

IMPACT OF NEGLECTED DISEASES ON ANIMAL PRODUCTIVITY AND PUBLIC HEALTH IN AFRICA

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1. Introduction

Animal diseases have important impacts on animal productivity and welfare and on human health and wellbeing. From a ‘One Health’ or ecohealth perspective, disease impacts on human health, animal health and ecosystem health are considered holistically. Animal diseases impose direct costs on the livestock sector, as a result of animal deaths, reduced productivity and the cost of disease control. The impacts of zoonotic and foodborne diseases are felt in terms of human illness and associated costs. Many diseases also have impacts in terms of indirect costs, both upstream (feed) and downstream (e.g. retailing links). Emerging diseases tend to have high impacts on other sectors, such as travel and tourism. It is often difficult to quantify the costs of wildlife diseases, but the impacts are potentially high.

- *Livestock sector impacts.* There have been many studies on the economic costs of disease as the result of losses from mortality, reduced productivity, and control costs. However, only a few studies have attempted to systematically assess the impacts of livestock disease across species or countries. The cost of 32 important diseases in the United Kingdom livestock sector was estimated at USD 1,178 million, or 8% of the value of the sector [1]. In Australia, the top 21 beef and sheep diseases cost the livestock sector AUD 979 million, or 16% of the value of the sector [7]. A study covered four different species and looked at the costs of five important diseases in Nigeria:
 - a) Newcastle disease (ND) in local poultry,
 - b) Peste des petits ruminants (PPR) in sheep and goats,
 - c) Contagious bovine pleuropneumonia (CBPP) in cattle,
 - d) African swine fever (ASF) in pigs and
 - e) Trypanosomosis in cattle and pigs.

All five were diseases of a transboundary nature listed by the OIE (see below); together, the diseases cost USD 185 million [2]. Another study looking at developing countries was limited by poor data from south Asia and Africa and hence had to rely on many questionable assumptions. Nevertheless, the study estimated that 15 important diseases cost USD 35 billion a year, representing 37% of the value of the sector (unpublished).

- *Human health impacts.* Animal diseases can have a direct effect on human health in the case of zoonoses (i.e. transmitted from animals to humans). Around 60% of all pathogens that cause disease in humans are zoonotic. Moreover, their impact in terms of human illness differs between high- and low-income countries. In 59 low-income countries, zoonoses accounted for 13% of the infectious disease burden while in rich countries zoonoses were responsible for less than 1% of the infectious disease burden [3]. Farmers, veterinarians and other livestock- and fish-sector workers are directly exposed to zoonoses; consumers of livestock and fish products are exposed through food.

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- *Impacts associated with disease emergence.* Many important diseases were originally zoonotic, such as measles, tetanus, smallpox, HIV and diphtheria. Moreover, ‘emerging’ diseases (defined as diseases that have newly appeared in populations or are rapidly increasing in frequency or range) are mostly zoonotic. Currently one new human disease is emerging every 4 months; three-quarters of emerging infectious diseases are zoonotic. The costs of these emerging zoonotic diseases are estimated at USD 6.7 billion per year [8].
- *Impacts on welfare and wildlife.* Animal diseases affect animal welfare by causing suffering and death. Diseases of wildlife can have impacts by acting as reservoirs for human or livestock disease, by reducing the value derived from wildlife by activities such as tourism or harvesting, and by reducing the ability of ecosystems to regulate disease.

This paper reports the findings of an OIE questionnaire on the impact of neglected diseases on animal productivity and public health in Africa. In human health, the World Health Organization (WHO) has defined 17 diseases as neglected tropical diseases (10 of these are zoonotic). There is no equivalent list of ‘neglected animal diseases’ and in this study we consider diseases of high prevalence and impact, where resources are inadequate for control, to be neglected diseases.

Many countries lack detailed information on animal diseases and their impacts. The survey was designed to gather information based on state Veterinary Services’ records and data and where such information was missing to capture the perceptions and opinions of the Veterinary Services, based on their expertise and experience. The survey results provide useful data for the OIE and the Delegates of OIE Member Countries and should serve as a basis for recommendations aimed at reducing the burden of animal disease in Africa.

2. Survey methodology

Questionnaires were sent to the Veterinary Authorities of the 54 OIE Member Countries in Africa. The questionnaire was developed by the authors of the report and benefited from an extensive review by OIE staff. Originally written in English, it was translated into French by OIE personnel with expertise in animal disease. It was framed around five aspects of the impact of animal diseases:

- a) Livestock disease prioritisation and current priorities;
- b) Trends in livestock disease and disease drivers;
- c) Information for estimating economic cost of disease;
- d) Knowledge, attitude, practices and suggestions for improving reporting;
- e) Work of the OIE on neglected animal diseases.

The questionnaire covered livestock, fish, and wildlife diseases and the smallholder, pastoralist and intensive sectors. It explicitly considered impacts on women and smallholders and on domestic and export markets.

Where information was required for specific diseases, the diseases of interest were drawn from four listings of diseases:

- a) the OIE single list of notifiable terrestrial and aquatic animal diseases (www.oie.int/animal-health-in-the-world/oie-listed-diseases-2015/) based on criteria of international spread, zoonotic potential, significant spread within naive populations and emergence;
- b) a list of animal diseases in Africa important for poor farmers developed by ILRI in order to guide research [5];
- c) a listing developed by the Global Alliance for Livestock Veterinary Medicine (GALVmed), a not-for-profit global alliance with the goal of developing and ensuring access to vaccines and other animal health products to help poor farmers in the developing world (www.galvmed.org); and
- d) the only comprehensive economic assessment of livestock disease impacts in Africa, which was funded by the Bill & Melinda Gates Foundation (www.gatesfoundation.org).

In order to better identify the Veterinary Services' perception of disease impacts, nine categories of disease were considered, although it was possible for a disease to appear under several categories. These included epidemic or transboundary diseases, vector-borne diseases, zoonotic diseases, food-borne diseases, emerging diseases and aquatic diseases, which correspond well to the OIE single list. Also included were endemic diseases and wildlife diseases: the first are important because of productivity impacts and the second because of impacts on ecosystem health. State Veterinary Services' perception of the impacts of 35 diseases was assessed using the estimates of disease parameters provided by respondents and expert opinion on the presence of disease in the country and the proportion of the livestock population at risk. To monetize these estimates, the average costs of treatment, vaccination and mortality, and the population structure, were assessed by experts and informed by previous economic assessments of livestock disease in Africa. Information on livestock populations in Africa was taken from FAOSTAT (2013).

Data were entered in Microsoft Excel and descriptive statistics generated using Microsoft Excel and Stata. Spatial analysis was performed in Microsoft Excel and R [R Development Core Team, 2010] using the 'worldmap' package [South, 2011].

3. Results and discussion

3.1. Response rates

Out of the 54 Member Countries having received the questionnaire, 34 countries responded within the specified time limit to be included in the analysis presented here, a response rate of 63%². However, because the countries that responded tended to have larger livestock sectors, the survey covers countries holding 87% of Africa's cattle, 87% of sheep and goats, 82% of poultry and 64% of pigs [FAOSTAT, 2014].

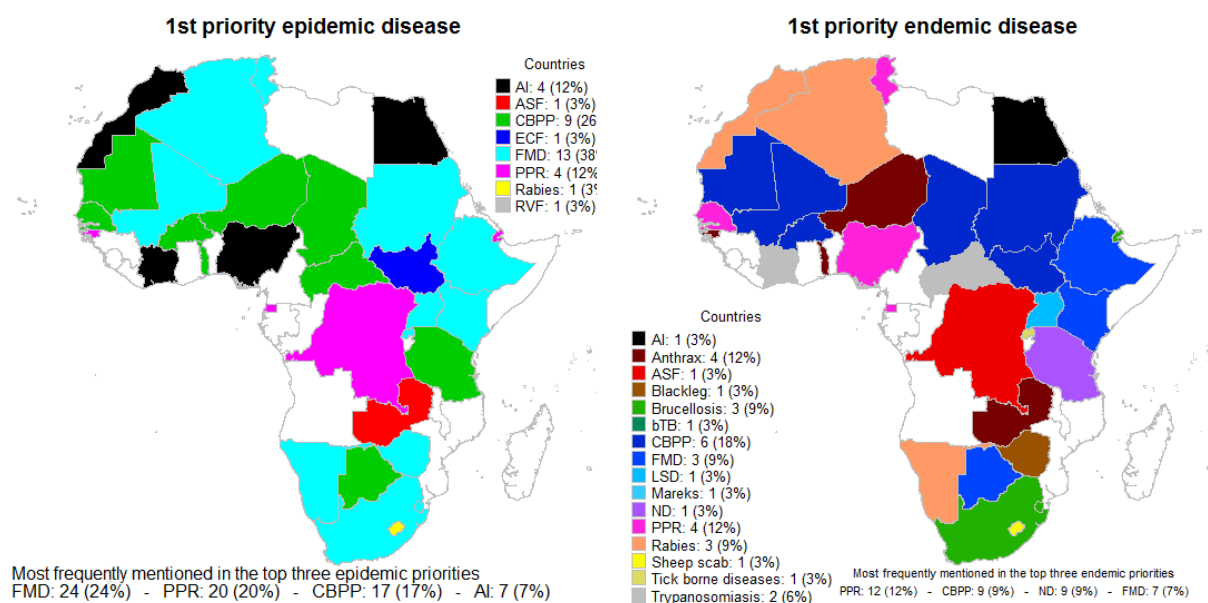
3.2. Different types of animal disease impacts on productivity and human health

The study considered seven different categories of disease that can impact on human wellbeing through different pathways (maps in Annex 1). Several important diseases fit in multiple categories, or can fit in different categories in different contexts (e.g. foot and mouth disease [FMD] may be endemic in some countries but epidemic in others).

- Epidemic or transboundary diseases are of concern because of their ability to spread rapidly and disrupt trade. Many epidemic diseases also cause high losses. FMD was most often ranked as a priority epidemic disease followed by peste des petits ruminants (PPR) and contagious bovine pleuropneumonia (CBPP) (Fig. 1).
- Endemic animal diseases are constantly present in ecosystems, and often have important effects on productivity. The priority disease was CBPP, followed by PPR and anthrax.
- Zoonotic and foodborne diseases have most of their impacts by causing human illness, but they also have livestock sector costs. Rabies was considered the first priority zoonotic disease by 45% of countries, and avian influenza was considered the most important emerging disease by 46% of respondents. Salmonellosis was considered the first priority foodborne disease by 67% of countries.

2 Algeria, Botswana, Burkina Faso, Central African Republic, Chad, Democratic Republic of Congo, Djibouti, Egypt, Equatorial Guinea, Ethiopia, Guinea-Bissau, Côte d'Ivoire, Kenya, Lesotho, Mali, Mauritania, Mauritius, Morocco, Namibia, Niger, Nigeria, Rwanda, Senegal, Seychelles, South Africa, South Sudan, Sudan, Swaziland, Tanzania, Togo, Tunisia, Uganda, Zambia, Zimbabwe.

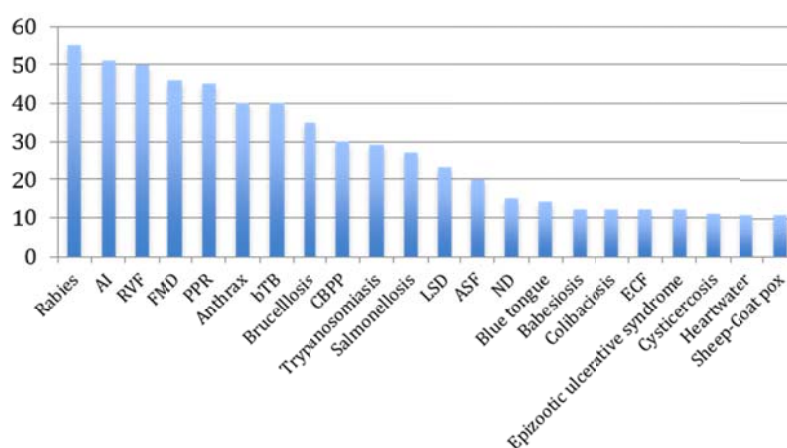
Fig. 1. – The first priority disease in epidemic and endemic disease categories



- Vector-borne diseases may be epidemic, endemic or zoonotic but are of additional interest because most are climate-sensitive and may change their distribution as a result of climate change. Trypanosomiasis was reported as the most important vector-borne disease in 33% of countries.
- Aquatic animal diseases are becoming of greater importance because of the rapid growth in aquaculture. Epizootic ulcerative syndrome was reported to be the most important aquatic animal disease by 39% of countries.
- Emerging diseases often have high impacts on trade and on other sectors. Avian influenza was considered the most important emerging disease.
- Wildlife diseases are especially important in Africa, where wild animals have important roles in supporting tourism, providing nutritional resources, and in maintaining natural ecosystems. Wildlife can also act as reservoirs for livestock diseases: rabies and anthrax were the most frequently mentioned wildlife diseases.

Under the category of ‘other diseases’ respondents added three diseases of bees (varroosis, wax moth, small hive beetle), one of felids (feline panleucopaenia), one of wildlife (rabies) and three of crocodiles (coccidiosis, mycoplasmosis, trichinellosis). In all, respondents named 113 diseases as priorities in the different categories of disease. Of these, 22 were named more than 10 times (Fig. 2).

The majority of diseases cited as priorities were infections but aflatoxins, heavy metal poisoning and pesticide poisoning were also considered priorities in some countries. Some of the diseases named were species specific and these included diseases of sheep and goats, ducks, crocodiles, monkeys, koi carp, camels and bees, showing that a wide variety of species are considered important.

Fig. 2. – Diseases cited by more than 10 countries as priorities in their country

3.3. Impact of animal diseases on different sectors

FMD is considered to be by far the most important disease in term of impacting export (Fig. 3). Newcastle disease (ND) was clearly considered the most important disease in terms of economic impact on women and food security. For other impacts, a number of diseases were seen as important, varying by disease category and region.

Animal diseases have impacts on important aspects of national economies. Respondents were asked which aspects were most important in helping the Veterinary Services decide overall priorities. A strong human development focus was noticed: the most important considerations were impact on food security, smallholders and pastoralists (Table I).

Table I. – Considerations for the state Veterinary Services in deciding which diseases are most important in terms of productivity and public health

	Most important	2nd most important	3rd most important
Impacts on food security	65%	18%	6%
Impacts on the smallholder sector	47%	18%	24%
Impacts on the pastoralist sector	41%	9%	9%
Impacts on the export sector	35%	21%	18%
Impacts on the commercial sector	32%	38%	9%
Impacts on public opinion	15%	18%	21%
Impacts on wildlife and the environment	6%	26%	24%

In the past, Veterinary Services in Africa were considered to prioritise large animals, commercial farming, and exports [4] so this survey indicates a shift towards more development-oriented prioritisation.

Fig. 3. – How animal diseases impact on different segments of national economies

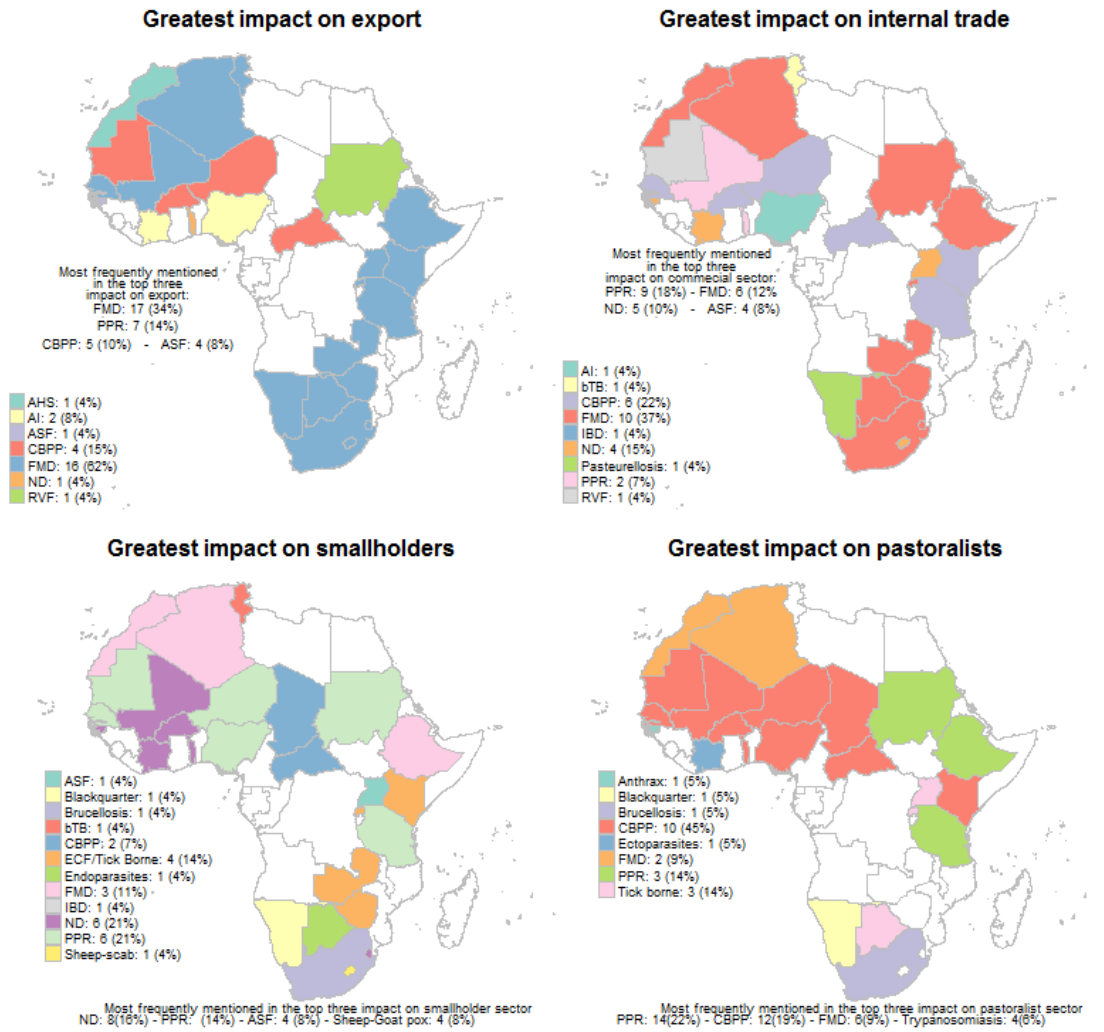
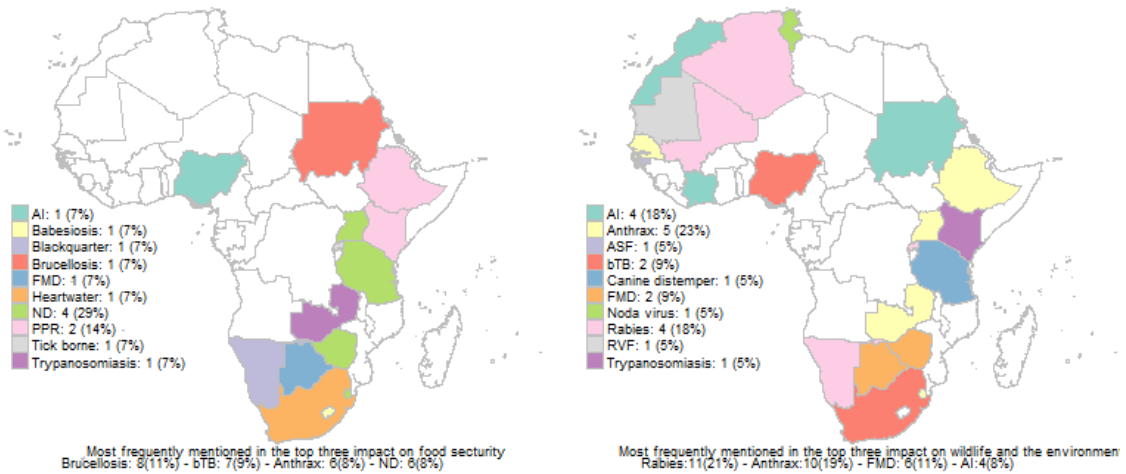
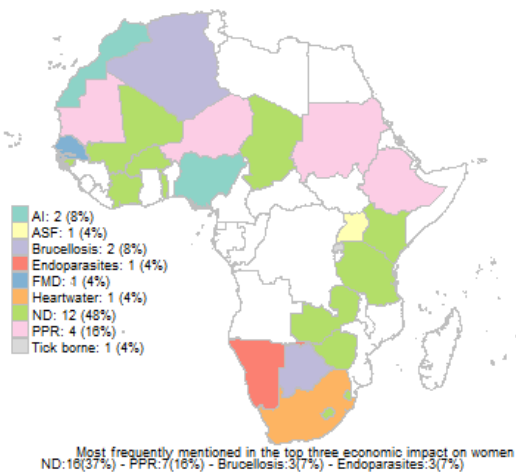


Fig. 3. (contd)

Greatest impact on food security (anglophone only)* Greatest impact on wildlife and the environment



Greatest economic impact on women



* For technical reasons food security data was not collected in Francophone countries.

3.4. Many important animal diseases are common

The questionnaire sought information on the prevalence of diseases that our review of disease lists had suggested were important. Of these 21 diseases, 12 appeared on both priority listings (country lists and perceived priorities), four appeared on one priority listing and just four were not on priority listings (dermatophilosis, bovine viral diarrhoea [BVD], echinococcosis and theileriosis). Bluetongue and salmonellosis appeared on both priority lists in our survey, but were not among the top priorities in the literature of lists of priority diseases.

Information on prevalence provides insights into the possible costs of disease to the livestock sector from mortality and productivity losses and the possible costs to human health from zoonoses. Common diseases are likely to be associated with high costs, but some relatively rare diseases can have high costs in the event of outbreaks or because of their especially severe health impacts.

The diseases considered to be common by more than half the respondents were rabies (85%), Newcastle disease (74%) brucellosis (68%), lumpy skin disease (LSD) (67%), FMD (65%), trypanosomiasis (62%), PPR (56%) and anthrax (53%). The diseases least likely to be considered common were BVD (10%) and Rift Valley fever (RVF) (11%). As shown in Figure 4, some diseases show a regional distribution: notably East Coast fever (ECF), bovine tuberculosis (bTB), echinococcosis and cysticercosis.

Fig. 4A. – Prevalence of priority animal diseases

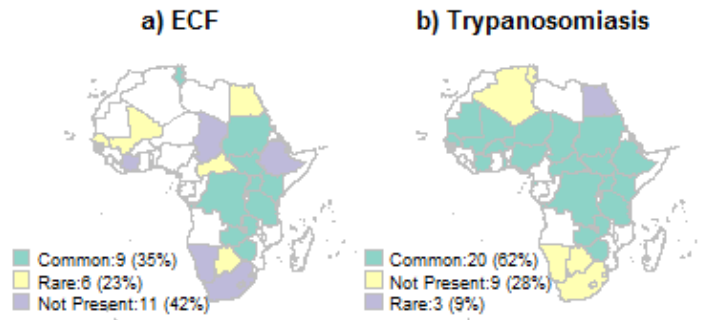


Fig. 4B. – Prevalence of priority animal diseases (contd)

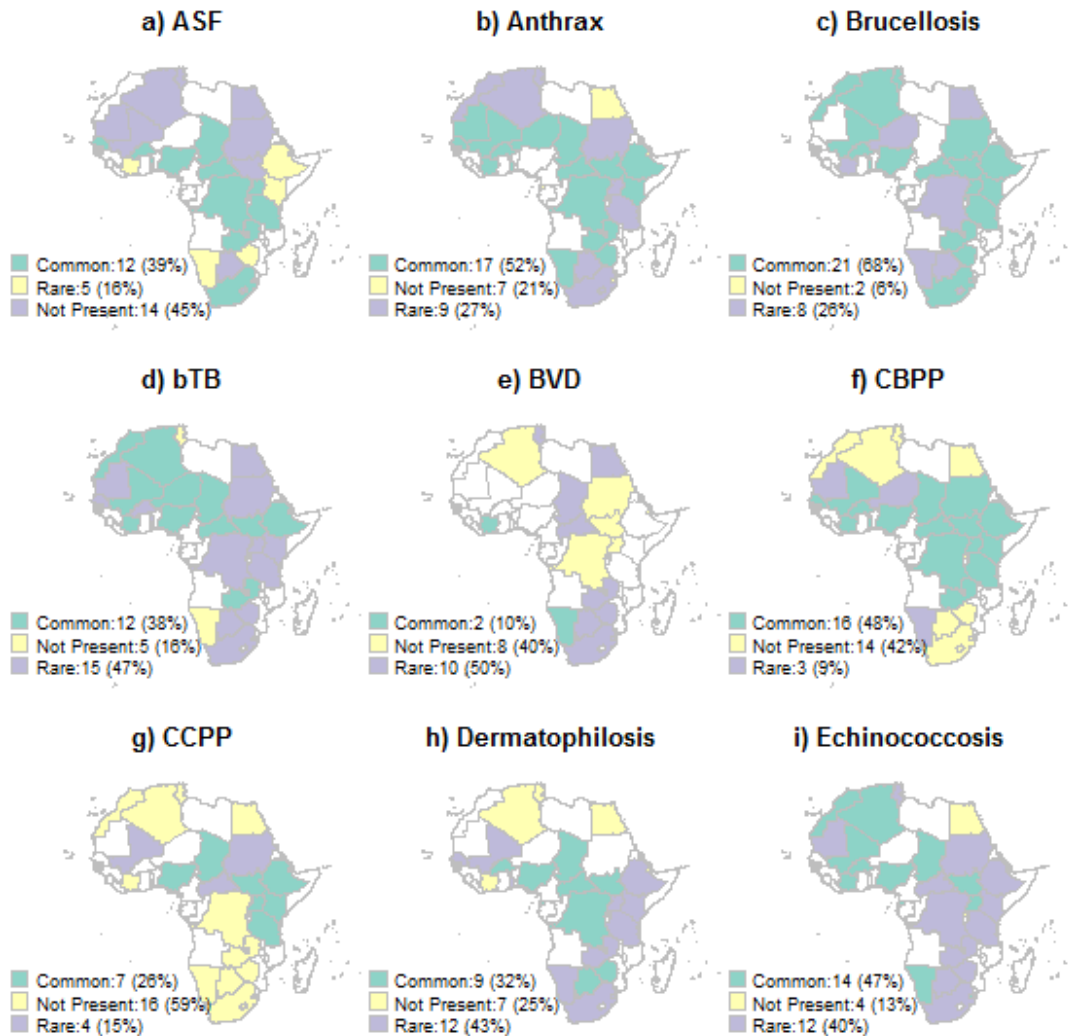
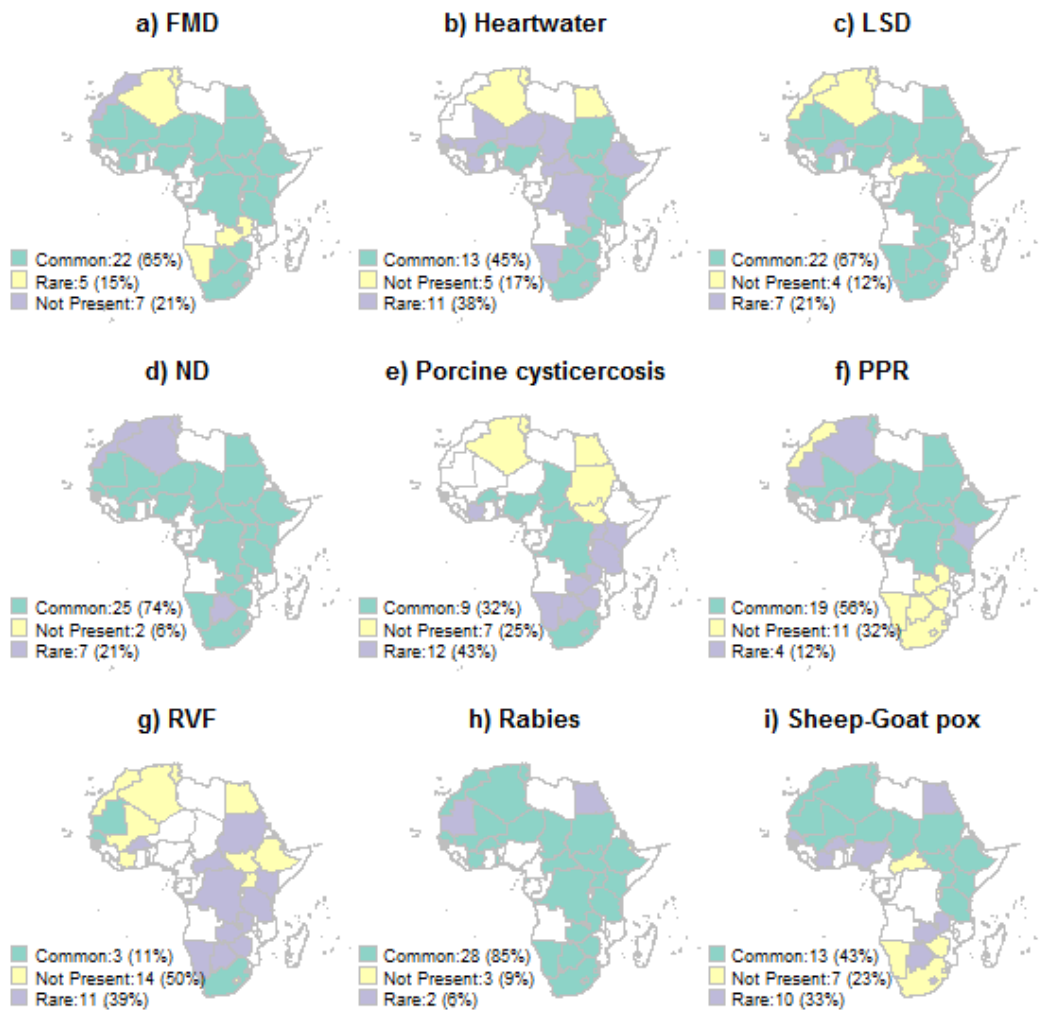


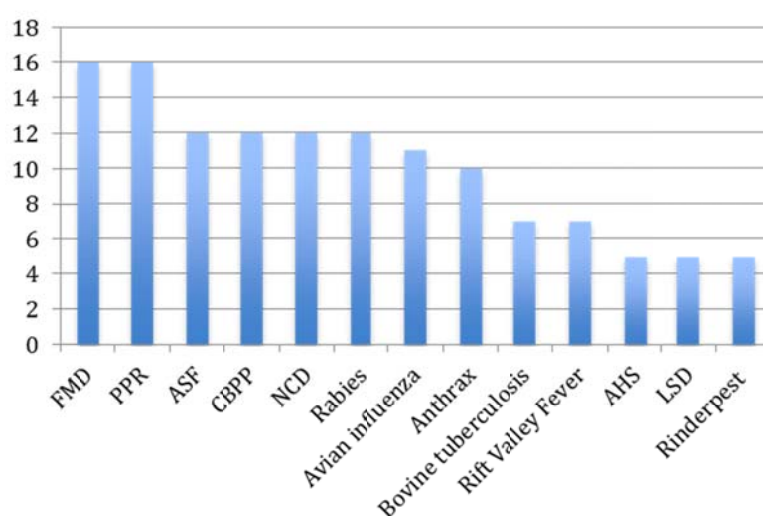
Fig. 4C. – Prevalence of priority animal diseases (contd)



3.5. Ability to control priority diseases

Priority disease lists are tools that help target scarce resources to the most important problems and plan for control. Most (28/34; i.e. 82%) of the countries had an official list of priority diseases. Nineteen countries provided their lists of priority diseases, while several referred to the OIE single list. This is an improvement from 2001, when there was a general lack of disease prioritisation at the level of national epidemiology units in developing countries [6].

The number of priority diseases ranged from 3 to 36 per country. In all, 45 identifiable diseases appeared on the priority lists, but just 13 were named by more than five countries. (For some diseases, we were not able to assign a scientific name, e.g. 'langue chez les elephants'). The most frequently named diseases did not include ECF or trypanosomosis, often considered among the most important diseases in Africa. Small ruminant, pig and poultry diseases were among those listed most frequently, suggesting that state Veterinary Services no longer focus mainly on cattle, as was perceived to be the case previously [4]. Overall, 20 priority diseases were present in 66% of the countries covered in the survey.

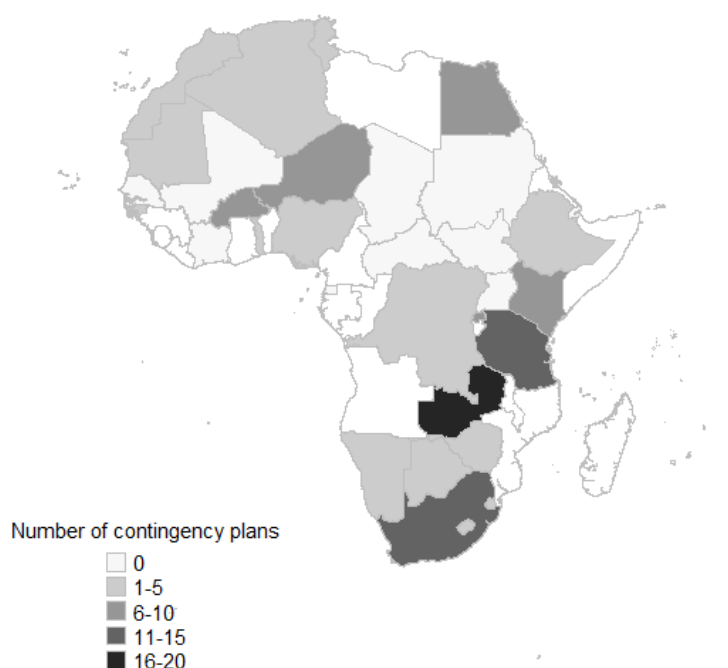
Fig. 5. – Diseases cited by more than 5 countries as present in their list of priority diseases

There was good agreement between the diseases appearing in country priority lists and the diseases named frequently as priorities, indicating good calibration between perceived priorities and disease priority lists (Fig. 5).

Respondents were asked about the presence of control measures (contingency plans, vaccination campaigns) for priority diseases (Table II). This provides insight into the cost of disease control. Overall, for diseases that are present in a country, 23% of countries have a contingency plan in place; among all countries, irrespective of whether the diseases are present or absent, just 15% have a contingency plan (Fig. 6). Around half of the countries have contingency plans for swine fever, CBPP, FMD, RVF and trypanosomosis. Southern and eastern countries tend to have more contingency plans in place than countries in other parts of Africa.

Table II. – Presence and control measures for priority diseases

	Countries with disease present %	Contingency plans % (all countries)	Contingency plans % (countries with disease)	Vaccination campaigns % (countries with disease)	Good control % of countries with disease
Swine fever	50	24	47	6	35
Anthrax	76	15	19	92	50
Brucellosis	85	21	24	59	21
bTB	79	9	11	19	19
BVD	35	3	8	33	33
CBPP	56	26	47	100	63
CCPP	32	3	9	55	27
Dermatophilosis	62	3	5	5	14
Echinococcosis	76	9	12	0	0
FMD	79	41	52	70	37
Heartwater	71	9	13	21	13
LSD	85	9	10	66	17
ND	94	18	19	94	38
Cysticercosis (pigs)	62	3	5	10	10
PPR	68	29	43	83	52
RVF	41	18	43	50	57
Sheep pox	88	24	27	97	20
ECF	68	9	13	61	13
Trypanosomosis	44	21	47	53	33

Fig. 6. – Number of contingency plans for animal health diseases, by country

In countries with diseases present, respondents consider that for 29% of the diseases control is good, for 40% of diseases control is fair and for the remainder of diseases control is poor.

Distribution of the costs of vaccination varies by disease as well by region (Fig. 7). Rabies, ND, CBPP, brucellosis and anthrax have good vaccination coverage. Only for three diseases are government campaigns the main provider of vaccination (anthrax, RVF and FMD). In the case of brucellosis and LSD, the private sector is the main provider of vaccines and for other diseases both sectors are involved. This indicates that the private sector is involved in disease control.

3.6. Disease trends

Overall, diseases were considered to be increasing or static: for 44% of the diseases assessed the trend was up, for 44% it was static and only for 12% was the trend downwards. Zoonotic and epidemic diseases were estimated to be increasing most and wildlife diseases least (Fig. 8).

Trends in disease also varied by region, with static or decreasing trends most likely in the south and north-west (Fig. 9).

3.7. Drivers of disease

Understanding the drivers of disease helps predict and manage diseases. The most important drivers of change in the patterns of disease were considered to be climate change and trade in livestock and products. A broad range of demographic, social, economic and environmental drivers were seen to have some importance, while inequality and land purchase by foreigners were not considered important (Table III and Fig. 10). Respondents added additional drivers of disease: globalisation, illegal trade and porous borders.

Fig. 7. – Vaccination for priority diseases

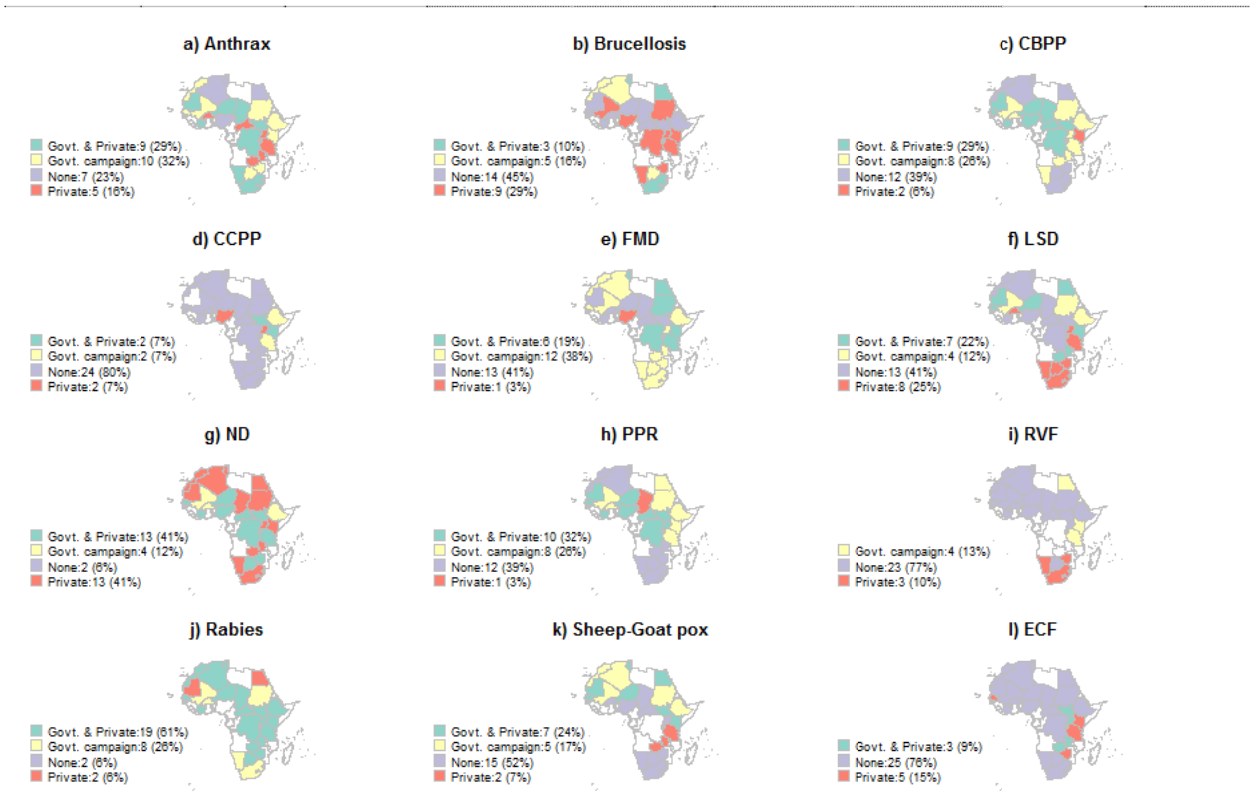


Fig. 8. – Perceptions in terms of change in disease importance, as reported by 34 countries

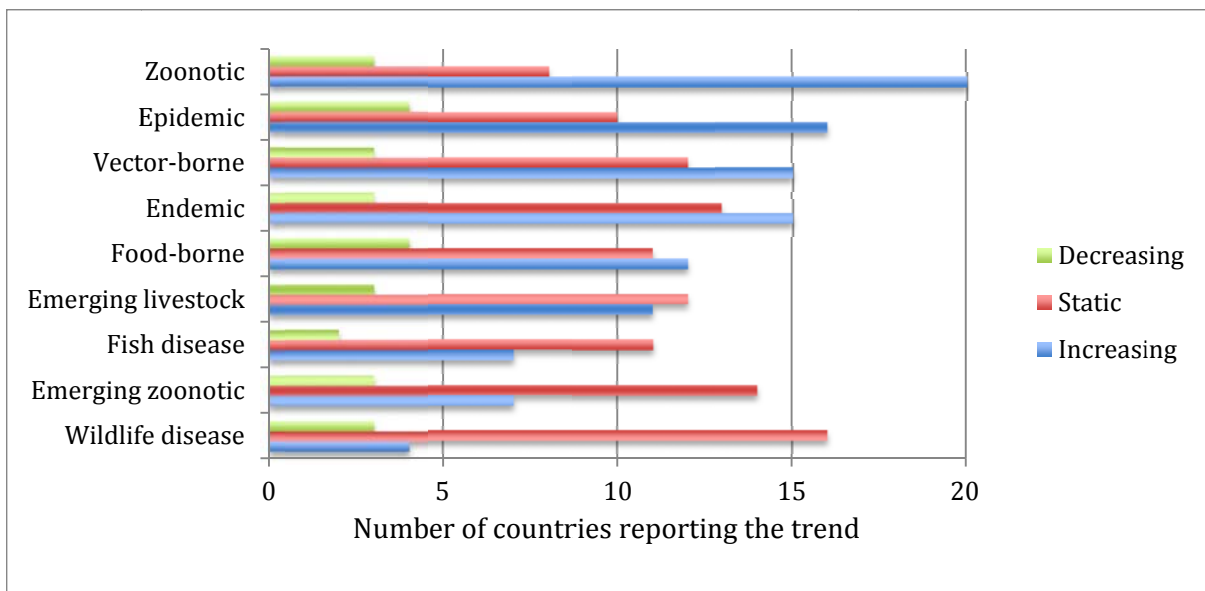


Fig. 9. – Veterinary Services’ perception of disease trends for different disease categories

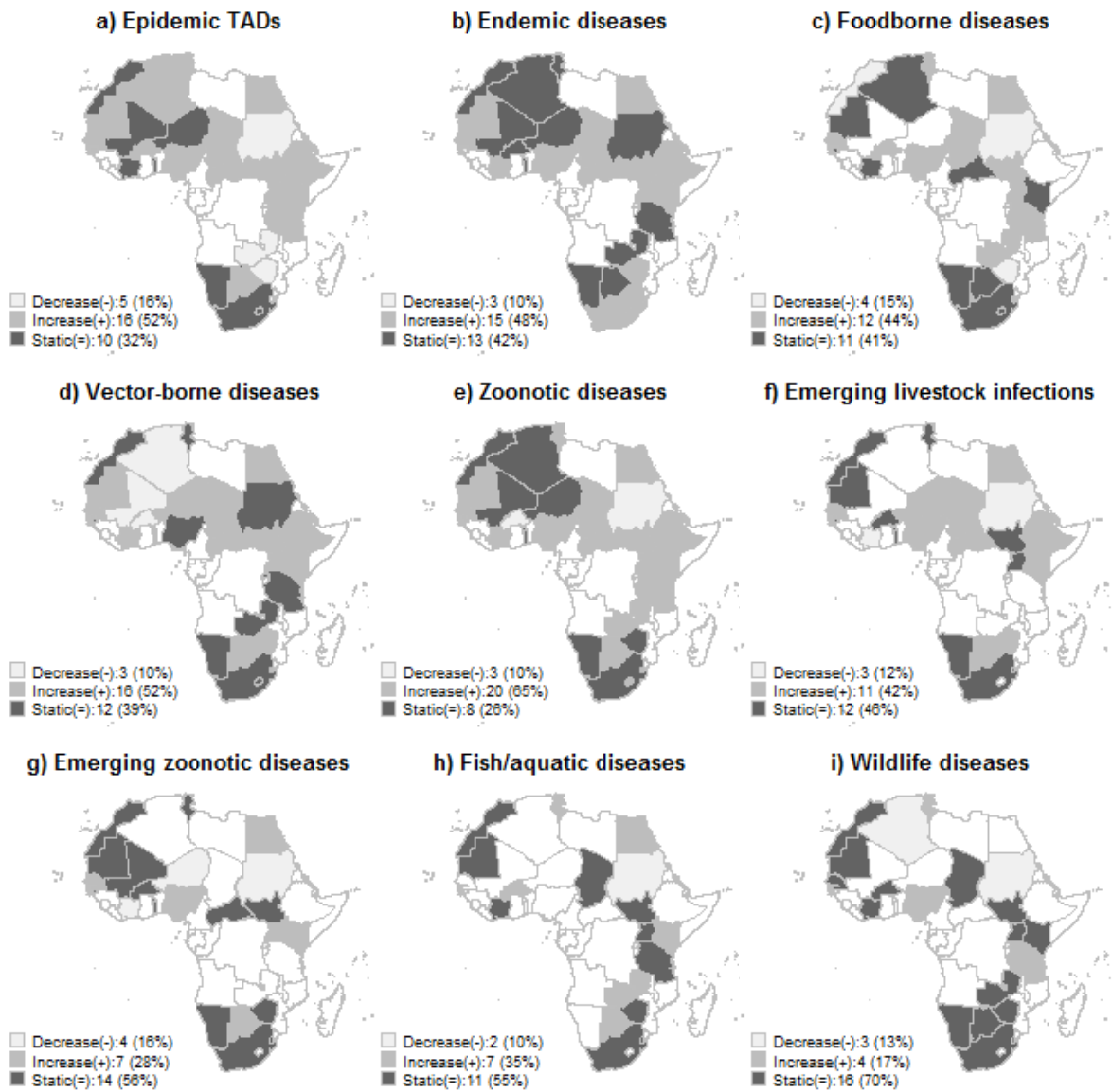


Fig. 10. – Underlying drivers of changes in disease dynamics (number of times a driver is cited by respondents)

A detailed listing is provided in Table III.

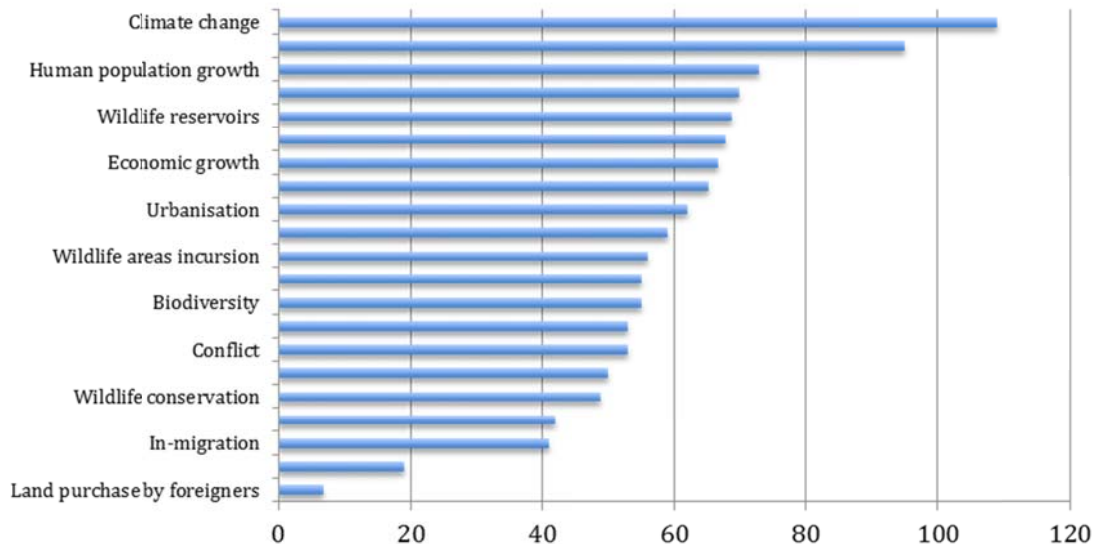


Table III. – Reported drivers of trends in animal diseases and zoonoses

Trends are reported in Fig. 10.

Drivers of change n=34	DISEASE CATEGORY								
	Epidemic or transboundary animal diseases	Endemic animal diseases	Food- borne diseases	Vector- borne diseases	Zoonotic diseases	Emerging infectious livestock diseases	Emerging zoonotic diseases	Fish or aquatic animal diseases	Wildlife diseases
Biodiversity decrease	10 (29%)	6 (18%)	4 (12%)	8 (24%)	6 (18%)	5 (15%)	6 (18%)	4 (12%)	6 (18%)
Conflict/war	12 (35%)	7 (21%)	5 (15%)	5 (15%)	7 (21%)	6 (18%)	6 (18%)	2 (6%)	3 (9%)
Wildlife conservation impact	11 (32%)	7 (21%)	0 (0%)	6 (18%)	6 (18%)	4 (12%)	5 (15%)	3 (9%)	7 (21%)
Climate change	15 (44%)	14 (41%)	7 (21%)	24 (71%)	13 (38%)	10 (29%)	10 (29%)	7 (21%)	9 (26%)
Deforestation	11 (32%)	8 (24%)	4 (12%)	14 (41%)	4 (12%)	8 (24%)	6 (18%)	3 (9%)	7 (21%)
Economic growth	12 (35%)	10 (29%)	11 (32%)	7 (21%)	7 (21%)	7 (21%)	4 (12%)	4 (12%)	5 (15%)
Food price increase	12 (35%)	8 (24%)	12 (35%)	4 (12%)	7 (21%)	6 (18%)	4 (12%)	3 (9%)	3 (9%)
Wildlife habitat loss	9 (26%)	6 (18%)	3 (9%)	10 (29%)	6 (18%)	6 (18%)	4 (12%)	2 (6%)	9 (26%)
Human population growth	11 (32%)	6 (18%)	14 (41%)	10 (29%)	12 (35%)	6 (18%)	5 (15%)	3 (9%)	6 (18%)
Inequality	4 (12%)	2 (6%)	3 (9%)	3 (9%)	2 (6%)	1 (3%)	1 (3%)	1 (3%)	2 (6%)
Immigration	10 (29%)	2 (6%)	4 (12%)	4 (12%)	8 (24%)	5 (15%)	4 (12%)	1 (3%)	3 (9%)
Livestock intensification	15 (44%)	14 (41%)	6 (18%)	10 (29%)	5 (15%)	10 (29%)	5 (15%)	2 (6%)	3 (9%)
Land purchase by foreigners	2 (6%)	0 (0%)	1 (3%)	1 (3%)	1 (3%)	0 (0%)	1 (3%)	0 (0%)	1 (3%)
Land use change	11 (32%)	9 (26%)	5 (15%)	9 (26%)	4 (12%)	2 (6%)	3 (9%)	4 (12%)	6 (18%)
Irrigation	8 (24%)	3 (9%)	4 (12%)	10 (29%)	8 (24%)	2 (6%)	2 (6%)	5 (15%)	0 (0%)
Poverty increase	14 (41%)	9 (26%)	10 (29%)	8 (24%)	11 (32%)	3 (9%)	3 (9%)	4 (12%)	2 (6%)
Social change	9 (26%)	10 (29%)	12 (35%)	8 (24%)	11 (32%)	6 (18%)	6 (18%)	4 (12%)	2 (6%)
Trade in livestock & products	21 (62%)	14 (41%)	12 (35%)	9 (26%)	14 (41%)	13 (38%)	7 (21%)	5 (15%)	3 (9%)
Urbanisation	5 (15%)	5 (15%)	14 (41%)	10 (29%)	14 (41%)	4 (12%)	5 (15%)	2 (6%)	3 (9%)
Incursion of domestic animals into wildlife areas	15 (44%)	10 (29%)	3 (9%)	12 (35%)	10 (29%)	9 (26%)	9 (26%)	1 (3%)	12 (35%)
Wildlife pathogen reservoirs	14 (41%)	8 (24%)	2 (6%)	8 (24%)	11 (32%)	10 (29%)	5 (15%)	1 (3%)	10 (29%)

3.8. Losses from condemnation

In all, 28 countries provided information on the number of approved slaughterhouses (as defined by the OIE). The average was 166, with a range of 1 to 1,500. In only 14% of countries are the majority of sheep and goats slaughtered in government-approved abattoirs and in two countries, no sheep or goats were reported slaughtered in an approved abattoir. For pigs, 20% of countries report the majority are slaughtered in approved abattoirs, for poultry 24%, and for cattle 35%. This suggests that potentially large numbers of human-infectious pathogens are not detected or removed from the food chain, increasing the human health impacts of animal disease but reducing economic losses from condemnation.

3.9. Costs of treatment of sick animals

In several countries most cattle get treated each year with therapeutic antibiotics, anthelmintics, vaccines and acaricides and no countries reported that treatments were rare or did not occur. However, prophylactic use of antibiotics is not believed to be common. Treatments were less common for sheep and goats. In intensively kept pigs and poultry, treatments were common but were rare in backyard systems. Most countries had no information on drug resistance but some reported encountering occasional problems.

Most countries did not have quantitative information on the amount of veterinary drugs used. Those that did (7 countries) reported that 418 tonnes of antibiotics were used per year on average. A recent study found that OECD countries use on average 864 tonnes per year (n=30) [van Boeckel, in press], or more than double the average for the African countries reported in this survey. Given that Africa has a higher population of farmed animals than OECD countries, this implies veterinary drug use is different.

3.10. Impacts of priority diseases on animal mortality and control costs

Respondents were asked to estimate parameters that drive economic impacts for 35 priority diseases. In all, 27 countries provided quantitative information. (If all 35 diseases were present in all 27 countries, this would have resulted in 945 reports of diseases presence.) There were 476 reports of disease present in the country and 35 reports of disease absent and 434 of no quantitative information. This indicates a high level of important diseases, but also a high level of lack of information on disease impacts. In terms of annual mortality rates, 13 priority cattle diseases were estimated to result in 17% mortality among the cattle population at risk, 10 sheep and goat diseases to cause 25% mortality, six priority poultry disease to cause 38% mortality and six priority pig diseases to cause 29% mortality.

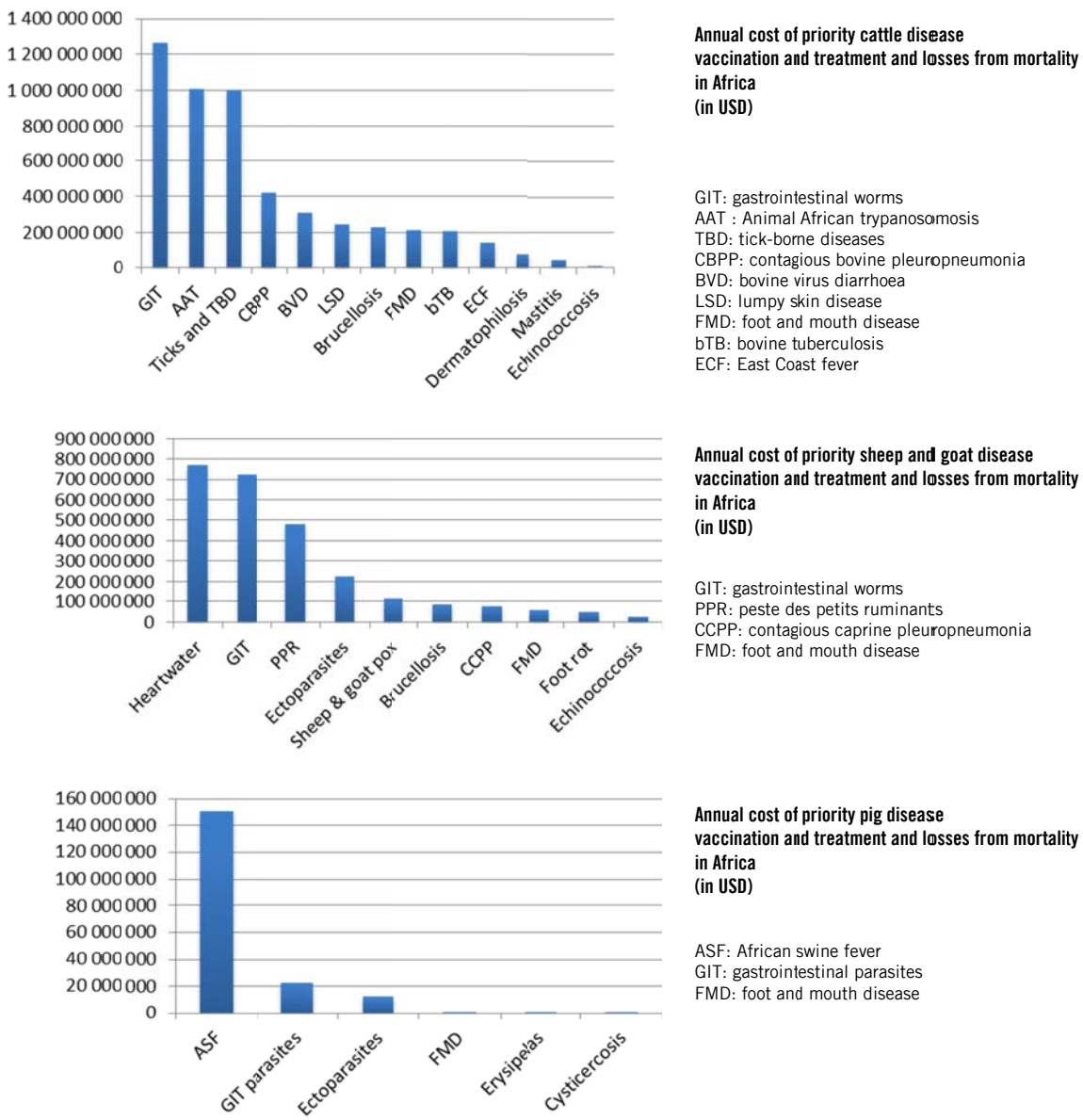
Expert opinion was used to estimate the average value of adult livestock (cattle USD 379, sheep, goats and pigs USD 44 and poultry USD 2.59). The average value of young adults was assumed to be 15% of adult values, and young animals were assumed to constitute 50% of populations, except for poultry, which were assumed to constitute 60%. Vaccination and treatments were estimated to cost USD 2 and USD 3 for large animals and USD 0.2 and USD 0.3 for poultry. Using these approximate estimates, the 35 priority diseases were roughly estimated to cost nearly USD 9 billion a year or 6% of the total value of the livestock sector in Africa. These estimates do not include losses due to lost productivity or to impacts on human health.

Losses were dominated by a small number of diseases (Fig. 11):

- Cattle: gastrointestinal worms, trypanosomosis, and ticks and tick-borne diseases
- Sheep: heartwater, gastrointestinal worms and PPR
- Pigs: African swine fever (ASF)
- Poultry: Newcastle disease

Most costs were due to the death of adult animals (76% of all costs) followed by death of young animals (11%), costs of vaccination (8%) and costs of treatment (5%). Cattle diseases were responsible for the majority of losses (59%); next were sheep and goat diseases (30%), followed by poultry diseases (9%) and lastly pig diseases (2%). These losses are lower than previous estimates by the Bill & Melinda Gates Foundation, mainly because estimates of prevalence and mortality were lower in this study and costs included in the previous study (productivity and reproduction) were not included in the survey reported here.

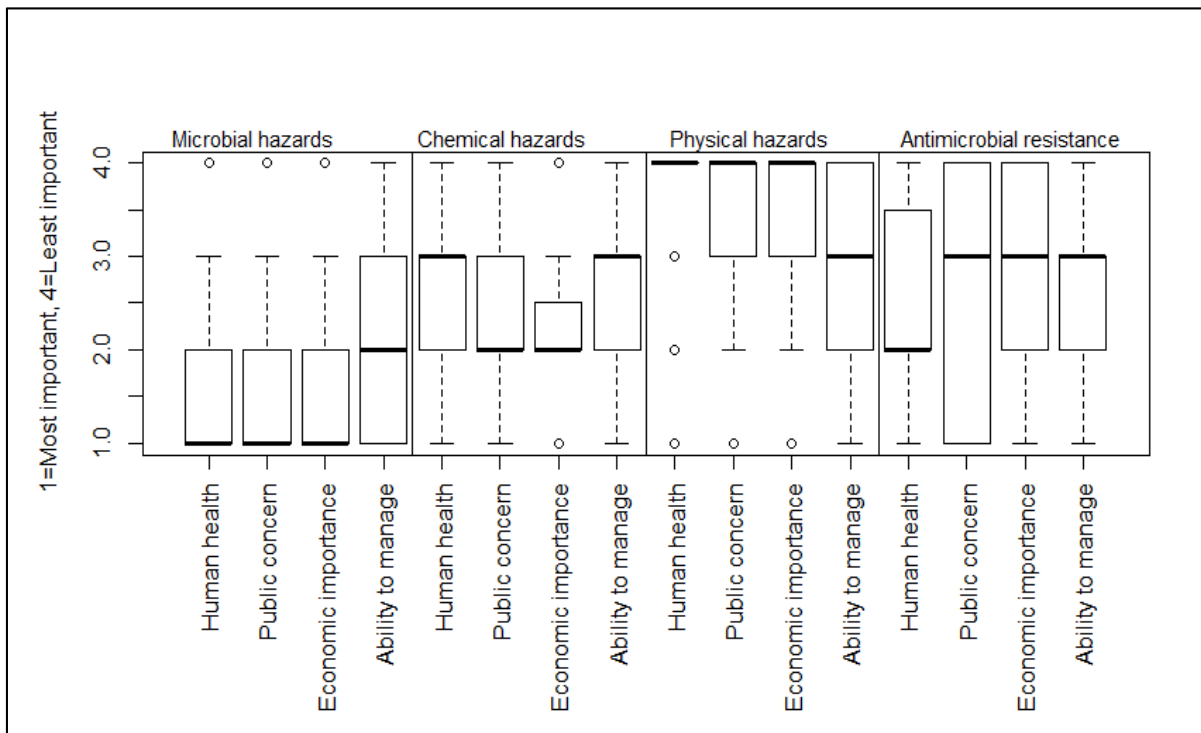
Fig. 11. – Costs of priority animal diseases by species



3.11. Impacts of animal diseases on food safety and antimicrobial resistance

Respondents were asked to rank hazards causing food-borne disease according to their importance on different dimensions. Microbial hazards, many of which are zoonotic and/or associated with animal source food were seen to be of the highest importance to human health and the greatest causes of economic losses (Fig. 12). Surveys of the general public often find that they incorrectly rank chemical hazards as being the most important causes of food-borne illness.

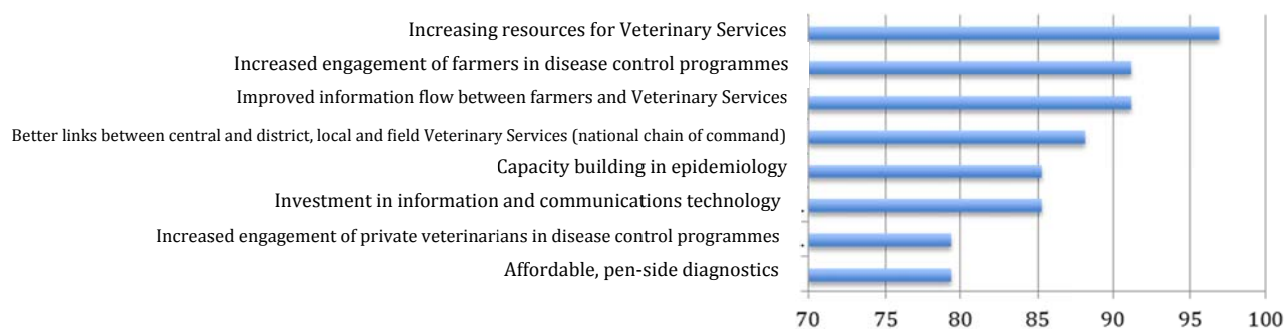
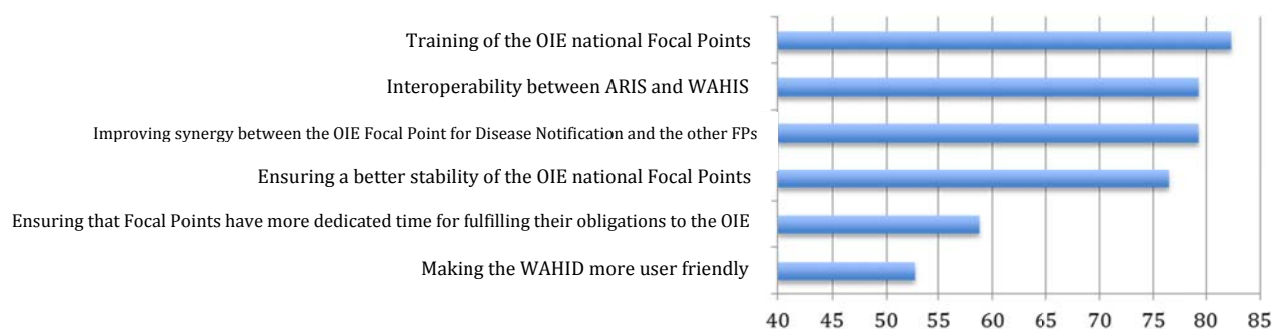
Fig. 12. – Ranking of causes of food-borne disease in terms of importance to human health, cause of economic loss, public concern and ability to manage



Human pathogens can become resistant to the antibiotics used to treat them as a result of use of antimicrobials in livestock and fish production. Respondents were moderately concerned about antimicrobial resistance.

3.12. Suggestions for improving disease reporting

All of the options suggested in the survey questionnaire were considered very important, with the lowest score being 79 (out of a maximum of 100) (Fig. 13). However, 'increasing resources for Veterinary Services' was seen as the most important. Additional suggestions included: reinforce surveillance networks; promote widespread access to veterinary services; provide training for newly recruited officers; increase awareness; demonstrate the economic importance and human health impacts of animal diseases.

Fig. 13. – Suggestions for improving disease reporting in the country**Fig. 14. – Suggestions for improving disease reporting of the country (to AU-IBAR and to the OIE)**

There was also high approval for most of the suggestions for OIE actions to reduce the impact of neglected diseases, with training for OIE Focal Points being the highest rated (scoring 82 out of a maximum of 100) (Fig. 14). Additional suggestions included: provide more feedback to countries; empower livestock keepers and their service providers to report; provide IT equipment; better align WAHID with the administrative boundaries; comprehensive epidemiology training for animal health technicians and field personnel.

4. Conclusions

In view of the lack of comprehensive information on the impacts of livestock and fish diseases on productivity and human health in African countries, a survey was conducted among OIE Delegates of Africa. Our report, synthesising the information collected, provides insight into the animal disease priorities of Veterinary Services and their perceptions regarding the impact of animal diseases on productivity and human health.

The survey added a new perspective to the literature on identifying the most important diseases and, while the diseases identified according to the proposed criteria were varied, there was a broad consistency and consensus on diseases of importance, with FMD, PPR, ASF, ND and rabies appearing as high priorities in multiple rankings.

The survey showed that considerable progress has been made in areas previously identified as weaknesses, such as a lack of priority disease lists and contingency plans. Furthermore, in many countries mixed models are being developing for disease control involving both public and private veterinarians and this is likely to increase the reach of control.

However, disease remains a major problem in most countries. Worryingly, Veterinary Services see the broad trend of animal and zoonotic diseases as being upwards and this is explained by upward trends of underlying drivers of disease, such as climate change, increasing trade and livestock intensification.

Most countries have insufficient data to allow a quantitative estimation of the impact of animal diseases on productivity and human health. However, the information on disease importance, prevalence, and treatments allows some tentative estimates: 35 priority diseases were estimated to

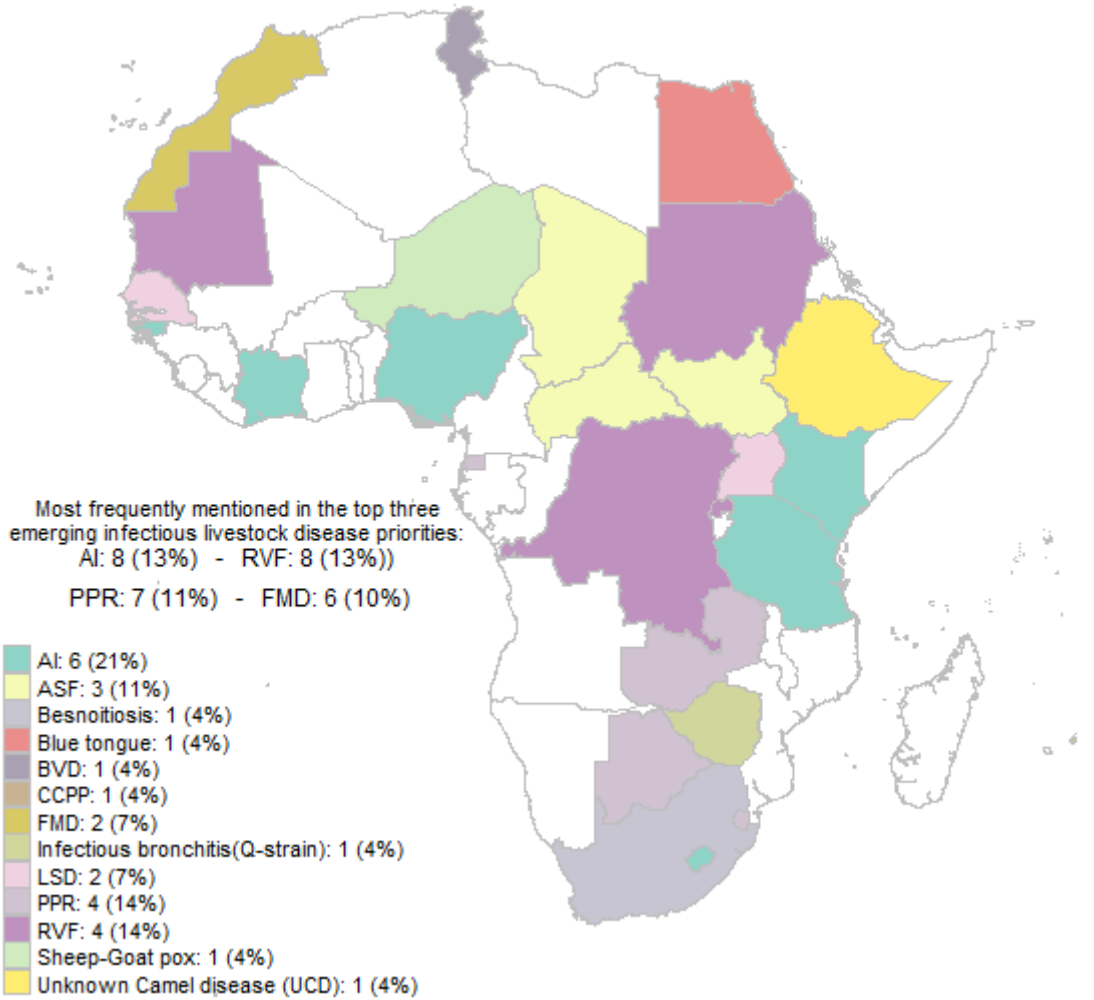
cost nearly USD 9 billion a year, equivalent to 6% of the total value of the livestock sector in Africa. More detailed economic studies are needed to motivate higher investment in animal disease control.

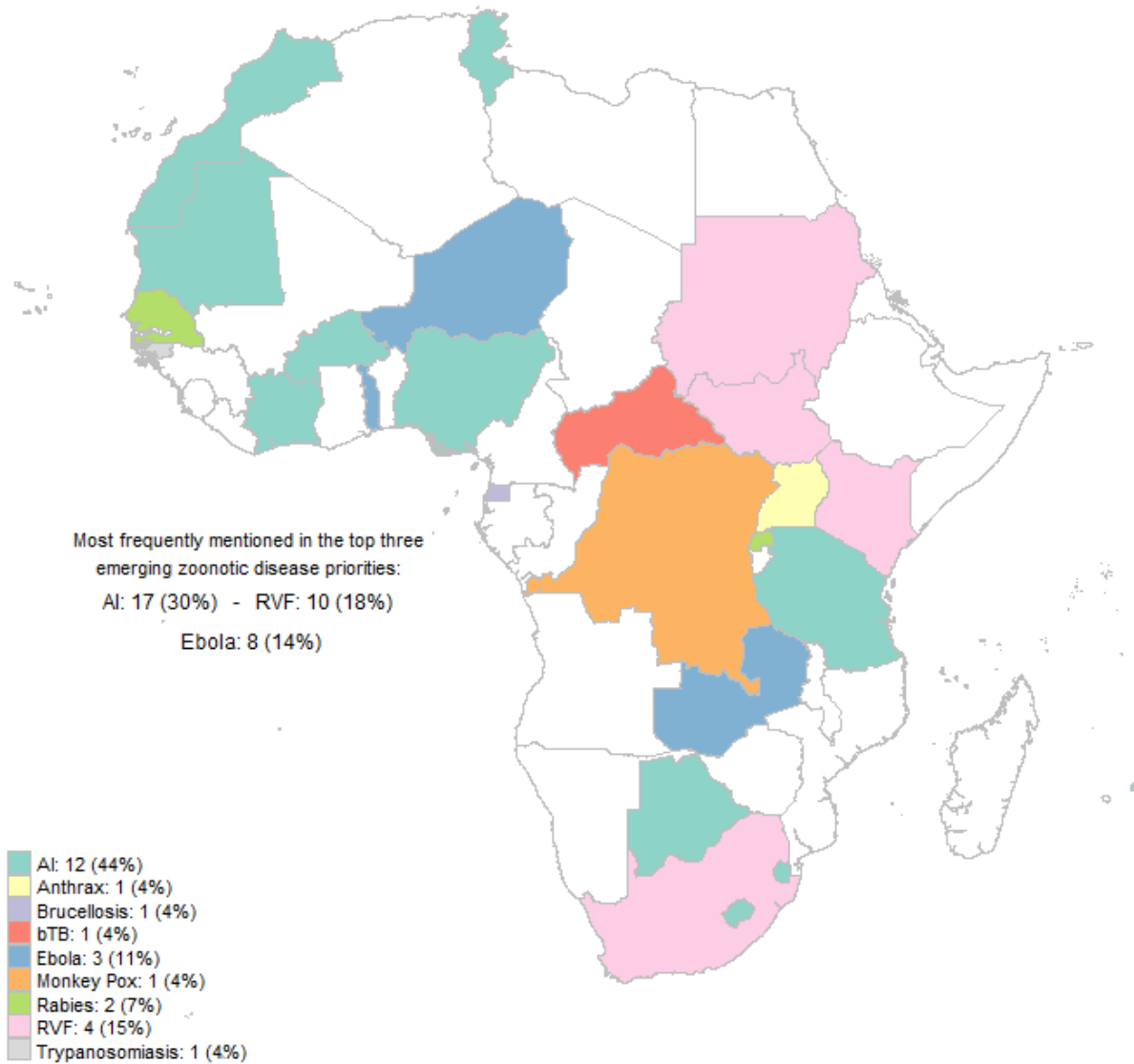
The survey also identified some of the problems that lead to delayed response to outbreaks, and ranked suggestions both for improving disease reporting and for additional support from the OIE.

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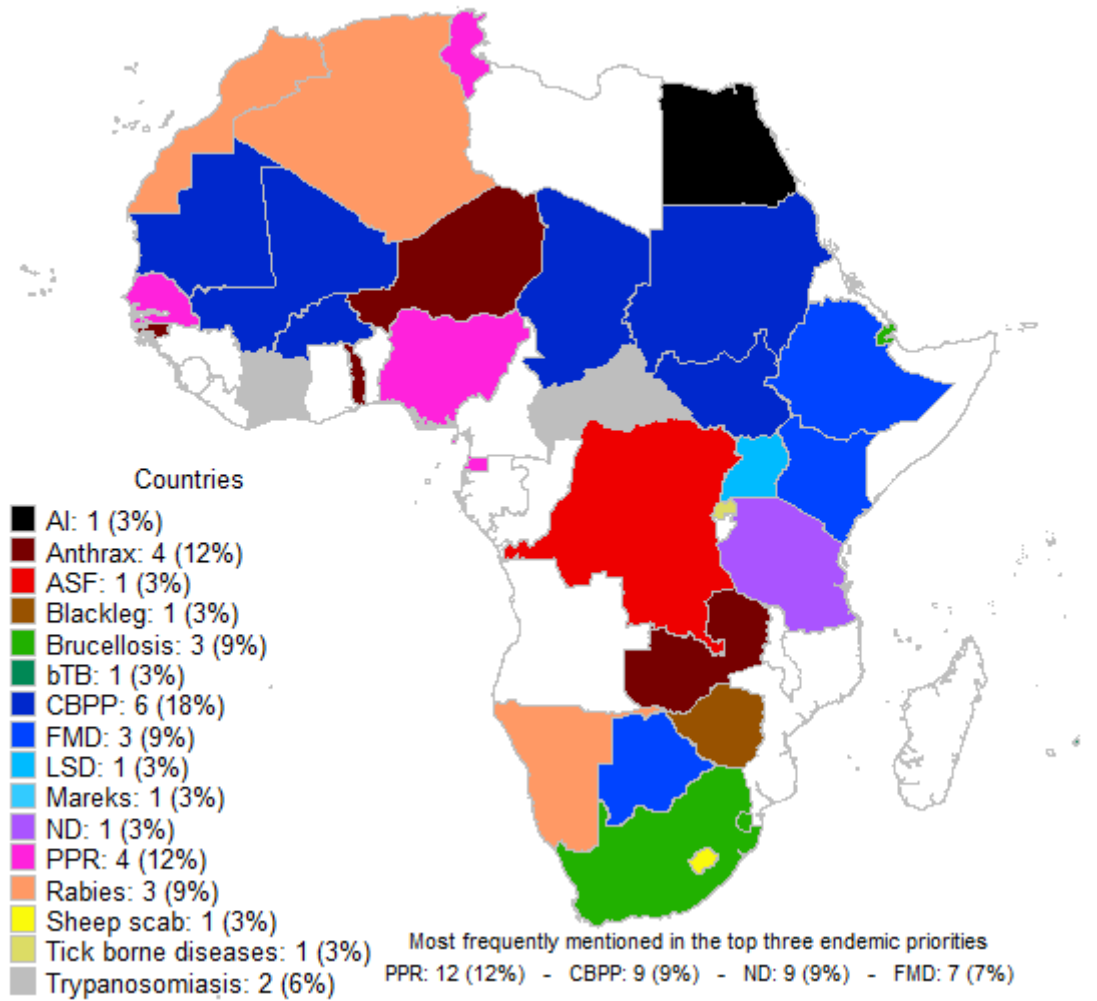
1st priority Emerging infectious livestock disease

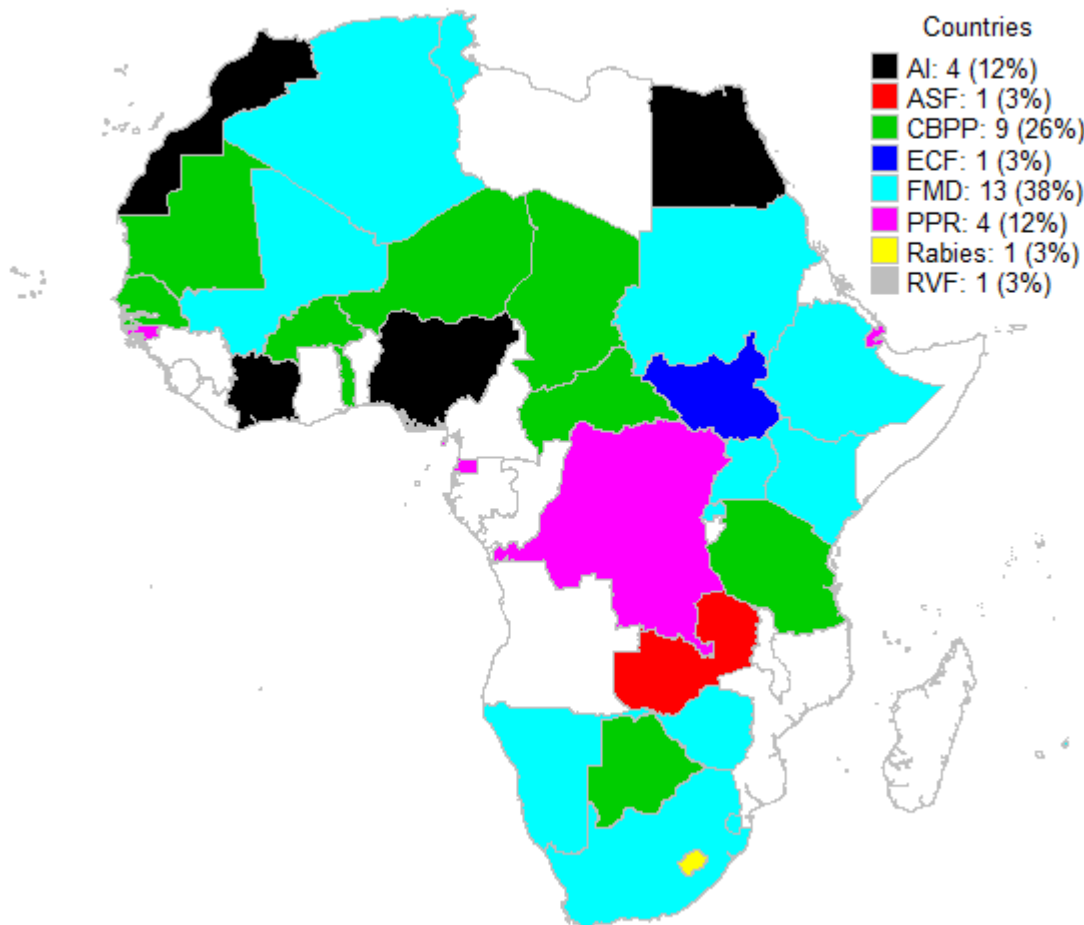


Map 2**1st priority Emerging zoonotic disease**

Map 3

1st priority endemic disease

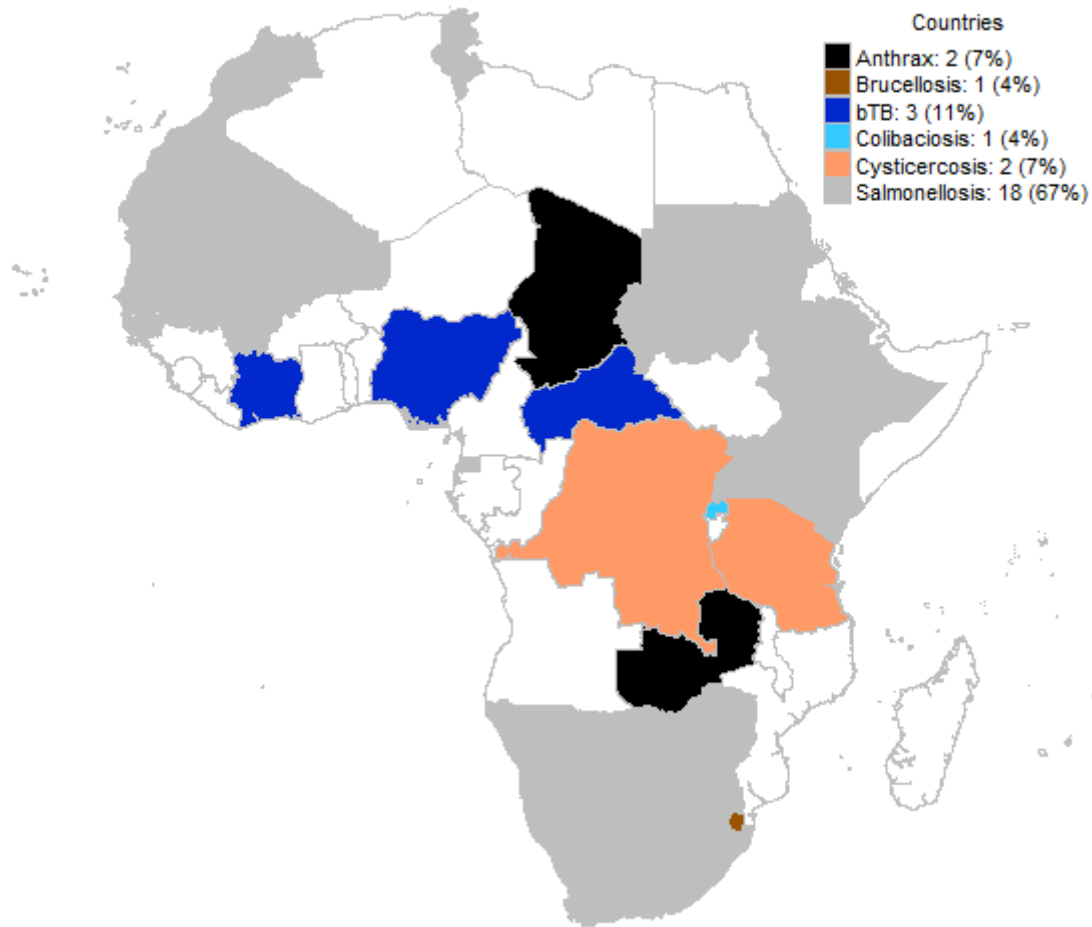


Map 4**1st priority epidemic disease**

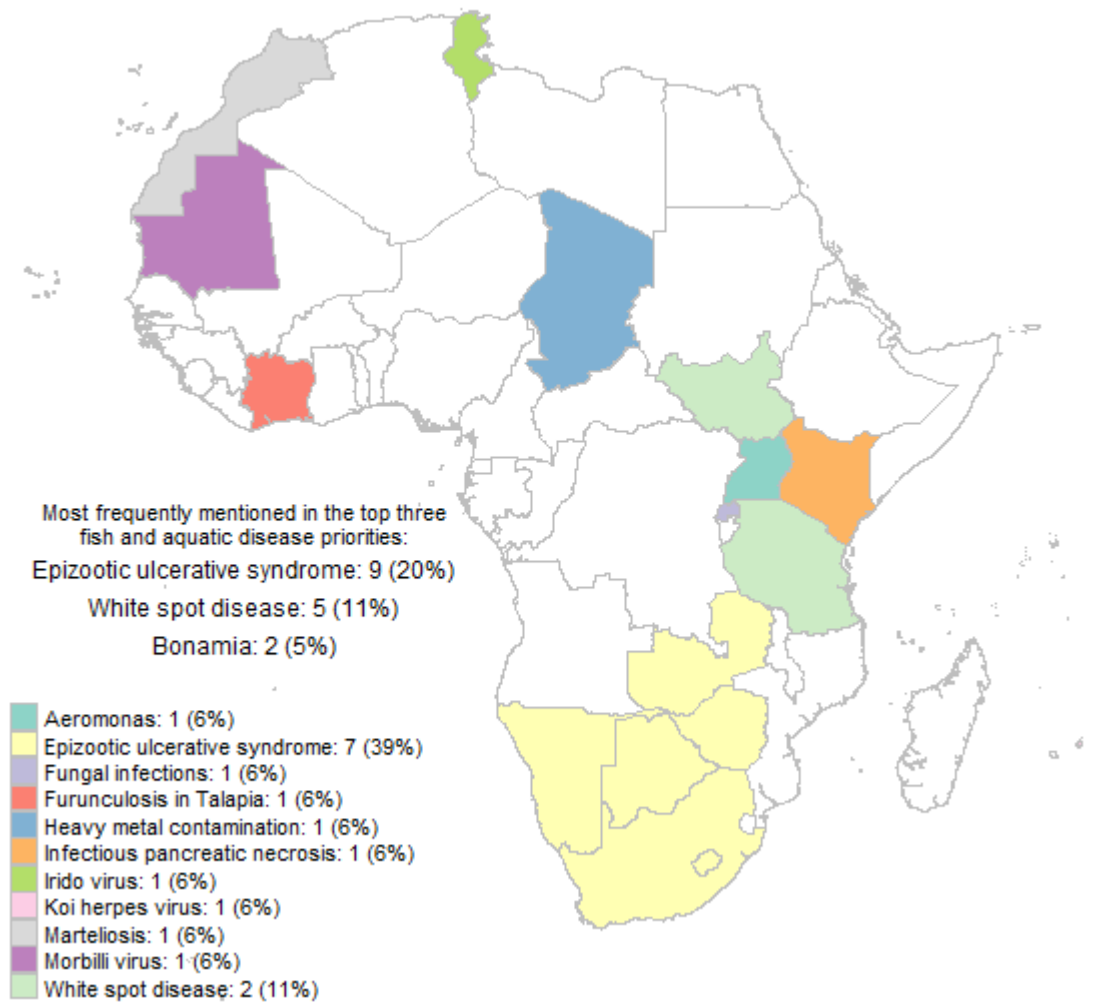
Most frequently mentioned in the top three epidemic priorities
 FMD: 24 (24%) - PPR: 20 (20%) - CBPP: 17 (17%) - AI: 7 (7%)

Map 5

1st priority foodborne disease

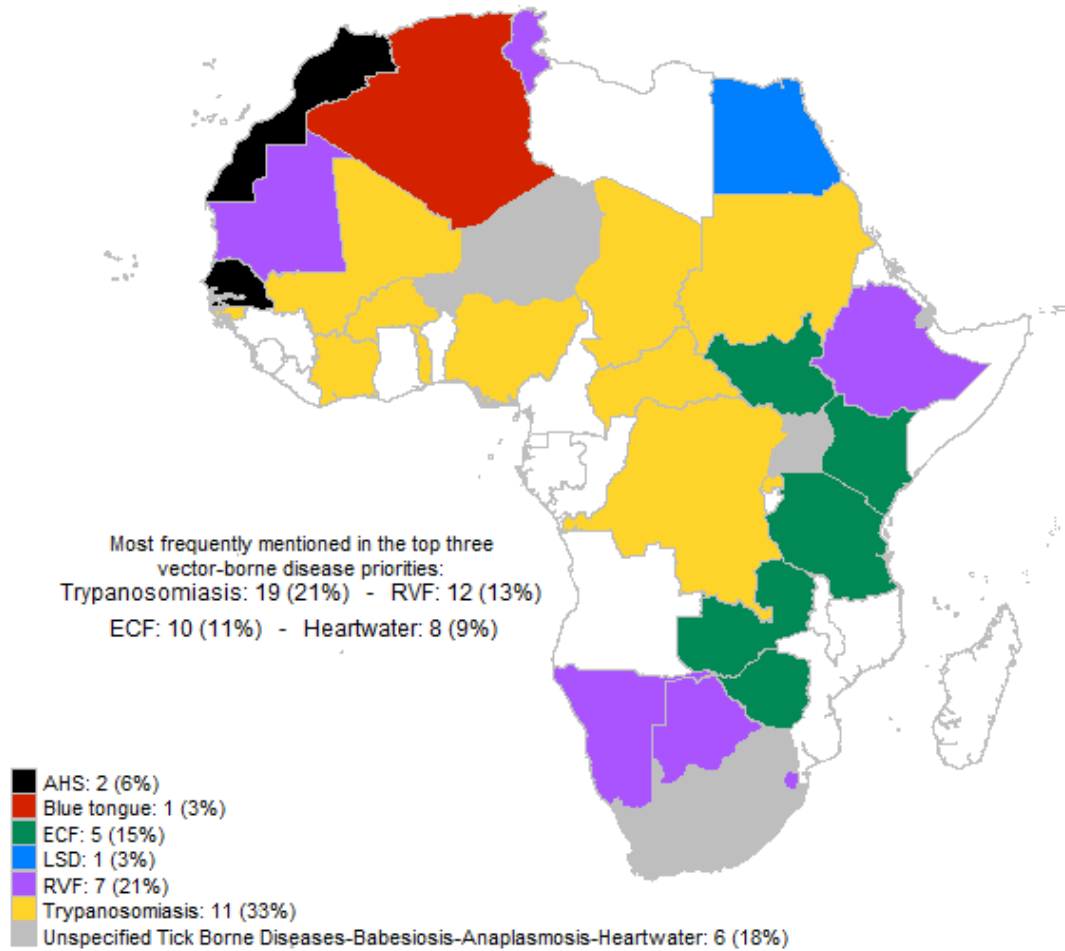


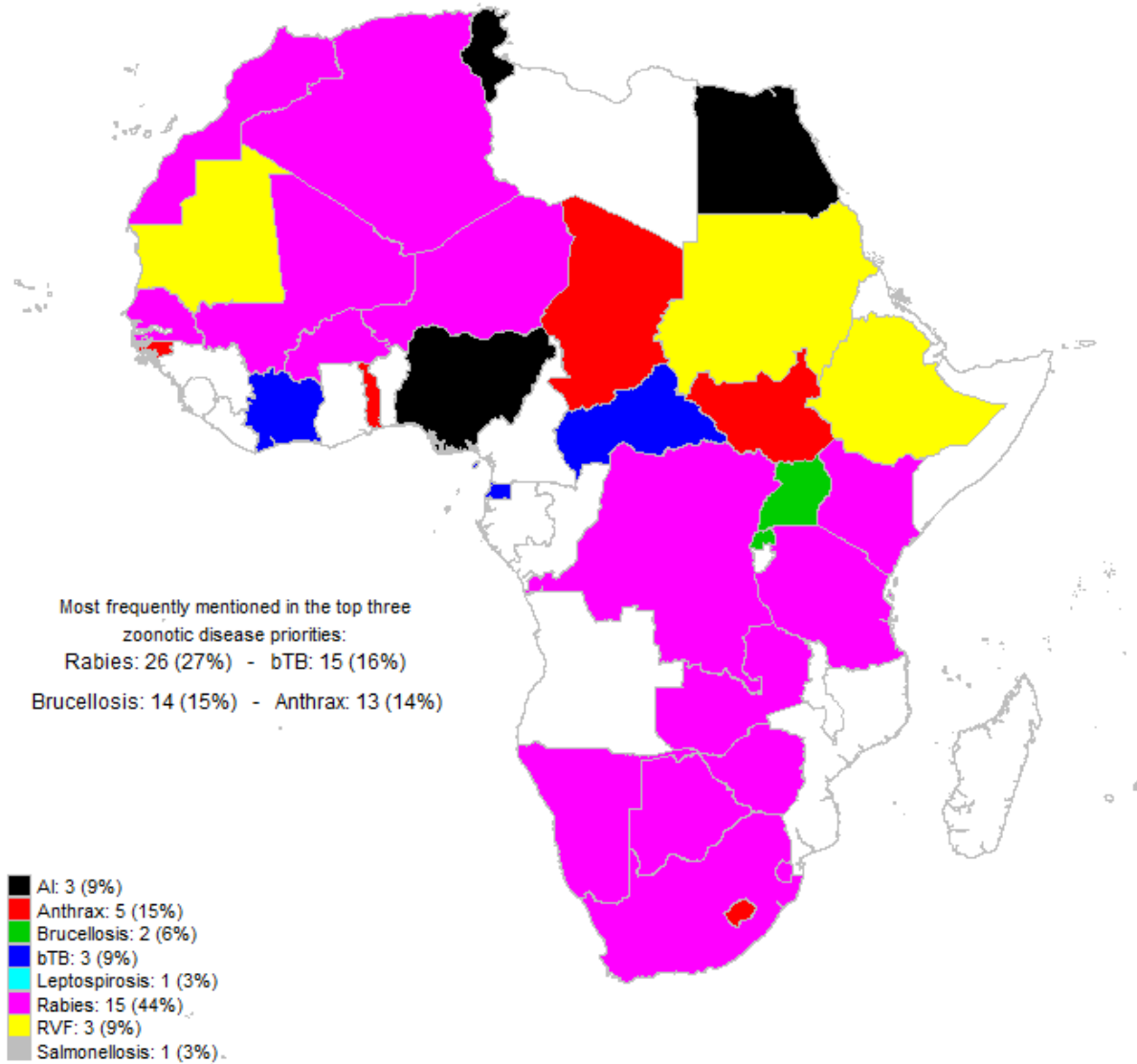
Most frequently mentioned in the top three foodborne disease priorities
 Salmonellosis: 24 (32%) - Colibaciosis: 10 (14%) - Cysticercosis: 6 (8%) - bTB: 5 (7%)

Map 6**1st priority fish and aquatic disease**

Map 7

1st priority vector-borne disease



Map 8**1st priority zoonotic disease**

Map 9

1st priority wildlife disease

