channel for assistance was seldom used by vets' because they thought that AEAs were too involved in competing informal veterinary practices. Mistrust and bad relationships between vets and AEAs seriously limit the communication between vets and AEAs about animal disease cases and therefore the scope of disease surveillance. Role specification also constituted an important missing requirement for collaboration in Ghanaian veterinary networks, which I discuss below.

Specifying actors' roles

After awareness and trust, the third key factor to establish OH collaborative relationships was a clear definition of the roles of the various actors, including vets, in zoonotic disease management. As discussed in Chapter Four, vets in Ghana had a determined idea of the role they should play in zoonosis management and felt that they were not sufficiently supported with resources to carry out this role. In practice, this role that vets aspire to play often cannot be successfully negotiated as being theirs because it is challenged by others' perspectives and by power dynamics. This had important implications for inter-sectoral collaborative networks and achievement OH processes because vets, as key actors in OH, can be prevented from realising their full potential for collaboration. This is explored below through examining relationships between: first, district vets and local resource providers; second, district vets and environmental health officers (EHOs); and third, the cross-level relationships already introduced in the first section of this chapter.

Vets' and local resource providers

At the district level, vets saw the under-resourcing of the veterinary services (discussed in Chapter Three and Four) as resulting from the prioritisation of other public services over veterinary services through decisions made by local government leaders like district MoFA directors and elected district assembly chiefs. The allocation of budgets to each department within the local MoFA (including the veterinary department) at the district level falls on one person, namely the district director of MoFA. In theory, it also was possible for vets to secure funding from the district assembly, after approval by the District Chief Executive (DCE), an elected local leader (see diagram of government-related resource flows in Figure 2, Chapter Two).

In practice, interactions between district vets and MoFA district directors and DCEs were often conflictual. Instead of constructive dialogue and collaboration, the relationship between vets and these local actors was defined by resentment from vets after failing to make a case for, and obtain, more funding from these local providers.

The district vets I met often blamed MoFA district directors for taking arbitrary decisions about the allocation of government funding, and for taking very little direction from their superiors (regional and national MoFA). Vets believed that MoFA district directors privileged other local units of the government agricultural services, especially crop-related units, over and above veterinary services because directors often had crop-related backgrounds and did not think that investing in veterinary services was necessary. Along this line, a vet technician said: *'They* [MoFA directors] *think we are useless, they think they are more sensible than us. That's why we don't receive anything'.*[#47] This view was confirmed when I interviewed the MoFA director of District Three, whose background was in horticulture and agricultural extension.[#73] He explained to me that, for the coming year (2015), very little money would go to the veterinary unit in his district, justified by the fact that crop needs were more urgent. For example, the seasonality of plants determined when farmers needed to be trained, in view of the next harvest. At the time of the discussion, the Canadian International Development Agency had offered to organise farmers' training sessions for improving crop production in this district. The MoFA director insisted that the departmental funding was indispensable if he were to make this project a success. He argued that livestock was much less influenced by seasonality and that opportunities might arise later in the year for vets and the livestock sector. This argument however did not hold much ground for vets who were concerned about diseases such as anthrax, for which outbreaks occur in a particular season.

As the lack of funding, in comparison to other MoFA units, was a major source of concern for all district vets, it would often be at the centre of discussions in local meetings. At a meeting with the district agricultural committee, Dr B exclaimed: *'we* [the veterinary unit] *are a very dedicated department but we have no resources and can't do nothing* [sic] *for years now!*' Someone in the audience supported his claim, pointing out that whether Ghana's vet units had money should not be a matter of private investment as it concerned zoonoses, which are '*general issues*'.[#32] But that day, the MoFA district director was absent and no progress was made towards solving this situation.

Farmers' Day, a national celebration of farmers in Ghana (see Figure 17), is a striking illustration of MoFA's failure to prioritise vets and of vets' resentment towards local resource providers. The tradition, since 1985, had been to celebrate the effort made by farmers and fisherman to feed Ghanaian citizens and to promote investments in agriculture. At the time of my fieldwork in 2014, Dr B declared that, in principle, he would like to get involved in the Farmers' Day, for example by sensitizing people to animal diseases and investing in livestock health. Yet, he explained that even if he were to attend and '*be around*' that day, he was so repelled by what he saw as the nepotism and demagoguery surrounding the event that he did not want to be part of the programme.

Figure 17. Farmers Day celebrated in District Three, 4th December 2014.

In 2014 and 2015, the event cost the government around five million GHc for which MoFA received donations from businesses and banks.[160] Farmers and fishermen were given prizes – machines and '*requisite equipment and items that could aid them*' – for their contributions and innovative skills. But I was told that the prizes often went to the more productive farmers who already had the capacity for large-scale production. District vets thought that this system of prizes and awards was unjust in that these highly productive farmers did not need aid, in comparison to poor farmers who struggled to

[160] Ghana News Agency, article of the 31.08.14: http://www.ghananewsagency.org/economics/MoFA-starts-receiving-2014-farmers-day-donations-79244 and article of the 01.08.15: http://www.ghananewsagency.org/social/31st-farmers-day-launched--92592

subsist, and the vets therefore considered these prizes to be rewards for political loyalty, as one remarked during a regional meeting:

> *The best farmer gets a house, but generally, it's already wealthy people. They* [the government] *only give to famers of the same party, the one of the current president.* #48

In 2014, I attended Farmers' Day with Bernard and we noticed that the winner of the best farmer prize (the motorbike in the picture in Figure 17) was indeed a rich man, judging from his convertible car and his very classy suit and sunglasses,#62 as well as the people he shook hands with. Bernard remarked that this man certainly did not need a motorbike compared to people like himself, for whom his motorbike represented the tool that allowed him to work, in other words, everything (discussed in Chapter Three).

MoFA's skewed distribution of money towards crop-related units creates the expectation from district vets that, when a veterinarian becomes MoFA district director, this person will compensate for the money lost in previous years by allocating more to the veterinary unit. This, in turn, creates frustration for other units. A senior vet surgeon admitted to privileging vets' interests once he was himself a district director for MoFA: *'I was a district MoFA director since the extension system was put in place and all units were gathered together, and I was biased! I wanted to give more resources to the veterinary services'!* #84

Frictions about money between district vets and their MoFA district directors can go beyond preferences to invest in crops rather than livestock due to discipline-related sensibilities. For example, Dr B remembered the time when a veterinarian was his district's MoFA director and yet did not give more resources to the veterinary unit.#28 In this case, the motivations were power and personal gain, and neither scientific evidence nor sensitivity to a political agenda mattered. Indeed, some district MoFA directors appeared to be taking money from vet services essentially for their own benefit:

> *Dr B and the district MoFA accountant discussed recurring delays in payments owed to Dr B: 'Last time, you were the only name we had problems with', the accountant said before bursting into laughter, and implying that Dr B was cursed regarding money. Dr B explained that they had a problem in the database with his number, but even if he had understood the problem as technical, he was very annoyed as it added to the money problems the vet team already encountered and which he saw as based on political choices, not technical mistakes. Perhaps this time it really was a mistake, but it was obvious that Dr B suspected the MoFA director of misappropriating money, taking funding away from frontline workers and directing it towards her own benefits. According to him, she would not get caught because she would produce fake receipts and because of her*

> *position within the hierarchy. 'Corruption is escalating' Dr B complained. He added that the behaviour of the MoFA district director 'was a matter of supremacy' and that this made him feel 'really bitter about it'.*[#47]

Other vets were as frustrated as Dr B, and they had similar understandings of the nature of the problem. A regional vet surgeon asserted that the main reason why district MoFA directors would not give funding to the vets was that vets were qualified scientific people, often more qualified than MoFA district directors themselves. This led MoFA directors to need to demonstrate their power over vets and one way of doing this was through limiting vets' access to funding.[#28] A district vet I met in Accra adhered to this view of MoFA district directors being against vets in principle. She claimed that providing documents with evidence of the presence and importance of certain diseases in the district (like a list of disease cases that had occurred in the past year), and by so doing asking for a budget to tackle these diseases, did not *'make any difference*' to MoFA district directors' budget decisions.[#95]

District vets have mentioned using the district assembly to fund zoonosis-related activities, notably post-outbreak vaccination campaigns against rabies in villages.[161] Although at the national level vets often mentioned lobbying politicians to promote their interests (see Chapter Four), lobbying the DCE was much harder for district vets. For instance, Afia admitted feeling very intimidated when asking for additional resources from the district assembly to carry out mass vaccination campaigns in villages because she only represented herself or, at most, a couple of vets for the whole district (depending on the current staff in her clinic), and thus found it hard to prove the legitimacy of her request.[#55] The vets underestimated, however, the challenges experienced by all government departments who were themselves under-resourced and had to compete with other sectors and departments for funding. One MoFA district director asserted that it was very difficult, even for him, to get any money from the district assembly because agriculture was not a tangible development that could be seen physically, like hospitals or schools and thus was not useful to political actors at times like elections. DCEs *'follow* [their] *own political agenda*' like MoFA District Directors, and often do not prioritise agriculture.[#77] During a meeting at the regional vet office, a district vet told me that he did not get any funding from the district assembly following a dog-bite case: '*We went to the DCE, he replied to us "you waste your money on rabies!"*'.[#75] Similarly, a press article on a rabies outbreak in Brong Ahafo

[161] Assemblies did sometimes make resources available in the case of important outbreaks. In November 2013, Bernard asked the assembly to lend him a pick-up vehicle for a vaccination campaign following the death of a child (see the newspaper photo). Nevertheless, Bernard still had to use his own salary to advance pay for the order of 400 vaccines because the assembly only provided the money after the campaign.[#61]

region in 2013 relates that *'veterinary sponsored programmes by the Municipal and District Assemblies had stopped due to lack of funds and* [the veterinary department] *was no longer undertaking surveillance or monitoring in the rural areas, and is no longer vaccinating animals free of charge*'.[162]

The examples above show how district vets do not feel that their role in zoonosis management is taken seriously by local resource providers, on whom vets depend. The sense of being undervalued and therefore under-financed, particularly in comparison with other sectors with which collaboration is needed in order to manage zoonoses, inhibited or prevented entirely that essential collaboration by vets.

Vets and environmental health officers

I witnessed another challenge linked to clarity of roles at animal slaughter facilities, where environmental health officers (EHOs) were inspecting the meat, in addition to vets. EHOs were local civil servants who worked under the MoH, but vets saw them as professionals separate from the 'medics'.[163] They had graduated from one of the country's schools of hygiene and were mainly responsible for ensuring good sanitation in public facilities.

The vets involved in inspection of live animals and carcasses after slaughter did not believe that EHOs should be involved in meat inspection. A sign of this tension between vets and EHOs was that EHOs were never identified in the network survey as key actors with whom my participant vets interacted about zoonoses (see Table 1 above). Vets I met who worked at slaughter sites argued that EHOs' skills were too limited for them to be able to identify disease symptoms and lesions in carcasses, and that only vets were suitably trained to carry out proper meat inspection. Dr B's statement illustrates this:

> *These people* [EHOs] *do not know anything about animals but still are in there for meat inspection (food products and trade) to collect revenues for the FDA* [Food and Drugs Authority] *and should not be in charge of delivering permits; it should be only the vets.*[#27]

[162] Article from the 12.06.2013, available at https://www.ghanabusinessnews.com/2013/06/12/rabies-outbreak-kills-two-in-brong-ahafo/

[163] I observed vets interacting with EHOs in slaughter facilities, but vets did not themselves identify EHOs as key actors in their work-related networks. For this reason, EHOs are not included in the network survey and related network graphs presented in this chapter.

Dr M and his assistant also reported confusion and problems with EHOs at the regional abattoir. Since the Public Health Act was written in 2012, Dr M asserted that Ghanaian vets were '*in charge of meat inspection*' (ante and post-mortem) and therefore EHOs should have stopped carrying out inspections. They thought EHOs '*do not know anything about pathology or animal anatomy and physiology*'.#51

Even though this confusion of roles with the EHOs came up in almost every conversation I had with my vet participants about meat inspection, some vets had found ways to collaborate with EHOs.

During a visit to the abattoir at a food complex,#44 I spoke to Emmanuel, a young veterinary technician overseeing livestock slaughter in the building. I asked about his relationship with the district EHO, and he indicated that, indeed, the EHO came and carried out inspections of the meat after slaughter.

However, he proudly added that, when he himself was not too busy with veterinary visits in the district and was able to come to the abattoir, which was almost every day, he would be the one to do both ante and post-mortem inspections.[164] Emmanuel explained that this decision came from a common agreement between himself and the EHO that only one person needed to be present to do the inspection. Both were equally capable but having two people present was a waste of time. The vet was really happy about this arrangement and considered it as a mutually-beneficial management of human resources. For him, checking the meat was relatively easy, as lesions indicating possible infection were 'visible' compared to figuring out if something was wrong in live but sick animals.

Nevertheless, Emmanuel preferred to oversee the inspection of the slaughter house himself rather than leave the task to the EHO. Emmanuel, as a vet, would normally undertake both ante-mortem and post-mortem inspections. The EHO, however, did not examine live animals in the vet's absence. EHOs were not trained to detect symptoms of infection in live animals. Yet, ante-mortem inspection represented an opportunity to identify the presence of diseases that could cause consumption of the meat to be dangerous or that could be transmissible to people's handling the meat. Emmanuel's view that the slaughterhouse inspection is best done by vets was shared by the manager of the abattoir. He said to me that the vet '*knows better*' and that thus the staff here '*do not need the environmental*

[164] Ante-mortem means before slaughter, on animals alive, and post-mortem means after the death of the animal, on the carcass.

officer when the vet is on the site'. EHOs were, he felt, necessary in some other places, where the abattoir staff '*do not have vets'*.

This example was the closest of what could be seen as a '*mutual understanding' and cooperation* between inter-sectoral actors involved in zoonosis prevention, because it involved an agreement and arrangement which necessitated communication between the practitioners from different sectors. However, it was, in fact, an exception in my data. In all the other slaughterhouses I examined, there was a total absence of communication between EHOs and vets posted to the same slaughter facility. Most of the time, vets and EHOs would not cooperate. When I asked a district vet about her collaboration with her district's EHO, she said that she did not support the EHO's presence and inspections. As a consequence, when she came to the abattoir, she carried out the inspection, and not the EHO. In general, vets took the opportunity to assert their professional dominance over EHOs in relation to zoonotic disease control whenever they could, as is evident in the following example:

> *Observations during my visit in District Two: Bernard invited me to join his morning visit to the local slaughter slab where around four cows per day are killed and sometimes a couple of small ruminants. The EHO was present, dressed more smartly than anybody else present. Therefore, when blood and other fluids spurted from the animals being slaughtered and cut into pieces, the EHO stayed aside. But Bernard was getting his hands 'dirty', being attentive to the process so that he could take the opportunity of this small window of time to look at the animals' visceral and muscle parts and make sure there were no signs of disease. There was nothing to declare at first, but suddenly a carcass was presented and Bernard spotted a problem. 'These are paramphistoms!' he said to me and the EHO. At this point, the EHO stepped in, saying that he thought it was the parasitic species Taenia saginata. Bernard immediately contradicted the EHO with a convincing explanation, showing that the EHO was wrong. The EHO did not argue with Bernard, showing little confidence in his diagnosis. This may have been especially embarrassing for the EHO as it all happened in front a young female EHO trainee who was experiencing her first day as an intern. After this, Bernard kept telling me and the EHO trainee what he observed on the carcasses, using a tone reminiscent of a teacher and including an impressive Latin vocabulary. The EHO stood silent and apart from the rest of us until the end of the inspection.*[#74]

OH scholars have advocated that environmental health officers should play a greater role in zoonosis management, not only through their participation in food safety, as is the case in Uganda (Musoke et al., 2016), but also by EHOs getting involved in animal disease surveillance alongside vets in wider contexts (Eddy et al., 2013). But in Ghana, this seems an ambitious objective, given that, as shown in the above discussion, the roles are not clearly defined and professional hierarchies mean that power relations come into play, making genuine OH collaboration or even cooperation difficult at times. Therefore in Ghana, such as Stephen and Karesh (2014) advance, the environmental sector (at least through the EHOs) is not a prime stakeholder of OH.

Roles within the Veterinary Services

An absence of clear roles within the veterinary services was also an important impediment for collaborative relationships for zoonosis management with actors outside the veterinary services. This lack of role definition concerned affected relationships between district vets and regional/national vets on the one hand, and between technicians and veterinary surgeons on the other. These two sets of role confusions overlapped in the sense that the roles of district vets were poorly distinguished with respect to vets with higher positions while the vets in lower positions often were veterinary technicians by training and the higher-positioned vets most often were veterinary surgeons.

Figure 18 displays how my participants connect the different levels of the VSD through their interactions about zoonoses. The strength of the connections[165] between national vets (VSDHQ) and local vets or animal owners on one hand, and between regional vet officers and local vets or animal owners on the other, appears equal. Here again, and only within the veterinary services, my data show a dense and non-hierarchical network of connections between vets at all levels, in contrast to the structure of the official, hierarchical system. This implies that my participants had connections that were not confined to the organisational structure of the veterinary services.

[165] Represented by the ties' weights (in Green). These are calculated by Pajek software and are function of the frequency of interaction score obtained in the network survey (see Chapter One) and the number of participants linking two nodes (actor categories). In other words, weights depend on the number of participants interacting with two actors and the frequency at which they do.

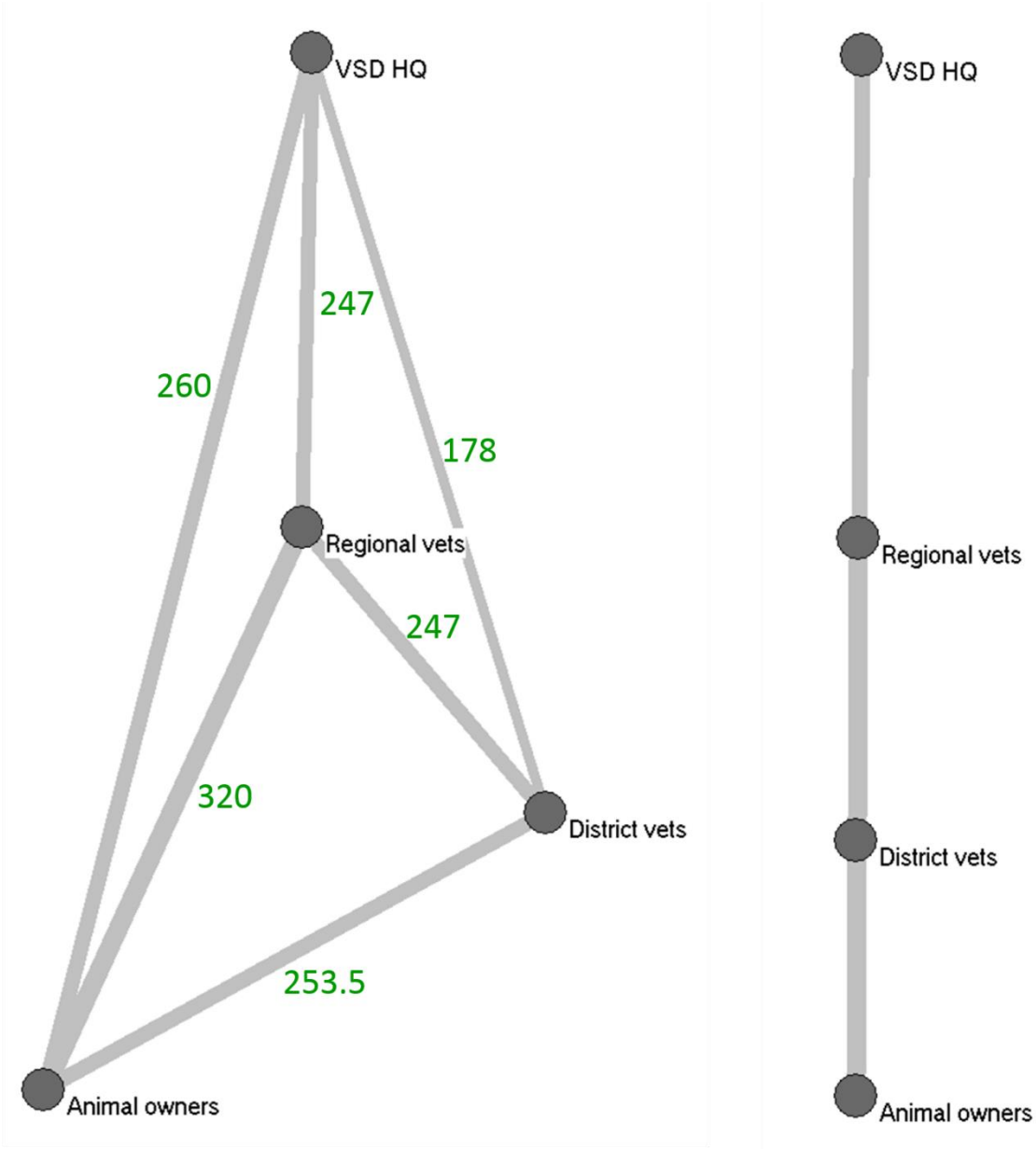

Figure 18. Network representing connections between vets at different levels and with animal owners (pet owners+farmers) showing zoonosis-related cross-level interactions within the vet services (left), and official system of knowledge/information exchanges about animal diseases (right).

The lack of clear guidelines and role specification meant that national vets did not have to show local vets any respect and could just work in these vets' communities. The fact that national vets engaged directly with villagers to obtain disease surveillance data, bypassing district vets, was a problem for collaboration between local veterinary services and local livestock owners/handlers. I was exposed to this problem when I followed a senior vet from the VSD headquarters, Dr P, on his trip to the border with Togo to talk to local poultry traders and to estimate the risk of importation of AI in Ghana through that border.[#23] Dr P, like many national vet surgeons, lived in the capital city and was used to interacting with people in a hierarchical way and showing his high status when addressing village communities. Although Dr P had legitimate intentions, as he wanted to protect his country from the importation of an infamous disease, my observations in this trip suggest that by-passing district vets challenges the quality of the animal disease surveillance system through damaging relationships between local vets and animal owners/handlers.

Indeed, district vets at the frontline can be seen as better positioned to get accurate and often sensitive information from the general public, and especially technicians who, according to Amankwah and colleagues, '*are often members of the same ethnic group as their clients, reside in communities where livestock is found, have lower income aspirations, and can handle 80-90% of the veterinary interventions in extensive livestock production systems'* (2014:298). However, by interacting directly with the public, national vets like Dr P may discredit district vets and impede district vets' capacity to form authority in the eyes of populations. District vets were not supporting veterinarians with managerial positions (at the regional level or above) to be in charge of livestock disease surveillance in industrial farms in their districts, as they considered this surveillance to be their official mandate as field vets.[#56,#72]

Having highly positioned vets involved in monitoring animal diseases on the ground, like in some research projects, had the effect of creating a parallel surveillance system. Although research projects on zoonoses seemed to be welcomed by field vets, as compensating for a financially-neglected general surveillance system, district vets regretted that they were not included in these projects and that they were rarely made aware of research findings. At an abattoir, the vets reported that researchers from a local university visited them on a weekly basis to collect data from the inspection registers. The veterinary team had little knowledge about who the researchers were and what project they were working on. The vet team also mentioned being visited by international research teams

(from Germany or the USA) as well as by university lecturers and students about three times a week. Being involved in these research projects would allow them to be aware of any risk identified (notably zoonosis cases in the abattoir staff like Tuberculosis), to learn from these academics and, as shown in Chapter Four, to enhance their professional role.

However, as research/surveillance findings eluded district vets, these were not recorded into the general surveillance system via monthly reports. Ultimately, this weakened the routine surveillance system and impeded the Ghana's capacity to identify emerging infections in animals. It risked making general awareness and prevention of zoonoses secondary, displaced by short-term projects for fighting animal diseases, which district vets condemned, as researchers talking directly to national vets created a two-tier system.

Although there are examples of research undertaken in collaboration with district vets, as it appears in studies such as Opoku-Agyemang et al. (2015), these collaborations mostly concern veterinary surgeons, which are the minority of district vets (as seen in Chapter Two). This is reflected in the network survey as local vet technicians had less informal connections with national and international animal health actors than local surgeons, as we can see on Figure 19:

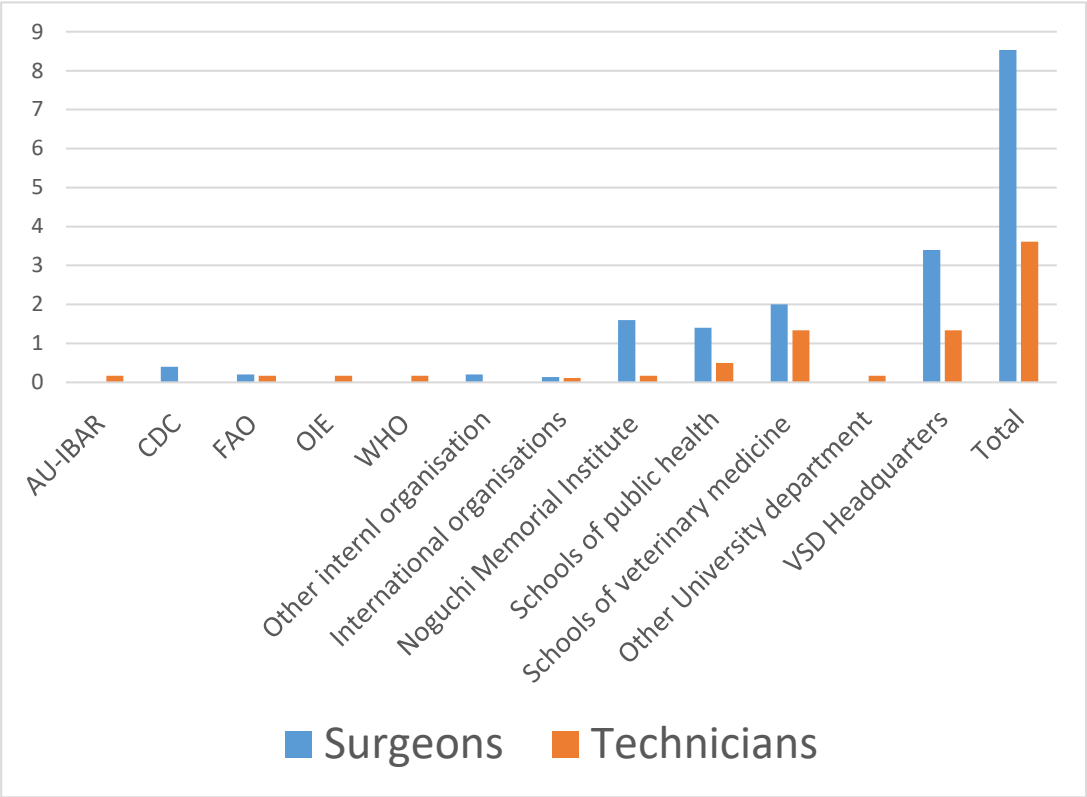

Figure 19.Average of frequency of interactions (scores) on zoonoses between local vets and international and national actors, comparison between technicians and surgeons.

Technicians therefore received little feedback from higher levels about the use of the data they had generated and are less able to follow up on cases and stay alert if need be.

The fact that technicians in Ghana played such crucial role in animal disease management at the district level (see Chapter Two) fostered a strong demand that they take part in the scientific and policy debates which were dominated by vet surgeons. Technicians I worked with would have appreciated, for example, attending scientific events such as conferences on animal diseases or taking part in research projects, as they valued their expertise generated in the field (knowledge of local livestock and pets) and saw this as complementing that of surgeons. But this is rendered difficult because of the fact that technicians cannot access higher qualifications beyond a Bsc.[#60] And therefore their expertise to participate in research or scientific debates is not recognised by most surgeons whereas it could provide key insights from the field for zoonosis-related policy and could better integrate new research into established disease reporting procedures and protocols.

The fact that vet surgeons and vet technicians had separate professional associations also undermined collaboration and cooperation. In parallel to the GVMA which gathered surgeons only, veterinary technicians participated in the VEMTAG which had its own meeting events. One of my participants, who had worked initially as a vet technician and then became a surgeon, complained about the lack of integration of technicians: '*Doctors have put them away. During the fight for the salary raise, they* [the surgeons] *didn't help them* [the technicians] *or include them'*.[#83] A veterinary technician shared with me the fact that he did not feel welcome at vets' annual activities:

> *I mentioned that I had not seen him at the GVMA conference and he replied that he was there only to give a speech during the opening ceremony (which I had missed) but that he would not stay because he did not like the atmosphere. I asked why and he explained to me that he is too passionate about issues concerning vet technicians (as their representative) and therefore the vets do not like him to 'stay around'. I then realised, and commented, that I had not seen any other technicians at the conference and he said this happened because if the technicians were present, 'they would ask too many questions after each presentation and the vets would not like it'*.[#45]

All this is consistent with the literature on social networks that argues that key brokers render networks more efficient, precisely what is needed when resources are scarce (Bierschenk et al., 2002, Burt, 2000). Indeed, cross-level interactions here can be seen as a symptom of the absence of knowledge brokerage in networks within the veterinary services. Besides the creation of relationships between actors, another way to build social capital is for a small number of actors to occupy strategic positions in networks. Burt developed the theory of 'structural holes' in which these holes correspond to empty spaces between disconnected groups of actors (Burt, 2000). Beyond the social capital lying in these structural holes, this theory also is associated with positive externalities that represent network efficiency (here information/knowledge exchange). Although, the hierarchical official system of the veterinary services, as presented in Chapter Two, involves vets as brokers at each level (district, regional, national, see Figure 18), the network presented in this chapter (Figure 14) is largely composed of informal relationships and cross-level interactions, presents no clear difference of social capital between actors and also between study participants, and therefore is not characterised by structural holes or clear brokerage.[166] This suggests that, because of these informal relationships, vets

[166] To test the level of brokerage in the network in Figure 14, I measured the betweeness centrality. I could see that vet surgeons amongst my participants had more of a broker role than technicians (the average betweeness for surgeons was 0.023, and for technicians 0.015). However, the measures of centrality betweeness in the network in Figure 14 did not go over 0.06, which indicates a low level of brokerage in this network (0 being the minimum and 1 the maximum).

networks in Ghana may not be as 'efficient' as possible and this may impact the potential for collaboration and integration.

Conclusion

In the first part of this chapter, I graphically displayed my participants' interaction networks and their structure, as well as investigated opportunities for interactions between vets and other actors. This revealed two significant findings. The first is that there were many opportunities for vets to interact in their work-associated social networks – composed of multiple actors, who interact with vets very frequently – and therefore a potential for collaboration around zoonoses from vets' social capital. The second is the degree of informality driving the establishment of relationships involving vets, as the network interactions do not follow the linear and hierarchical paths delineated by the official structure of the veterinary services.

In the second part of this chapter, zooming in on a few specific relationship challenges for vets, I argued that *Awareness*, *Trust*, and *Role specification*, the three critical factors identified as enabling collaboration, also constitute important challenges for vets' interactions with inter-sectoral actors in routine animal disease surveillance, prevention and control in Ghana.

Raising awareness was indispensable for vets to initiate good relationships with other professionals. It means transmitting basic knowledge about vets' roles in zoonosis management to actors such as livestock owners, butchers, customs agents, NADMO agents and medics. This was necessary for collaboration between vets and these actors with regards to the prevention and control of disease such as anthrax and rabies, and it can be achieved through, for example, more inter-professional education at university.

Building trust between key actors and vets required sustained inter-sectoral interactions over time which are necessary for professionals to collaborate. Trust in veterinary networks in Ghana was inhibited by physical distance between actors in large urban centres and rural settings as well as by the absence of follow-up opportunities to meet repeatedly. Digital technologies could partially replace direct personal interactions. The need to build trust also implied that relationships between vets and animal owners required time and energy to establish, which therefore limited general surveillance of animal diseases in areas where vets are few.

Specifying the roles actors should or could play when working together in managing zoonoses was also revealed as critical for collaboration. In Ghana role specification implies that local resource providers to empower district vets, and more communication with EHOs in slaughter facilities to organise full inspection of live animals and the meat. It also meant avoiding cross-level relationships that were based on the power national vets and surgeons have over district vets and technicians, and which undermined the role played by latter and this could be done by reinforcing knowledge brokerage positions from the local to the national level of the veterinary services.

The perceived lack of awareness, trust, and role specification explained why my study vet participants felt that connections with key OH actors were either limited to a few people in each category of actors in their networks (though visible on the graphs), or absent of these networks. This explained why collaboration around zoonoses was not viewed as the norm.

Chapter Six: Conclusions

This thesis endeavoured to better understand OH application in LMICs from the angle of professional characteristics and their influence on the scope for integration. It considered the case of veterinarians in southern Ghana, hypothesised the influence of three important veterinary characteristics – namely practices, perspectives and relationships – on the scope for integration in zoonosis management, and asked how such influences, if present, took place.

In so doing, this thesis contributes to the current debates and knowledge around integration in policy and practice of complex and multidimensional development issues at the interface between humans and their environment. Notably, this work adds to the literature on interprofessional relations, networks and collaboration for integrated health – complementing authors like Nugus et al., (2010), Zillich et al., (2004), Manring, (2007), Johnson et al. (2018) and Homesland et al. (2010) – through examining how particular health professionals work together as well as how they work with non-health professionals (like agricultural agents) on common issues. This work also sheds light on our limited knowledge of global health policy implementation challenges at the local level in LMIC settings, where resources are scarce and priorities often differ from high-income countries (Gilson and Raphaely, 2008, Okello et al., 2015). In addition, this thesis contributes to our knowledge of veterinary professionalism since we know little about vets' values and strategies in LMICs (see Chapter One) and notably in areas identified as 'hotspots' for zoonotic emergence (Jones et al., 2008), where the profession perhaps has to adapt the most to contemporary global changes.

In Chapters Two to Five, I have focused respectively on institutional positioning, practices, perspectives and relationships that characterise the veterinarians I met in Southern Ghana. In this conclusion, I draw together the findings emerging from each chapter to answer my initial research question: how do veterinary perspectives, practices and relationships concerning policy and action around zoonoses in Ghana influence the scope for One Health integration? I do so below across three themes which predominantly emerged from one empirical chapter each, but which resonate in the other chapters (as symbolised on Figure 20) and synthesise this work's implications for knowledge and policy on OH integration: prestige; dominance; and heterogeneity.

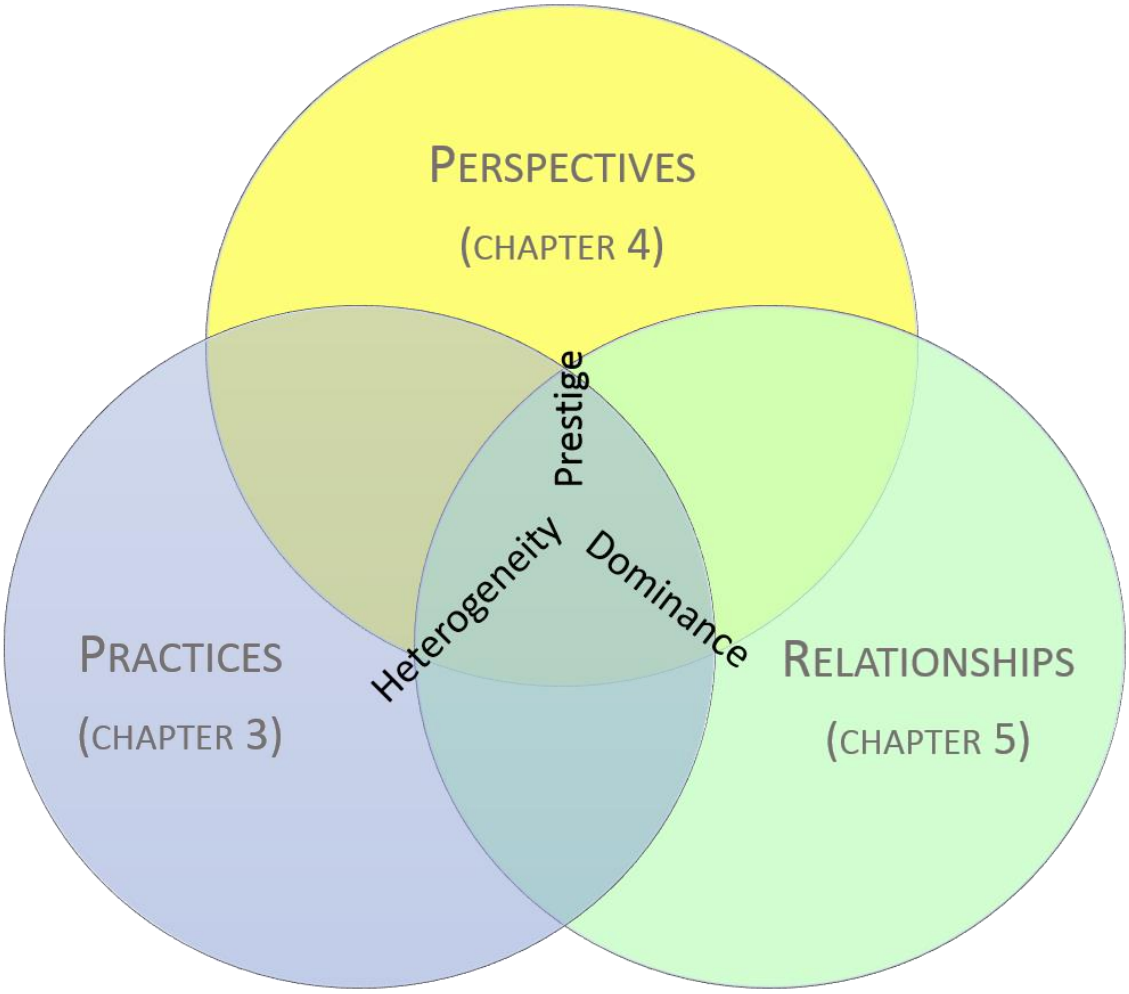

Figure 20. Venn diagram representing the three main findings at the intersection of professional characteristics constitutive of this study's framework.

Professional prestige and OH

The importance of professional prestige for understanding the scope for OH is inherent in the study of professional perspectives (Chapter Four and Figure 20). The relevance and benefit vets can find from promoting OH has rarely been questioned in the literature as vets have been portrayed as being the initiators or main actors of OH (see Chapter One). My enquiry in Ghana challenged this assumption and I looked at whether and why vets would be interested in OH. This thesis shows the importance of professional status and how veterinary professionals' views of their profession's status matter for OH integration.

There has been an increased presence of animal health, vets and zoonoses in Ghanaian agricultural and public health policies in the twenty-year period 1995-2015. As discussed in Chapter Two, there is a willingness to engage vets in agricultural matters and public health issues, and this is favourable to OH implementation. But, in the absence of formal OH mandates or OH structures at the national level, there are no institutional directives or incentives for vets to do this and therefore OH must appear relevant and beneficial for the veterinary profession to engage in OH in their routine practices.

Vets' holistic view of animal health helps provide this relevance. In chapter Two, I showed that veterinary considerations of animal health started with the premise that animal husbandry is significant for people's livelihoods and that this has implications for the human health sector. This remains part of vets' holistic view of animal health. Yet, at the same time and as shown in Chapter Two, zoonoses, and especially endemic zoonoses, have rarely been the target of focused interventions. Vets see this as resulting from a widespread lack of awareness and knowledge about the significance of their work in zoonoses and, they argue, they are simultaneously unable to demonstrate this significance because of their lack of financial, material and human resources (see Chapters Two and Three). Without systematic diagnosis of suspect zoonotic infections, they cannot showcase their roles in human disease control and eradication. This, in turn, leads to the lack of protective and preventative behaviour at all levels (not vaccinating animals, not wearing protective clothing, not knowing accurate disease prevalence rates and not being able to make a case for interventions), which enhances the possibility of zoonotic disease events.

Vets' holistic view on animal health helps promote OH networks in Ghana which, as shown in Chapter Five, are driven by zoonoses issues, precisely because zoonoses are embedded in larger animal health issues. This is consistent with vets' understanding of animal health, as being an essential factor for protecting human health and livelihoods (see Chapter Four). Finally, a holistic view of animal health is also consistent with vets' emphasis on prevention rather than crisis response, which I describe in Chapter Five. This emphasis on prevention would be ideal for OH, however vets currently lack the material, human and financial resources to make this routine and systematic.

The benefit that would accrue to vets involved in OH zoonosis management is also linked to vets' need to enhance their professional prestige. In Chapters Three and Four, we have seen that professional prestige is a key professional interest which enables vets to fulfil other interests. The challenge of fighting zoonotic diseases with an integrated OH approach across government sectors, geographic and administrative scales, and diverse professions is a means of enhancing veterinary prestige as

Ghanaian vets see their greater role in zoonosis management as indispensable for today's society. For the study participants, promoting veterinary public health through a greater involvement around zoonoses did not constitute one isolated goal which competed with their other core responsibilities, but was instead inextricably linked to developing and promoting their profession. A OH agenda is also attractive because of its potential to enhance vets' professional status, which is consistent with Manring's argument that pursuing a higher status gives professionals motivation to get involved in collaborations (Manring, 2007). Stephen and Karesh also argue that OH facilitates 're-invigoration of veterinary public health' as it advances this important application of the profession (2014:376).

But, at the same time, a minimum of prestige may be necessary to pursue OH. Leitch (2014) argues that a certain level of prestige is a necessary condition for professionals to be able to work in conjunction with other professionals. Vets' perceptions of the 'downgrading' of the status of the veterinary profession in the past four decades (described in Chapter Four) has had significant implications on vets' opportunities to collaborate with other professionals. For instance, the preliminary results of the evaluation of the VSD from the OIE (Daborn, 2008:1), reported that the opportunity of '*a significant pro-poor contribution to livelihoods and GDP'* through collaboration with medical and agricultural counterparts has been lost due to the *'failure of the Veterinary Profession in Ghana to adequately advocate for its importance as a professional body'.* At present Ghana's vets feel they have to fight for the resources and recognition that they need to do their jobs, and they contrast this position with Ghana's highly-regarded and better-resourced medical profession. Leitch further argues that attitudes and behaviours associated with a 'low' prestige profession can negatively influence collaboration processes. This is shown in Chapter Five, as Ghanaian vets experience very little acknowledgement of their specific contribution to zoonosis management from their counterparts in other sectors. This makes it difficult for vets to use their relationships for a greater involvement in zoonosis management. Thus vets' 'low' professional prestige, relative to human medicine, is both a reason for wanting to engage in OH and a challenge to the actual process of engagement. This suggests that engagement in OH may not be as straightforward as assumed in the literature, even if professionals are in favour of the concept, and that OH, beyond an ideal to pursue, may be also an opportunity for vets' professional development.

The promotion of OH initiatives to professionals in LMICs may therefore have to take additional factors, such as professional prestige and interests, into consideration. This is not only because different, and currently siloed, professions may experience different challenges to OH integration; but

also because targeting professionalism in each profession could represent the greatest opportunity to promote integration projects like OH.

Professional dominance

Professional dominance is crucial for understanding the scope for OH in this thesis and this is the best shown in the study of professional relationships (Chapter Five and Figure 20). As shown earlier, the literature on OH is very thin on power relations which have been overlooked in relation to OH integration. Failure to address power relations may, however, create more isolation and fragmentation between OH professionals.

In Chapter One, I pointed out that scholars working on integration (including OH) tend to assume that, in absence of strong national coordination and structural changes, necessary arrangements leading to collaborative relationships between different professions can happen on the basis of mutual understanding and spontaneous efforts (Glouberman and Mintzberg, 2001, Orchard et al., 2005, Shannon and Schmidt, 2002, Vandersmissen and Welburn, 2014). But little is known about how this process may happen. Current suggestions are limited to a good level of interaction and communication between key OH actors in order to build social capital (Binot et al., 2015, Vandersmissen and Welburn, 2014) and current debates overlook power as an important determinant.

In the light of this failure to study power relations in OH, this thesis draws on the literature on inter-professional interactions to study vets' work relationships and their potential for collaboration with other OH actors. Chapter Five demonstrates the importance of awareness, trust and role specification as precursors to inter-professional negotiation and subsequent collaboration between Ghana's vets and other professionals working on zoonoses, for example in the prevention of rabies after dog bites or in the rapid control of anthrax. Indeed, as this chapter shows, despite frequent interactions with many different actors concerned with zoonosis management, when these conditions of awareness, trust and role specification were not met, vets perceived the potential for collaboration to be very limited.

There were, however, also instances in which vets made arrangements favourable to collaborative – or, more realistically, cooperative – relationships. For instance, the exchanges between Emmanuel (a

district vet) and the EHO of his district constitute an illustration of mutual understanding and arrangement, as they organised themselves to make sure that one of them carried out meat inspection every day. For the most part, however, OH-labelled initiatives that gathered vets and other professionals to build or strengthen relationships were limited to specific disease threats or crises and, as they did little to promote awareness, trust and role specification, vets felt that these relationships were difficult to sustain.

Appropriate role recognition, from the vets' perspective, would include recognising their legitimacy to lead on both animal and human zoonosis management. Their institutional positioning within MoFA is, as shown in earlier chapters, perceived by vets to be a misalignment which does not reflect the holistic nature of animal health and which threatens not only their ability to take on a greater role in zoonosis management; but also the actual survival of the profession itself. This has led vets to pursue a strategy of institutional realignment and of gaining autonomy while asserting their claim to a leading role in zoonosis management.

As suggested above, prestige can stimulate collaboration. However, any quest for prestige may go too far and lead professionals towards excessive professional autonomy and isolation rather than integration. Leitch also remarks that occupational prestige might '*act as a barrier to interprofessional work* […] *and may even serve as reasoning for one professional group* [to] *overpower another on a team'* (Leitch, 2014:55). The regaining or enhancing of Ghana's vets' prestige may not automatically facilitate OH collaboration processes if it also involves assertions of vets' professional dominance in zoonosis management. Given vets' lack of material, financial and human resources, alongside what they perceived as a general lack of awareness of their work, trust in their skills and role specification, when vets interacted with other actors they sought to assert their dominance. This happened regardless of whether the interactions were at a practical level when sharing space with other practitioners or at the national level when attempting to change legislation and policy. For instance, vets exercised power over EHOs, AEAs, and informal practitioners (see Chapter Three and Five). They also aspire to exercise power over MoFA directors and local medical staff and national human public health decision makers when dealing with zoonotic disease events (see Chapter Five). My description of vets in Ghana is not the only story in which vets exert power over other professionals in order to raise their status, as shown in this passage by Woods (2018), who retraces sheep disease investigations in Britain in the late 19th/early 20th century:

> *'Keen to achieve the status of prime experts in animal health, they [two British vets] sought to capture sick sheep for themselves by awarding them a new role as vehicles for veterinary professional ambitions. These vets were not the first to try to advance the profession's status. Earlier efforts, stretching back to the 1820s, had been impeded by internecine strife within the profession, its competitors' demonstrable effectiveness in the management and investigation of animal disease, and its inferior social and scientific status relative to human medicine' (Woods, 2018:97).*

Such a strategy of asserted dominance contradicts the assumption in the internationally-dominant OH discourses that OH integration should be based on common goals, self-regulation or synergetic leadership amongst OH professionals (Johnson et al., 2018, Vandersmissen and Welburn, 2014, Zinsstag et al., 2005). Although vets' perspective of their role vis-à-vis OH and zoonoses is aligned with the ways in which OH implementation appears in the literature (for e.g. with a holistic and 'public good' approach of animal/public health, cf Alders et al., 2017, Binot et al., 2015, Leung et al., 2012,), the way they aspire to reach this goal is not. Incorporating a consideration of professionalism and power relations into the study of OH reveals inconsistencies between a theoretical ideal and implementation practices. It also reveals contradictions between internationally-agreed discourses and local imperatives. For example, in Chapter Four, we saw that vets demand more autonomy and dominance, which can favour isolation instead of integration with other professionals.

Another dimension to this question of power relations in OH concerns the public good of animal health and therefore zoonosis management. The rationale defended by vets in Ghana is that with increased financial, material and human resources, they could work smoothly and this, coupled with the higher prestige which would accrue, they could create the necessary space and legitimisation for public health-related collaborative activities to routinely happen. But is this realistic? Are these goals not antagonistic and mutually exclusive? The fact that vets desire to win the competition of leadership in zoonosis management – a strategy which can be seen as a characteristic of neoliberalism (Asen, 2017:329) – with the goal of protecting the public good is paradoxical. Although focusing on the tensions between LMICs and HICs, Degeling and colleagues highlight the possible tensions between economic development and health that may be problematic for developing a OH approach and urges '*a more explicit recognition* […] *of who are the primary beneficiaries and who bears the costs of a One Health approach*' (Degeling et al., 2015:5). Within a country, similar tensions exist, such as between developing the livestock industry or protecting people from disease, as illustrated by vets' perceived misalignment with their home ministry.

One of the main motivations behind the OH concept is to reduce inequalities to health (Rock et al., 2009) but, as this discussion about power relations has shown, there also are inequalities in the endeavour towards OH, and these inequalities exist between those professions tasked to achieve OH. Indeed, my participants perceived their chances of leading integrative activities around zoonosis management to be poor, yet believed that they were the most suited and motivated to do so. Johnson and colleagues, examining OH in a high-income country, have argued that, *'*[…] *for a One Health approach to be implemented* […]*, those working in the fields of human, animal and ecological health must agree on several aspects'* (Johnson et al., 2018:e229). The idea of consensus between professions is problematic – and perhaps unrealistic or 'imaginary' (Leach and Dry, 2010) – in part, because of the training provided to different professions and because of the ways in which current governments operate. In the same paper, one vet said: *'*[…] *we're still trained either as vets or doctors or environmental scientists…so we have a very siloed view of the world'* (Johnson et al., 2018:e232). That these professional silos also exist between vets and medics in Ghana is shown in Chapter Five and it suggests that integration will not be automatic and will have to be nurtured and developed in order to promote OH. Education, and notably interprofessional training, appears as a way forward to avoid deep siloed professional views for OH (Johnson et al., 2018, LeJeune and Kersting, 2010, Lueddeke et al., 2017). Ghana is already making steps in this direction, with for example the introduction of the FELT programme and, as shown in Chapter Four, many vets in Ghana also support this idea of a common education before professional practice. From their point of view, not only would a basic veterinary knowledge assist in the diagnosis and treatment of zoonoses, it would also mean that the value of veterinary knowledge is more recognised by professors of human health and medicine.

Power dynamics within the veterinary profession are also important in understanding vets' potential for OH integration in Ghana. The literature on contemporary veterinary practices recently acknowledged the need to understand power dynamics between veterinary doctors and nurses[167] in high-income settings (Hamilton, 2013, Kinnison et al., 2016). In Ghana, since vet technicians constituted the majority of the animal health workforce (see Chapter Two), there was a perceived imbalance in prestige and access to resources between veterinary surgeons and technicians (as seen in Chapter Four). This imbalance, which one could consider normal in high-income countries, affected technicians' ability to respond to zoonoses in practice (see Chapter Three) and also share key

[167] Vet doctors and nurses are the equivalent of, respectively, vet surgeons and technicians.

information with key OH actors (like medics or farmers) in order to manage zoonoses in a more integrated way (see Chapter Five) in Ghana. Therefore intra-sectoral integration (Kinnison et al., 2016) matters for OH implementation in low-income settings.

Since technicians in Ghana are more present at the local level, and, surgeons at the national level, intra-sectoral integration also has an impact on integration vertically from the districts to Accra. According to Binot et al., 2015, interactions between actors of the same profession between lower and higher administrative levels ensure that OH strategies are shared and therefore work. As described in Chapter Two, in Ghana, official links within the veterinary profession already exist. But my analysis in Chapter Five has shown that, in reality, local vets sometimes find themselves in competition with national vets. Although this may have appeared to facilitate zoonosis management in the short-term, such as in senior and prestigious vets intervening to reassure local populations on zoonotic threats, it was also potentially detrimental for vets' developing role in OH as local vets felt excluded (see Chapter Five).

In other words, at the national level, the profession's strategy was straightforward and served to create a spirit of community, a group fighting for a cause together (see Chapter Four). But the profession's quest for power and recognition may be incompatible with OH implementation as ideally portrayed in the literature. When thinking about how to implement OH in LMICs, policymakers need to pay attention to who may lose or win, the tensions and inequalities within professions and how the different professional bodies relate to each other, as well as asking who has power over others (or seek to have it) and what implications this will have? OH scholars should not assume that there will be a natural mutual understanding, that collaboration will happen spontaneously and that this will sustain itself over time simply because all parties support the idea of collaborating. A focus on power relations helps identify inequalities, tensions, competition between actors and aspirations. Currently these tensions result in the absence of communication about common OH issues, but once identified, they may be reduced through a range of strategies which include reorganisation of government sectors, educational changes, redistribution of resources, and incentives for ongoing collaboration and engagement which encourage enhanced awareness, trust and role recognition amongst all professionals and put in place strategies that facilitate key OH relationships.

What this work has shown is that, in Ghana, vets' professional goal is hampered by the lack of awareness, trust, and role specification and the way this is translated into OH is that vets seek to exercise power over other professionals. This approach, which emphasises the professional

dominance of veterinary surgeons in the domain of zoonosis management, is incompatible with the current ethos and approach of OH. Power relations within the profession also represent a challenge for OH implementation. Yet, current conceptions of OH and the failure to consider power relations as a significant driver or obstacle to OH, are also inadequate. This research suggests that suitable mutual arrangements are unlikely to happen on their own.

Professional heterogeneity and integration mechanisms

Professional heterogeneity, raised by the study of professional practices in Chapter Three, also constitutes a significant theme in the understanding of OH's scope (as shown on Figure 20). Taking a professional angle to explore OH integration also meant identifying variations in practices, perspectives and relationships amongst individuals of the same profession, given the different micro-contexts in which they were embedded. I found an important heterogeneity in veterinary practical settings. For example, some vets operated in organised teams in well-equipped clinics performing sophisticated surgeries on pets in urban centres while others assisted farmers in rural remote areas with just a small bag of veterinary gear. In Chapter Three, I show how such setting variation influenced how vets practiced animal medicine, with most still facing the daily need to maintain a clinic space, and with all vets needing to generate a revenue for their profession, deal with clients' lack of willingness (or inability) to pay for services, protect themselves against zoonotic infections, and compete with informal practitioners.

This heterogeneity also resonates with vets' perspectives on animal health. For some vets in this study sample, animal production was very important, as was the case for Bernard, who was a livestock farmer himself. For others, animal welfare was a goal to fight for, such as Afia who saw many pets every day in consultation and for Dr M and his assistant at the abattoir. Others, like Dr B, expressed great motivation to be a vet in order to protect human health, though in time this motivation also became anger and frustration against local resource providers who seemed to prevent him from being proactive in this way. Roder et al. (2012) also found some variation in public vets' values in the UK, based on whether they prioritised altruism and social justice or commercialism, professional autonomy and dominance and Roder and colleagues worried about the second set of values becoming prioritised in the late stages of vets' careers. This, they argue, is at odds with what UK society expects from the veterinary profession.

However, there was much less heterogeneity in vets' perspectives on the role of the profession in the global context of emerging zoonoses. In Ghana, all the vets I met agreed on the need for their profession to acquire a higher status and they all agreed that vets were better suited to leading the management of zoonoses. Although altruism and social justice are part of national veterinary discourses (see Chapter Four), my findings indicate that commercialism (through producing a revenue by profiting from service delivery) as well as autonomy (via the legislation change that occurred in 2015) and dominance (the aspiration to lead zoonosis management) also appeared as strong trends of veterinary professionalism in Ghana. As in the UK, these emerging trends of veterinary professionalism may silence/counter-balance vets' interest in participating in OH and challenge Ghana society's needs and the demand for stronger veterinary public health (Rosol et al., 2009, Salman, 2009).

Another aspect of heterogeneity evident in vets' networks is informality, which also accounted for variation in other vets' professional characteristics and was a recurrent theme in my data analysis. For instance, the perceived lack of policy support for vets at the ministry level forced vets to have their own informal guidelines around zoonosis management (see Chapter Two). In Chapter Five, I showed that cross-level interactions that bypass district or regional actors, appeared as important as inter-level formal relationships between vets and other key zoonosis management actors. These interactions could both have positive and negative effects on vets' participation in zoonosis management. Indeed, these cross-level interactions may represent an opportunity for OH as they create a sensitive surveillance system of animal diseases, where information is likely to reach vet authorities and non-vet actors in a timely manner. However, if key vets' specific roles are ignored, these vets may not act as trusted brokers, which, as we have seen in Chapter Five where I explore the need to specify vets' roles, may be detrimental for long-term collaborative relationships necessary for OH.

As shown in this thesis, some behaviours – such as vets negotiating prices for services with clients, vets intentionally not report disease cases, regional vets being in charge of local farms, practitioners operating without any veterinary qualifications, or farmers medicating and vaccinating their livestock (all described in Chapter Three) – happen outside official regulations and outside the official system of animal health management. These behaviours result from the intersection between vets' values and interests, their official position and access to formal routes, the profession's strategy at the

national level, and their immediate context of practice and interactions, and therefore affect the scope for OH in complex ways.

As described in Chapter One, the literature on Street Level Bureaucrats says that health practitioners can use their discretion to promote personal interests which may either support national policies/guidelines or contradict them (Gaede, 2016, Meyers and Vorsanger, 2007). But as we saw in Chapter Two, national policies and guidelines for animal health in Ghana are primarily focused on economic growth and do not pay much attention to public health, except for crises of international concern. Yet, both the economic and human health implications of animal health are important for vets, and assumedly for their clients. In other words, Ghana's vets expressed dissatisfaction with the fact that animal health policies and other institutional support (resources and legislation) did not cover all of vets' interests and was limited, on the one hand, to guaranteeing livestock production for economic growth (MoFA), and, on the other hand, to protecting human health in the event of emerging zoonosis with pandemic potential (MoH). This dissatisfaction, then, was rooted in the scope of institutional support not being broad enough, rather than vets disagreeing with what was already in place in the policy agenda.

In practice, on a more individual scale, the wide interests of protecting economic growth and human health can mean different things and the different choices made by individual vets to privilege either of them are based on local resources and power dynamics which do not exist at the national level. The re-centralisation of the veterinary services at the local level that officially took place in January 2015 and which was still unclear when I left Ghana (see Chapter Two), may limit the heterogeneity and therefore the informality highlighted in this work, since district vets are expected to depend less on their local contexts to get support for intervening around zoonosis prevention and control.

In the meantime, the space for heterogeneity and informality in the Ghanaian veterinary system means that different types of OH integration for different 'types' of vets or practices may be possible. Although my data does not allow for a clear typology of vets and their related potential for OH, one may find it helpful to imagine a spectrum based on level of operation and qualification. Such a spectrum would go from a high-positioned vet surgeon in an office in Accra towards the young technician by him/herself in rural Ghana. The first is likely to make use of formal organised events to meet other OH actors and push for the profession's agenda but may struggle to sustain trustful relationships with these other OH actors. The second is likely to engage with his/her role for integrated health on a daily basis, according to the needs of his/her clients and the available resources while

maintaining a few valuable connections with other OH actors that provide solid on-the-ground relationships which may serve OH, particularly if there is a zoonotic disease emergence. Both would play an important role in OH.

Although neither of the words '*One Health*' or '*integration*' came up very often in my discussions with the study participants, the idea of integrated health and veterinary medicine was always present through expressions like '*working together with',* '*linking animal and human health',* etc., Similarly, the words 'c*ollaboration', 'coordination' and 'cooperation'* were rarely mentioned in discussion with my participants, but they were expressed through stories of routine needs and strategies. Amongst the ideas my participants conveyed to me, collaboration appeared as the most desirable form of integration pursued, and perhaps used discursively, borrowed from international communications and consistently with most of the literature on integration (see Chapter One). Yet, collaboration was not useful for characterising everyday practices of integrated zoonosis management. This research shows that, when focusing on the ground realities and everyday practices of vets, cooperation and coordination are more important forms of integration (as shown in Chapter Five).

In Ghana, the outside observer may note that OH is not a reality because there is no official OH government structure or strategic plan and because there does not seem to be active, ongoing collaboration between actors in the agricultural, environmental health, human health, and animal health sectors. Moreover, professional discourses may indicate that OH is not a reality because of the absence of OH labels on formal projects, policies, or organisation. But in Ghana practitioners and professionals in the world of veterinary medicine feel that they participate in integrative health activities through ad hoc or informal cooperation. Perhaps if this cooperation were noticed and promoted more at the national level, the idea of not reaching international standards and '*not doing well enough'*, as some participants of this study often put it, would not prevail. Collaboration or cooperation with OH actors in different positions and of diverse status is an important factor that has, to date, been overlooked in relation to OH integration. In Ghana, if district vets cooperate with MoFA agents or with farmers, this can have very different effects and support competing interests. Thus, nuances between different forms of integration which have an impact on the ground and in terms of daily practices around animal health and the politics surrounding policies need to be examined in more theoretical depth when envisaging OH implementation. However, recent developments suggest that, in the future, there may be a more concerted policy agenda on zoonoses and OH in Ghana. Indeed, the Minister of Food and Agriculture declared on the 30 March 2018 that MoFA was

determined to prioritise important endemic and emerging zoonoses affecting the country, in collaboration with the Ministries in charge of human and environmental health in Ghana.[168]

Methodological reflections, generalisation, and policy recommendations

The methodology applied in this research (and presented in Chapter One) involved a combination of ethnographic methods, document analysis and network mapping. This combination of methods worked well for collecting data from different people and in different contexts, for visualising relationships between different actors and for triangulating findings. The crux of this research was that the research participants were themselves researchers and were therefore constantly, although usually not explicitly, making value judgements on the social science nature of this research.

The initial intention had been to include participatory methods (for example the use of drawings by participants to represent resource/information flows) to interviews and informal discussions. This, however, was not well received by vets at the beginning of fieldwork, perhaps because it was not viewed as a valid scientific research method. This led me to focus instead on a more traditional data collection approach during interviews and informal discussions. The combination of methods I used could also work if applied in other locations, where the emphasis is on studying elite or professional communities, how they actualise their scientific knowledge and professional relationships which are not evident through regular face-to-face interactions. I would therefore advise researchers to proceed with caution if wishing to use participatory tools in similar research with bureaucrats who see themselves as part of the 'scientific elite'.

During the analysis phase, it was challenging to match the data collected on the veterinary networks with my qualitative findings. This was because the network data concerned categories of people and not individuals, whereas discussions with participants mostly focused on specific relationships with individuals. Other researchers pursuing a similar investigation might want to avoid this challenge by using network graphs in a second phase of fieldwork, as an aid to discuss specific relationships with participants themselves and collect precise qualitative information, rather than in an early phase.

[168] Source: Ghana news Agency. Article available at: http://www.peacefmonline.com/pages/local/social/201803/348313.php

Overall, however, this combination of interviews, participant observation, network mapping and document analysis provided a means to undertake research which understood their professional expertise and was deemed as valid by the subjects of the research yet also provided deeper social science insights into their practices, perspectives, and relationships.

This PhD study of vets' characteristics and their influence on the scope for OH at the local level was focused on one of the nine regions of Ghana, which may represent a limit on the reliability of generalisation at the country level. In this regard, it is important to note that information obtained at the national level allowed me to expect that the selected region would not differ much from the other regions in terms of its diversity of practices. If any difference, and according to national vets, the diversity of practices was expected to be less important in other regions since the number of district vet clinics in less urbanised regions was expected to be fewest. The veterinary team inspecting at the regional abattoir also is present in very few regions included the selected one. Less diversity in practices in other regions means that the choice of this particular region was good in terms of detecting potential heterogeneity in local vets in Ghana, which I attempted to do.

However, in this specific region, vets may have had access to more resources and be carrying out more activities than other regions in Ghana. Indeed, participants led me to understand that the proximity and frequency of contacts between this region and the vet office in Accra was particularly important, and that its animal disease management was '*well performing*', especially when compared to northern regions of the country, further away from Accra. If this is indeed the case, and other regions are more isolated from policy decisions and resources, one expects to find an increase in vets' perceived marginalisation, lack of resources and credibility with regard to zoonoses in Ghana. This reinforces the argument put forward in this thesis, namely that there is a perceived lack of veterinary professional prestige which motivates vets as a profession to engage in zoonosis management and OH.

One can expect some of the key country features and factors involved in Ghana's animal disease management systems to be similar for other countries, especially on the African continent. For instance, neoliberal reforms of decentralisation and privatisation, which affected the evolution of the veterinary profession in Ghana, happened all over Africa in the 1980s and 1990s (Amankwah et al., 2014). The introduction of CAHWs also happened at the same time in many African countries as well as in Asia and Latin America (Catley et al., 2004).

However, the case of Ghana may present some distinctive aspects that would imply limits on the generalisation of my findings to other countries. For example, the disease and outbreak history of another country may differ from that experienced by Ghana and this may mean different ways of shaping integration milestones. As shown in Chapter Two, the avian influenza outbreak in 2007 and the Ebola scare in 2014/2015 were important triggers for the medical and veterinary sector to work more closely together and this may not have happened in countries which did not experience such threats of international concern for human and animal health in recent years.

Another potential specificity of Ghana is the vets' perceived low prestige, which appeared significant in shaping vets' interests and values with regard to zoonoses and OH (see Chapter Four and Six). In countries where vets perceived their profession as benefiting from a relatively high prestige, for example in comparison to the human medical staff, interests in getting involved in OH may be different. Where other countries veterinary staff experience structural conditions similar to Ghana (low numbers of qualified staff, resource limitations, large geographical areas of responsibility and high levels of informal, unqualified actors delivering animal health services), and where vets similarly experience low levels of professional status, one would expect similar findings. These include: vets welcoming OH as a means to raise veterinary professional status and mobilise resources; confidence in the power of veterinary knowledge to address and lead zoonotic disease management; struggles over status and hierarchy, both within the veterinary services and between vets and the human public health, agriculture, and environmental health sectors; and at the same time, many constraints and few practical demonstrations over how to apply OH in day-to-day practice.

This work can contribute to several audiences. It is intended for scholars involved in thinking about and implementing OH or other integrative approaches in LMICs as well as those who are interested in veterinary professionalism and contemporary challenges faced by the profession and by public health professionals responsible for dealing with zoonotic diseases. On the non-academic and policy side, this work can inform LMICs governments, international donors and organisations, non-governmental and intergovernmental agencies involved in helping LMICs in zoonosis management and OH implementation like the OIE, FAO or WHO. For this audience, I developed some policy recommendations (see below), which elaborates on the practical implications of these research findings as well as recommends possible concrete steps for improving integration of vets in zoonosis management in countries like Ghana.

INTEGRATING PROFESSIONALS IN ZOONOTIC DISEASE MANAGEMENT IN LMICs

General Situation:

Low income countries like Ghana face the need to fight zoonotic diseases, both emerging and endemic, to protect the health of its people, animals, and economy and generally have limited resources to do this. Integration of professionals of various sectors and from local to national levels is the main pathway against zoonoses put forward by the international community and the idea behind the OH concept. But, like many other countries, Ghana does not yet have a dedicated OH governmental structure or agenda or clear national-level coordination of the various actors who contribute to fighting zoonoses. This doctoral research examined how one of the key OH professionals concerned by zoonoses in Ghana, namely veterinarians, could integrate their activities across other sectors and scales. It adopted a socio-anthropological approach that sought to detect the potential diversity of perspectives and practices as well as power dynamics in relationships between different actors in order to document the complexity of implementing OH across professional cultural specificities.

Specific findings of this research:

Analysing veterinary perspectives, practices and relationships within the veterinary services and with other professionals (medical staff, agricultural agents and environmental officers) shed light on important professional factors that influence the potential for OH implementation in Ghana. Since professional characteristics are intertwined, these factors echo and influence each other, as seen represented on Figure 21.

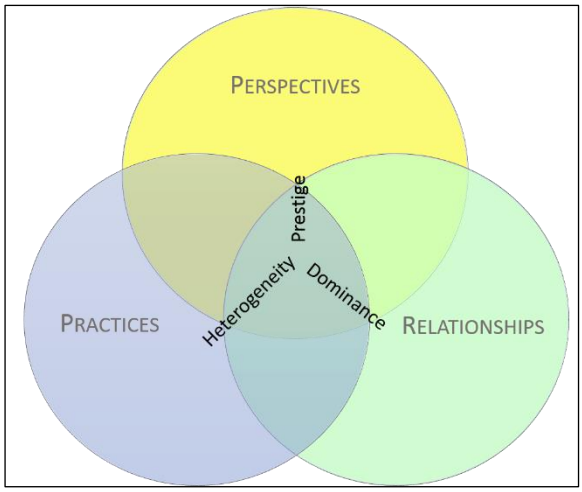

Figure 21: Venn diagram situating the three major themes emerging themes of this doctoral research.

Prestige: This work revealed that vets had a holistic view of animal health in which protecting animal welfare, livestock production for farmers' livelihoods, and the health of populations was as important as their professional status. Vets in Ghana perceiving veterinary status as low relative to that of human health professionalism, sought higher prestige and this constituted a motivation to participate in zoonosis management and OH. Seeking prestige may therefore be critical for a profession as to whether to be able to effectively get involved in integrative health.

Dominance: Considering power dynamics in veterinary networks in Ghana, this research revealed a trend for vets to pursue institutional autonomy and dominate zoonosis management operations at both national and local levels, which sometimes translates into absent or competitive relationships with people in other related professions. This may significantly limit the scope for effectively implementing OH, and if this trend continues or is also adopted by other professions, may prevent cooperative or collaborative relationships on the ground.

Heterogeneity: Focusing on one of the nine regions of Ghana, this work has shown important diversities in the ways veterinary services are delivered on the ground. The way vets practice veterinary medicine in their own local settings depends on their needs to: maintain a clinic space; generate a revenue for the survival of their profession; negotiate with clients unable or unwilling to pay them; protect themselves against zoonotic infections and compete with informal practitioners. On the one hand, this led to discretionary behaviours and informal interactions outside the official system, which therefore represents potential for the national level to miss critical information in regard to zoonoses. On the other hand, this suggests that different pathways of integration than collaboration, i.e. cooperation and coordination, can be undertaken in pursuing OH.

Policy recommendations:

1) Governments (with the help of international organisations) planning OH interventions should consider a comprehensive list of actors/professionals at all administrative levels and their corresponding power relations that may impede integration both within and outside the veterinary and other relevant professions. This may require prior social anthropological research. In Ghana, an example can be the investigation of how less-qualified professional actors like technicians can contribute to OH if they are included in OH strategies.

2) When designing OH-related programmes or evaluations, international organisations should pay attention to different countries' histories of diseases and outbreaks, as well as histories of professional

organisations at the country level. This is crucial to understand the background behind different professions' interests towards integrative approaches to health in different settings.

3) Governments (with the help of international organisations) should discuss the importance of veterinary services position in their home ministry, the level of autonomy or dominance they seek and how this can impact on integrative relationships with key OH actors. Consideration of the positioning veterinary and other relevant services within different government ministries must take place in order to prevent fragmentation.

4) Governments (with the help of international organisations) should develop coordination and cooperation strategies and tactics amongst key OH actors like vets, agricultural agents, environmental officers etc., rather than focus only on collaboration in professional routine practices. For example, developing coordination would mean promoting a OH strategic plan at the national level that would make sure different professions exchange information on a regular, ongoing basis, even outside of sanitary crises. In Ghana, an example of developing cooperation could be training district directors of the Ministry of Food and Agriculture on how to better integrate animal health and production in budget decision making.

OH and the development agenda

Through discussions on professional prestige, dominance and heterogeneity, this thesis demonstrates that professional characteristics are vital components that should be considered when strategising OH implementation. Policy makers who adopt a OH approach need to be mindful of strategies that promote professional status, and also consider power relations both within and between professionals in order to identify what is possible in terms of integration. Notably, as shown in this research, aspiration and enactment of professional dominance can threaten the potential for integration while heterogeneity can offer multiple avenues for developing the policy and practice of integrated health.

This thesis began by raising concern about the lack of academic attention given to the social, political and cultural aspects of the OH global ideal (see Hinchcliffe, 2015, Bardosh, 2016 and others). I have addressed these gaps by highlighting the importance of local structures, contexts and knowledges for

OH in Ghana. This emphasis, on professional values, interests, and strategies at the national level and in a country striving to 'develop' on the one hand, and on individual practitioners' constraints and priorities at the very local in districts on the other hand, exemplifies how OH is (not) operationalised at the national and local level. It also offers a sense of how global OH agendas could fit (or not) into already existing national or local structures and into current practices. This thesis pays particular attention to the social relations and perceptions of power inequalities and which in turn create the barriers and/or opportunities that shape and give meaning to OH integration.

This study sheds light on why the field of One Health, in terms of its application in policy and action, needs to pay more attention to professional differences, cultural barriers and competitive situations that may impede OH implementation by professional bureaucrats. By providing policy makers, researchers, OH practitioners, and others with concrete accounts of how professionals work and interact in local contexts, such research helps understand how professionals and policy makers are likely to respond to integrative approaches to zoonoses.

The field of OH has in recent years been more open to social science findings and approaches that take a critical stance and analyse human social dynamics like values and power relations to understand the 'wicked problem' of zoonotic diseases (see Chapter One). Works like this doctoral thesis only constitute more incentives to expand social science knowledge on zoonoses and the integration of disease management by raising new questions (see section on further research). This is even more needed as disciplines such as anthropology, sociology, history, political economy or philosophy remain perceived as 'soft' sciences and thus neglected when studying such topics as zoonoses (Waltner-Toews, 2017).

This PhD research shows that seeing OH as a binary state – as either absent or present in a geographical area or country – does not account for the complexity of practices and relationships involved in the realities of animal disease management and endeavours towards more integration in which practitioners and policy makers participate on a daily basis. In the case of Ghana, there is no national OH strategy. As shown in Chapter Five, key relationships between various categories of professional actors (including at the student level) already exist, but this does not mean that all individuals belonging to these actor categories interact frequently or work together around zoonosis management. Policy texts also exist and promote cooperation and collaboration amongst the same key OH actors on the ground but are often unclear, dated or not enforced. Recognising what already works for OH and identifying hidden policy/relationship gaps in order to lead focused interventions

would be a way to considerably advance OH in Ghana. Therefore I argue that OH, notwithstanding its various definitions and approaches, is best conceived as an aspirational guide regardless of whether or not there is a clear national OH strategy. Instead of seeing OH as an end goal, governments and international organisations can use OH principles to orient existing, dynamic and complex policies and practices.

The SDGs and the development agenda set for 2030 offer a refreshing alternative to the foreign-aid, technology-based, top down, and short-term interventions previously implemented in LMICs and embodied in the MDGs. This is an opportunity to improve the health of populations through and alongside holistic and sustainable economic

Development and this is based on the strengthening and integration of health systems (Dye, 2018). OH offers one avenue for doing this and this thesis provides an in depth analysis into the complexities of applying such an integrative approach in resource-constrained contexts. This research on vets and zoonoses in Ghana thus enriches the potential application of OH and other integrative approaches, which are becoming increasingly relevant and necessary in tackling the development challenges of our globalised world.

One avenue for further research is the investigation of informal veterinary practices in Ghana. This thesis has raised the issue of former trained CAHWs and AEAs potentially involved in delivering veterinary services to populations outside the reach of those with an official remit, although this is something that vets firmly oppose. The vets opposition to, and dismissal of, informal animal health workers meant that my contacts with these informal practitioners were extremely limited and therefore only vets' perspectives were presented in this research. There is a need for such informal systems to be better understood through other actors' eyes and documented through mapping, in order to have an enhanced understanding of what they might be able to contribute to animal disease management and OH.

In this thesis, I have suggested that coordination and cooperation may be neglected mechanisms, compared to collaboration, when studying and pursuing integration in public health and OH. Therefore further work that seeks to understand the practical differences of cooperation/coordination/collaboration, to see if one can lead to another, if they are scale-specific, or if one form of integration is enough in the remit of OH would potentially be illuminating.

Another possible line of research that emerges from this study is the need for a better understanding of relationships between vets and actors of the agricultural and environmental sectors, since the bulk of the recent literature on OH tends to focus on relationships between vets and medical staff but does not pursue integration with those responsible for environmental protection. In Ghana, I have shown that those relationships were often appear absent or competitive, which seriously affected the potential for implementing OH. In-depth social science research on these relationships and in various settings may identify avenues for improvements and enhance interventions for OH.

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Appendix A: Information on research data collected

Number (#)	Date	Type of inquiry	Person(s)	Place
1	29.07.14	First contact and interview	Vet Surgeon	Wildlife Division (Ministry of forestry), Accra
2	30.07.14	Introduction of myself to several vets through first contact and informal discussions	Several vets	Veterinary Services Department Headquarters (VSD HQ), Accra
3	01.08.14	Observations	Several vets	VSD HQ, Accra
4	05.08.14	Observations	Stakeholders meeting on new livestock policy	Ministry of Food and Agriculture (MOFA) Resource Centre
5	07.08.14	Interview	One vet surgeon and one vet technician working in the lab	VSD HQ, Accra
6	13.08.14	Interview	Senior vet surgeon	VSD HQ, Accra
7	15.08. 14	Interview	Senior vet surgeon	VSD HQ, Accra
8	20.08.14	Informal discussion	Junior vet technician	VSD HQ, Accra
9	20.08.14	Interview	Senior vet technician	VSD HQ, Accra
10	21.08.14	Interview	Senior vet surgeon	VSD HQ Laboratory, Accra
11	22.08.14	Interview	Senior vet surgeon	VSD HQ, Accra
12	24.08.14	Interview	Senior vet surgeon	VSD HQ, Accra
13	25.08.14	Interview	Retired vet surgeon	A district clinic, Greater Accra
14	28.08.14	Observations	Ebola international experts and Health Ministers of West-African countries	Emergency meeting of ECOWAS on Ebola, Miklin Hotel, Accra
15	01.09.14	Short discussions and observations	Health Minister Ghana, GHS director, and director of disease surveillance department (GHS)	Health ministry, Accra
16	02.09.14	Interview	Vet surgeon	VSD HQ, Accra
17	02.09.14	Interview	Vet technician	Vet office and airport arrivals, Airport, Accra
18	02.09.14	Interview	Vet surgeon	Vet office and cargo space, Airport, Accra
19	03.09.14	Interview	Senior Vet Surgeon	VSD HQ, Accra
20	10.09.14	Informal discussion	Medical Doctor - Public Health specialist	GHS national office, Accra
21	10.09.14	Interview	Retired vet surgeon	VSD HQ, Accra
22	10.09.14	Interview	Former Director of the VSD	VSD HQ, Accra
23	12.09.14	Observations and informal discussions	Senior Vet Surgeon	Field trip to Aflao (border between Ghana and Togo)
24	23.09.14	Interview	Regional vet director	Regional vet office

25	24.09.14	Interview	Regional vet surgeon and lecturer	regional pet clinic
26	26.09.14	Interview	Private vet	Private vet clinic, Accra
27	29.09.14	Observations and informal discussions	Dr B and his team	District 1 Vet Clinic
28	30.09.14	Observations and informal discussions	Dr B and his team	District 1 Vet Clinic
29	01.10.14	Observations and informal discussions	Dr B and his team	District 1 Vet Clinic
30	02.10.14	Observations and informal discussions	Dr B and his team	District 1 Vet Clinic
31	07.10.14	Observations and informal discussions	Dr B and his team	District 1 Vet Clinic
32	08.10.14	Observations and informal discussions	Dr B and his team	District 1 Vet Clinic
33	09.10.14	Observations and informal discussions	Dr B and his team	District 1 Vet Clinic
34	10.10.14	Observations and informal discussions	Two vet surgeons	Regional vet Lab
35	10.10.14	Observations	Regional vets + districts vets	Regional vet office
36	10.10.14	Interview	Dr D	Regional Pet clinic
37	13.10.14	Network survey	Several vets	VSD HQ, Accra
38	14.10.14	Interview	University Lecturer (vet surgeon)	Faculty of Veterinary Medicine, Legon, Accra
39	29.10.14	Observations and informal discussions	Many vets, a few public health officers	Institute of Local Government Studies, Medina
40	30.10.14	Observations and informal discussions	Many vets, a few public health officers	Institute of Local Government Studies, Medina
41	03.11.14	Interview	Senior Research Fellow and Virologist	NOGUCHI Medical Institute, University of Ghana, Accra
42	03.11.14	Interview	Senior public health lecturer	School of Public Health, Legon, Accra
43	04.11.14	Informal discussion	Public Health Officer	GHS metropolitan office, Accra
44	05.11.14	Observations and informal discussions	Senior vet surgeon and consultants	Filed trip to slaughterhouses in Greater Accra
45	05.11.14	Informal discussion	Senior vet technician	VSD HQ, Accra
46	11.11.14	Interview	Human Public health District Director	A cafe in Accra
47	13.11.14	Observations and informal discussions	Dr B and his team	District 1 Vet Clinic
48	14.11.14	Observations and informal discussions	Regional vets + districts vets	Regional vet office
49	17.11.14	Observations and informal discussions	Dr B and his team	District 1 Vet Clinic
50	18.11.14	Observations and informal discussions	Dr B, 2 interns and the farmer(s)	Cattle Farm in District 1
51	19.11.14	Interview + Observations	Dr M and his team	Regional Abattoir

52	20.11.14	Observations and informal discussions	Dr B and his team	District 1 Vet Clinic
53	21.11.14	Interview	District Disease Control Director	District 1 (Human Public Health) Office
54	25.11.14	Observations and informal discussions	Afia and her team	District 2 Vet Clinic
55	26.11.14	Observations and informal discussions	Afia and her team	District 2 Vet Clinic
56	27.11.14	Observations and informal discussions	Afia and her team	District 2 Vet Clinic
57	01.12.14	Informal discussion	Dr M and his team	Regional Abattoir
58	01.12.14	Network survey	Regional vet officers + Private vets	Regional vet office/lab + private vet clinic
59	02.12.14	Observations and informal discussions	Afia and her team	District 2 Vet Clinic
60	03.12.14	Observations and informal discussions	Afia and her team	District 2 Vet Clinic
61	04.12.14	Observations and informal discussions	Bernard	District 3
62	05.12.14	Observations and informal discussions	Bernard	Farmer's day in District 3
63	08.12.14	Observations and informal discussions	Bernard	District 3
64	09.12.14	Observations and informal discussions	Bernard	District 3
65	10.12.14	Observations and informal discussions	Bernard	District 3
66	11.12.14	Network survey	Several vets	VSD HQ
67	30.12.14	Informal discussion	Bernard	District 3
68	05.01.15	Network survey + informal discussions	Several vets	VSD HQ, Accra
69	21.01.15	Network survey + informal discussions	Several vets	VSD HQ, Accra
70	23.01.15	Interview	Public Health Officer	GHS metropolitan office, Accra
71	23.01.15	Informal discussion	Senior Vet technician	VSD HQ, Accra
72	26.01.15	Observations and informal discussions	Bernard	District 3
73	26.01.15	Interview	MoFA Director of District Three	District 3
74	27.01.15	Observations and informal discussions	Bernard	District 3 slaughter slab + trip to meat market
75	28.01.15	Observations and informal discussions	Regional vets + districts vets	Regional Vet Office
76	29.01.15	Interview	University Lecturer (vet)	Faculty of veterinary Medicine, University of Kumasi
77	29.01.15	Interview	Regional Director of MoFA (of the selected region)	MoFA regional office
78	30.01.15	Presentation of my preliminary findings and informal discussions and observations	Regional vets + districts vets	Regional Vet Office

79	30.01.15	Observations	Regional Vet Director + Vet Technician Students	Regional Vet Office
80	02.02.15	Observations and informal discussion	Senior Zoo Keeper	Accra Zoo, Achimota Forest, Accra
81	03.02.15	Observations and informal discussions	OH Next-Gen workshop participants and organisers (vets and non-vets)	Accra
82	04.02.15	Interview	Senior vet working for MoFA	MoFA HQ, Accra
83	05.02.15	Interview	Retired vet surgeon	Accra
84	06.02.15	Observations and informal discussions	OH Next-Gen workshop participants and organisers (vets and non-vets)	Accra
85	09.02.15	Informal discussion + document collection	Several national vets	VSD HQ, Accra
86	09.02.15	Interview	Ghana Coordinator	Project Abroad, Accra
87	09.02.15	Interview	Private vet surgeon	Accra
88	10.02.15	Interview	Assistant FAO representative	World Bank office, Accra
89	10.02.15	Interview	FAO Programme Officer	World Bank office, Accra
90	10.02.15	Interview	2 senior NADMO national officers	NADMO HQ, Accra
91	12.02.15	Interview	Data Analyst at Legon University Hospital (OH Next-Gen workshop participant)	Legon University Hospital, Accra
92	12.02.15	Informal discussion	Head of Public Health Nurse	Legon University Hospital, Accra
93	14.02.15	Informal discussion	University Lecturer (vet surgeon)	Faculty of Veterinary Medicine, Legon, Accra
94	16.02.15	Informal discussion	Medical Doctor - Public Health specialist	Human Disease Surveillance Department, GHS, Accra
95	18.02.15	Presentation of my preliminary findings and informal discussions and observations	Several vets, all levels	VSD HQ, Accra
96	23.02.15	Informal discussion	Senior vet surgeons	VSD HQ, Accra
97	23.02.15	Interview	District vet surgeon	A cafe in Accra
98	24.02.15	Interview	Dr P	VSD HQ, Accra
99	24.02.15	informal discussion	Senior vet surgeon	VSD HQ, Accra
100	26.02.15	Interview	WHO and Public Health consultant	Accra
101	26.02.15	Interview	Monitoring and Evaluation Specialist	Policy Planning Monitoring and Evaluation Directorate, MoFA HQ, Accra
102	27.02.15	Interview	Senior vet surgeon	Military Vet Clinic, Accra

Appendix B: Interview/informal discussion checklist

The keywords listed below represent the entire range of interview questions and informal discussion topics focused on during my research. They emphasise vets' perceptions and I made a decision, in each instance, whether to ask questions about a certain topic or not depending on the respondent's position and expressed views. Some of these topics were identified through a literature review and others emerged during fieldwork and were added to the checklist.

Official system of the veterinary services

Organogram vet services
Main responsibilities, key positions
Career paths, promotion system, posting
Reporting from local to global
Use of the surveillance data at national level
Feedback from national to the local level
Quarantines, movement control
Border control
Statistics on staff and procedures (vets per region and district, qualifications)
Perspectives on number of staff in the country
Vet associations (technicians and surgeons)
Vet surgeons' association conference organisation (people invited, abstract selection, theme selection)
Vets' opportunities for employment and new generations of graduates
Vets' training places and curricula, strike and advocacy
Perspectives on privatisation and decentralisation,
Zoonosis control and access to resources
Comparison technician/surgeon statuses and salaries
Lecturers and veterinary teaching at university vet schools
Money flows between local and national/global (budget to MOFA, VSD)
Vet schools: number of students, change they (may) bring, curriculum
Perceptions on VSD being situated within MoFA
Perspectives on Ghana's satisfaction of international standards

Policies and role of vets in policy formulation/change

Veterinary/animal health policies that exist and how they matter
Public health priorities at national level
Priority/notifiable diseases
Perceptions on prioritising endemic/epidemic-pandemic zoonoses
Actors' knowledge of and usefulness of the 2012 booklet on animal diseases
Wildlife surveillance plans
Impact of OIE PVS evaluation
Role of vets and at which level of operation
Animal health research priorities

Funding sources, current projects and translation of research on animal health into policy
Tourist places with wildlife and regulations
AI and Ebola preparedness plans
Legislation/policy change in 2015: mechanisms and effect on vets

Being a vet, practice and experience of zoonoses

Effect of religion on vets' job and interactions
Work with butchers and their perception of disease risk
Informal practices
Perspectives on informal practitioners
Challenges in vet practice
Resources available about zoonoses
Zoonotic risk for practitioners
Amount of revenue expected to be sent to national level, perspectives on revenue generation/service charges
Experiences in dealing with AI outbreaks and their control in 2007 and other recent zoonotic disease events
Responses to risk of Ebola in Ghana and impact of the threat on other zoonoses and their policies/responses
Benefits/limitations of preparedness plans for local practice
Local roles in surveillance (general and targeted)

Interactions between vets and with counterparts in other levels/disciplines/sectors

With medics, MoFA agents, EHOs, NGOs, the media, private vets, butchers, universities, NADMO, CAHWs, labs, etc.
Roles in inter-ministerial committee
Perspectives on the level on intersectoral collaboration
Benefits and challenges for vets' practice
Relationships between technicians/surgeons and vets at local/regional/national levels
Interactions between national vets and international organisations: OIE focal points, feedback, regularity of interaction, recommendations

Labelled (or unlabelled) OH activities

Purpose of the identified activity/event
Frequency of the identified activity/event
For events: invited actors, post-training communication with co-trainees
Part of foreign/government funding
Usefulness, benefits, and challenges with regard to vets' practice
Perspectives on other professionals' commitment/participation.

Appendix C: Network Survey Questionnaire

About prevention or control of zoonotic diseases (rabies, anthrax, tuberculosis, influenza, Ebola, Nipah ..) **can you please precise the frequency at which you meet/exchange info (mail, phone etc.) with the people for each of the categories below :**

Actors	Frequency						
	6	5	4	3	2	1	0
	Everyday/ almost everyday	3x/week	2x/week	1x/week	Btw 1 and 4 times /month	Less than 1 x/month (Precise frequency in each box)	Never
VSD Headquarters (directorate)							
VSD Headquarters (surgeons)							
VSD Headquarters (paravets/technicians)							
VSD Headquarters (assistants)							
Regional veterinary officers							
District veterinary officers							
Farmers							
Associations of farmers/breeders							
Noguchi Memorial Institute							
Ghana Health Service							
Other staff MOFA							
Schools of public health							
Schools of veterinary medicine							
Other University department							
Private vets (animal clinics)							
Hospitals/human clinics							
Voluntary health workers							
District Assembly							

	Everyday/ almost everyday	3x/week	2x/week	1x/week	Btw 1 and 4 times x/month	Less than 1 x/month (Precise frequency in each box)	Never
Other locals (chief village)							
Pet owners							
Religious leaders							
Military							
AU-IBAR							
FAO							
OIE							
WHO							
CDC							
Other international organisation/partner: precise which							
NGO: precise which							
Others: precise who below							

Appendix D: Different grades of veterinary officers in Ghana (VSD, 2003)

I. PROFESSIONAL GROUP A

VETERINARY MEDICAL OFFICERS (VETERINARY SURGEONS)

i. Veterinary officer
ii. Senior Veterinary Officer
iii. Principal Veterinary Officer
iv. Deputy Director of Veterinary Services
v. Director of Veterinary Services in- charge of :
   - Epidemiology
   - Disease Control
   - Laboratory Services
   - Animal Reproduction & Artificial Insemination (Theriogenology)
   - Public Health
   - Wildlife Medicine
   - Aquatic Animal Health
   - Administration and Operations

vi. Veterinary Medical Specialist
vii. Senior Veterinary Medical Specialist
viii. Veterinary Medical Consultant
ix. Chief Veterinary Officer

PROFESSIONAL GROUP B

1. VETERINARY MEDICAL ASSISTANTS

i. Veterinary Medical Assistant
ii. Senior Veterinary Medical Assistant
iii. Principal Veterinary Medical Assistant
iv. Assistant Chief Veterinary Medical Assistant
v. Chief Veterinary Medical Assistant

2. VETERINARY LABORATORY TECHNOLOGIST

i. Veterinary Laboratory Technologist
ii. Senior Veterinary Laboratory Technologist
iii. Principal Veterinary Laboratory Technologist
iv. Assistant Chief Laboratory Technologist
v. Chief Veterinary Laboratory Technologist

II. SUB-PROFESSIONALGROUP

ANIMAL HEALTH OFFICERS

i. Animal Health Officer
ii. Senior Animal Health Officer
iii. Principal Animal Health officer
iv. Assistant Chief Animal Health Officer
v. Chief Animal Health Officer

III. TECHNICAL OFFICERS GROUP

i. Technical officer grade II
ii. Technical Officer Grade I
iii. Senior Technical Officer
iv. Principal Technical Officer
v. Assistant Chief Technical Officer
vi. Chief Technical Officer

Appendix E: Reporting form used by district vets

VETERINARY SERVICES DIRECTORATE

OUTBREAKS OF SCHEDULED DISEASES REPORTING FORM (VF1)

ACKGROUND DATA

Date of Outbreak	2) Date outbreak reported to Vet.	3) Date of investigation by Vet	4. Date of final field diagnosis	5. Husbandry practice	6. Region	7. District	8. Town/Village	9) Community	10) Longitude	11) Latitude

MEMIOLOGICAL DATA

Species: ov., Cap., vi., Sui., an., Fel., ıu., etc	12) Age group most affected	13) Sex most affected	14. No. of cases (sick plus dead)	15. No. of incontacts	16. No. Dead	17. No. destroyed	18. No. Slaughtered	19) No. at risk (8km radius)	20) Any human involved and number affected	21) Any human deaths and number

INICAL DATA

) History and Clinical signs observed

) Post mortem lesions/signs

) Tentative diagnosis	25) Differential diagnosis

) Samples taken	2.) Date samples sent to laboratory (indicate laboratory)	28. Date laboratory results received

). Control measures including ant treatment given:

) Name and grade of officer reporting	31) Signature of reporting officer and date:

ov=Bovine, Cap=Caprine., Ovi = Ovine., Sui =Pig? Swine., Avi = Birds, Can = Dogs, Fel = Cats., Equ = Equidae (Horse, Donkey)

Appendix F: List of scheduled diseases in Ghana (from VSD, 2012)

[Zoonoses are in **bold**]

Anthrax
Rabies
Trypanosomosis
Highly Pathogenic avian influenza (Fowl plague)
Tuberculosis
Brucellosis
Bovine Spongiform Encephalopathy

Rinderpest
Contagious Bovine Pleuropneumonia
Epizootic lymphangitis
Mange
African swine fever
Swine erysipelas
Foot and mouth disease
Black quarters
Glanders
Newcastle disease
Fowl thyphoid
Pullorum (bacillary white diarrhoea)
Marek's disease (fowl paralysis)
Fowl pox
Haemorrhagic septicaemia
Gumboro disease (infectious bursal disease)
African horse sickness
Lumpy skin disease
Peste des Petits Ruminants
Dermatophilosis
Contagious pustular dermatitis (ORF)

Appendix G: Letter from MoFA about the 'recentralisation' of the VSD

In case of reply the number and date of this letter should be quoted

M.A. Form 7

Republic of Ghana

Telephone: 233 21 663507/662961
Tel / Fax: 233 21 663507/662961

MINISTRY OF FOOD & AGRICULTURE
P. O. BOX M.37
ACCRA

My Ref. No :' KA 119/287/01

Your Ref. No

9th June 2014

DECENTRALIZATION OF DIRECTORATES IN THE MINISTRY OF FOOD AND AGRICULTURE

The Ministry of Food and Agriculture has been informed of the concerns raised by District Veterinary Units as regards their status vis-à-vis the new Local Government Decentralization programme.

In order to fulfill its regulatory mandate and International Obligation to Development Partners, it has been decided that the Veterinary Services exists as separate functional entity at the regional and district levels under the Ministry of Food and Agriculture.

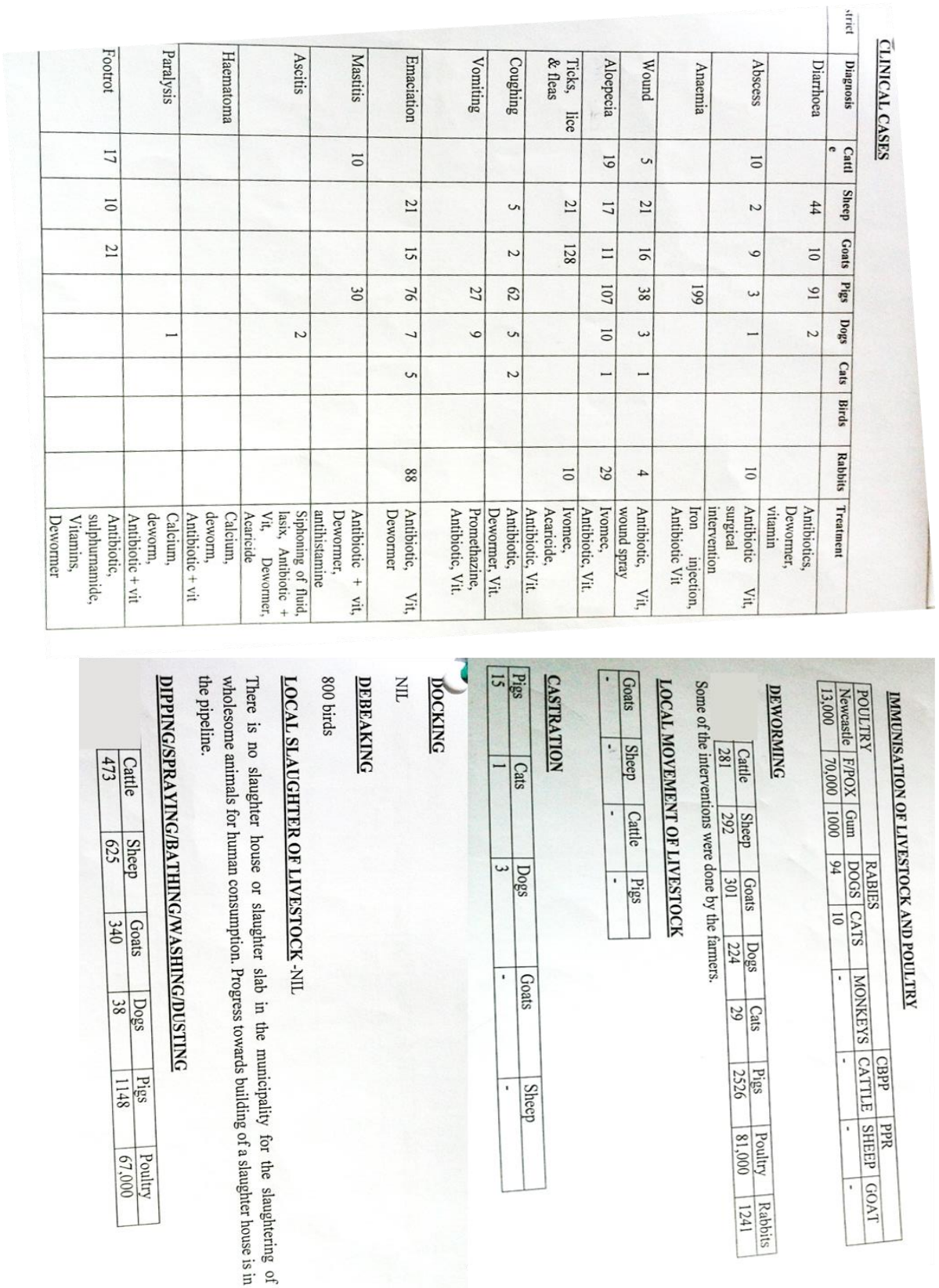
All Regional Directors are to take note and to inform all District Directors accordingly.

HON. DR. HANNA LOUISA BISIW (MP)
DEPUTY MINISTER, LIVESTOCK
For: MINISTER OF FOOD & AGRICULTURE

ALL REGIONAL DIRECTORS
RADU-MoFA

cc: Chief Director, MoFA
Ag. Director, VSD

Appendix H: Example of animal health issues and treatments occurring in one district clinic during a one-month period



CLINICAL CASES

District	Diagnosis	Cattle	Sheep	Goats	Pigs	Dogs	Cats	Birds	Rabbits	Treatment
	Diarrhoea		44	10	91	2				Antibiotics, Dewormer, vitamin
	Abscess	10	2	9	3	1			10	Antibiotic Vit, surgical intervention
	Anaemia				199					Iron injection, Antibiotic Vit
	Wound	5	21	16	38	3	1		4	Antibiotic, Vit, wound spray
	Aloepecia	19	17	11	107	10	1		29	Ivomec, Antibiotic, Vit.
	Ticks, lice & fleas		21	128					10	Ivomec, Acaricide, Antibiotic, Vit.
	Coughing		5	2	62	5	2			Antibiotic, Dewormer, Vit.
	Vomiting				27	9				Promethazine, Antibiotic, Vit.
	Emaciation		21	15	76	7	5		88	Antibiotic, Vit, Dewormer
	Mastitis	10			30					Antibiotic + vit, Dewormer, antihistamine
	Ascitis					2				Siphoning of fluid, lasix, Antibiotic + Vit, Dewormer, Acaricide
	Haematoma									Calcium, dewworm, Antibiotic + vit
	Paralysis					1				Calcium, deworm, Antibiotic + vit
	Footrot	17	10	21						Antibiotic, sulphurnamide, Vitamins, Dewormer

IMMUNISATION OF LIVESTOCK AND POULTRY

POULTRY			RABIES		MONKEYS	CBPP	PPR	
Newcastle	F/POX	Gum	DOGS	CATS		CATTLE	SHEEP	GOAT
13,000	70,000	1000	94	10	-	-	-	-

DEWORMING

Cattle	Sheep	Goats	Dogs	Cats	Pigs	Poultry	Rabbits
281	292	301	224	29	2526	81,000	1241

Some of the interventions were done by the farmers.

LOCAL MOVEMENT OF LIVESTOCK

Goats	Sheep	Cattle	Pigs
-	-	-	-

CASTRATION

Pigs	Cats	Dogs	Goats	Sheep
15	1	3	-	-

DOCKING

NIL

DEBEAKING

800 birds

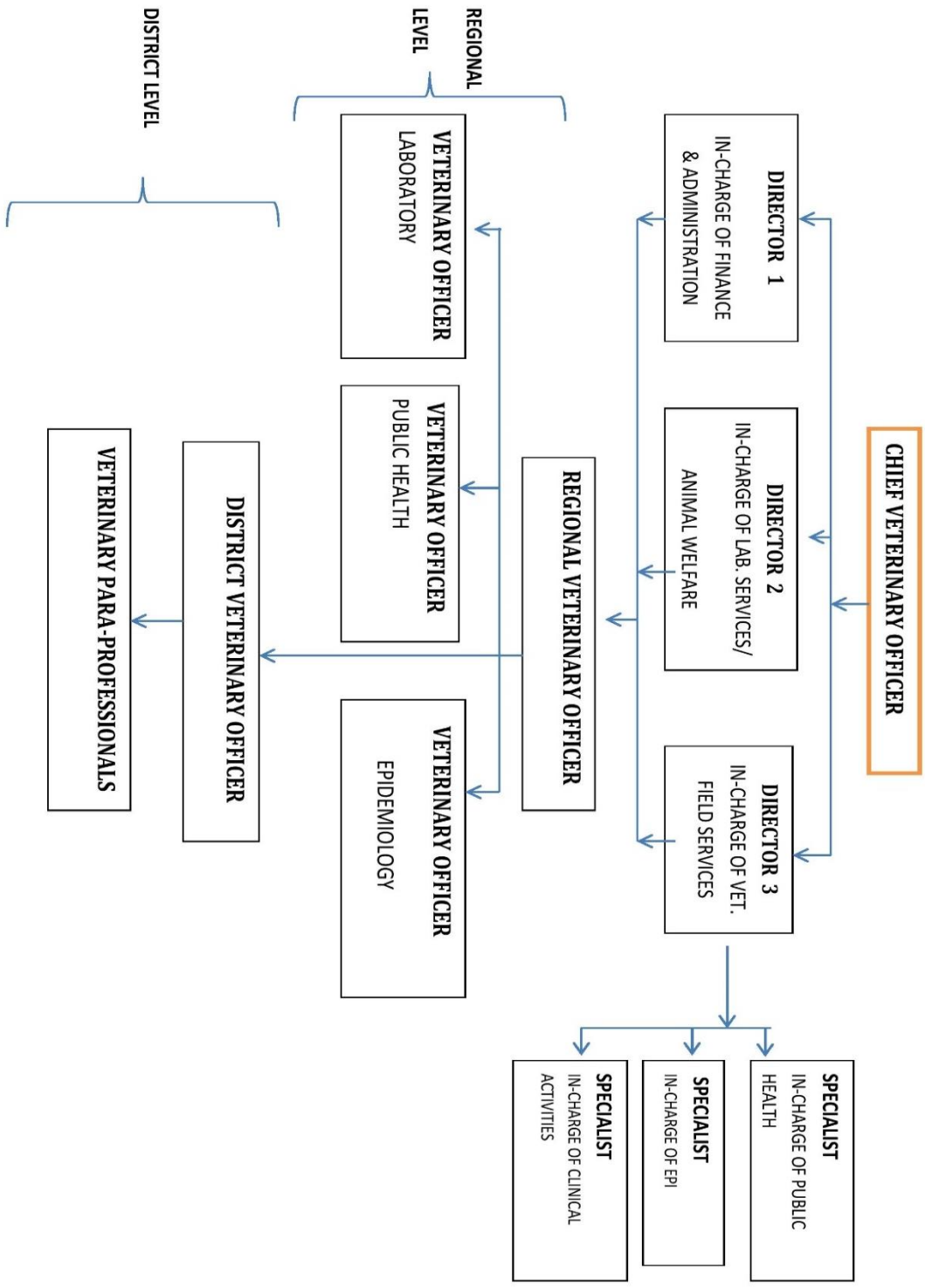
LOCAL SLAUGHTER OF LIVESTOCK -NIL

There is no slaughter house or slaughter slab in the municipality for the slaughtering of wholesome animals for human consumption. Progress towards building of a slaughter house is in the pipeline.

DIPPING/SPRAYING/BATHING/WASHING/DUSTING

Cattle	Sheep	Goats	Dogs	Pigs	Poultry
473	625	340	38	1148	67,000

Appendix I: Ghana's VSD Organogram



Source: given by a senior vet working at the VSD headquarters