



Independent review of PVS Pathway reports from African Member Countries

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List of acronyms

AHS	African Horse Sickness
AMR	Antimicrobial resistance
ASF	African Swine Fever
AU	African Union
CBPP	Contagious Bovine Pleuropneumonia
CC	Critical Competency
CSF	Classical Swine Fever
CVO	Chief Veterinary Officer
EAC	East African Community
ECCAS	Economic Community of Central African States
ECOWAS	Economic Community of West African States
EoI	Expression of Interest
FAO	Food and Agriculture Organization (of the United Nations)
FC	Fundamental Component
FMD	Foot and mouth disease
GDP	Gross Domestic Product
GIS	Geographical Information System
GLW	Gridded Livestock of the World
GNI	Gross National Income
ISO	International Organization for Standardization
IT	Information Technology
HDI	Human Development Index
LoA	Level of Advancement
LPI	Livestock Production Index
LSD	Lumpy Skin Disease
NDA	Non-Disclosure Agreement
OIE	World Organisation for Animal Health
PPR	Peste des petits ruminants
PRRS	Porcine reproductive respiratory syndrome
PVS	Performance of Veterinary Services
RVF	Rift Valley Fever
SADC	Southern African Development Community
SOP	Standard Operating Protocol
SPS	Sanitary Phyto-Sanitary Agreement (of the WTO)
SVSDC	Strengthening Veterinary Services in Developing Countries
TAD	Transboundary Animal Disease
TAHC	Terrestrial Animal Health Code

TB	Tuberculosis
UN	United Nations
VLSP	Veterinary Legislation Support Programme
VPP	Veterinary paraprofessional
VS	Veterinary Services
VSb	Veterinary Statutory Body
WHO	World Health Organization (of the United Nations)
WTO	World Trade Organization

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Executive Summary

Veterinary Services¹ have been identified as a global public good as they are recognised as being crucial for human health and well-being, the supply of safe food and economic development, through the prevention, early detection and control of animal diseases including those transmissible to man (zoonoses).

The Performance of Veterinary Services (PVS) Pathway was developed by the OIE (the World Organisation for Animal Health) to support compliance with established international standards. The PVS Pathway seeks to assess and support the strengthening of national Veterinary Services (VS). PVS Pathway missions are delivered by accredited PVS experts who carry out independent external PVS Evaluations of country VS, and, as requested, implement supplementary missions including PVS Gap Analysis, Veterinary Legislation Support Programme (VLSP) and PVS Laboratory missions. These missions are voluntary and highly participatory requiring the input of in-country stakeholders.

The PVS Evaluation and PVS Evaluation Follow-Up missions use a well-defined protocol, the ‘PVS Tool’, to assess the Levels of Advancement (LoAs, categorised on a 5-point scale) of a standardised set of Critical Competencies (CCs) which cover the whole veterinary domain, that is animal health, animal welfare, veterinary public health and food safety and associated activities. The CCs are grouped under four Fundamental Components (FCs):

1. Human, Physical and Financial Resources
2. Technical Authority and Capability
3. Interaction with Stakeholders
4. Access to Markets

The PVS Tool has evolved since its introduction in 2006 from a set of 33 to 45 CCs in the seventh edition (2019). This review uses as a reference the sixth edition (2013) which was most widely used in the reports. The PVS Gap Analysis missions are not evaluations but are focused on planning using the evaluation ‘baseline’ and are ‘aspirational’, that is the reports provide target LoAs to be achieved in five years with activities and a proposed budget. The VLSP and PVS Laboratory missions provide assessments and make recommendations on development priorities in legislation and laboratories respectively.

To date there has been no clear, objective assessment of the PVS Pathway reports to assess the current performance or progress achieved by the VS of Member Countries. The primary task of this review was to consider the status of national VS in Africa and the progress being made by countries, using the information from the available PVS Pathway reports.

At the time of the review, 53 of the 54 countries in Africa had engaged in the PVS Pathway with a PVS Evaluation. As not all reports were made available owing to confidentiality agreements, this review was able to assess 46 PVS Evaluation reports, 47 PVS Gap Analysis reports, 18 PVS Evaluation Follow-Up reports, 25 Veterinary Legislation Support Programme (VLSP) reports and 6 PVS Laboratory reports from missions carried out between December 2006 and February 2019.

¹ As defined in the Terrestrial Animal Health Code (TAHC), VS means the combination of governmental and non-governmental individuals and organisations, responsible to relevant Competent Authorities, that perform activities to implement standards and recommendations of the Terrestrial Code.

The PVS Evaluation reports were analysed to provide a baseline with the much smaller number of PVS Evaluation Follow-Up reports enabling an assessment of change over the intervening period. The PVS Gap Analysis reports were informative as they reflected the ambition or motivation of the country VS. As no follow up missions have been conducted for the VLSP, no direct assessment of change was possible. As the number of PVS Laboratory mission reports was very low, these could not be analysed in any meaningful way, and therefore were not considered further.

The analysis of the PVS Pathway reports was undertaken in two stages: a) analysis of data and b) interpretation of the information provided in the reports.

- a) The numeric LoAs of the CCs were extracted from the PVS Evaluation, PVS Evaluation Follow-Up and PVS Gap Analysis reports and standardised; these LoAs were considered to be a proxy for the performance of the VS and were analysed per CC and for each country. Regional trends and associations with external economic indicator data were also investigated. The outputs of the analysis were used to develop summaries of the data and a range of data visualisations and infographics. The review also developed a simple scoring matrix for the VLSP reports considering the quality and coverage of veterinary legislation, enabling the information from these reports to be similarly summarised.
- b) The extensive text narrative sections of the PVS Pathway reports were reviewed and used to provide essential depth and subtlety to the categorical analysis. This information supplements and integrates with the categorical analysis.

On the basis of these outputs, recommendations were developed highlighting the priority areas and actions for African VS to better comply with international standards and for the strengthening of the PVS Pathway. This approach can be applied for future reviews of PVS Pathway reports in other parts of the world or repeated over time in Africa to be utilised as an active monitoring tool.

Generally, the PVS reports were of a high standard and provided extensive background information on the country, its VS competencies against OIE standards, and their legislation as assessed by the VLSP. However, there was considerable variation in report consistency, content and formatting, particularly in the early period of use of the PVS Evaluations and in the VLSP. As the PVS Tool became more established and matured, the mission teams became more experienced and better trained, and the OIE guidance and support became stronger, the consistency and standard of the reports markedly increased.

From an analysis of the changes in LoAs of CCs between the PVS Evaluation and PVS Evaluation Follow-Up reports, it appeared that overall there had been little change in the performance of the VS in Africa over the intervening periods. However, the following points are made:

- a) There were notable differences between countries, with some performing strongly and others deteriorating. Compiling all results continent-wide inevitably results in this nuance being lost. Given the time constraints and its desktop nature, a stronger focus on country case studies was not possible as part of this review. This approach could be useful further work to explore in depth why and how some countries have successfully used PVS reports to strengthen their VS and why others have not.
- b) The scoring of the CCs became more rigorous over the successive PVS Tool editions, and as the programme matured, with changes in the content and interpretation of the LoA categories, increasing rigour from the PVS experts, and stricter review/validation of their findings and reports by the OIE peer review process.

- c) There were considerable differences between countries in the time intervals between the PVS Evaluation and PVS Evaluation Follow-Up missions.
- d) When the report narrative text was reviewed in more detail and other factors were taken into account, marked improvements were identified in a number of core areas which were not reflected in the LoA scores as they were considered to be insufficient to warrant advancement by a full point on the categorical LoA scale. These included the competencies of veterinarians, emergency preparedness and response and the implementation of disease control programmes, better management of the distribution and use of veterinary medicines and engagement and collaboration with the private sector.

Despite these points, it was felt that the PVS Tool generally produced accurate and representative results. The apparent weakening in the VS of some countries could often be attributed to external political and economic factors. Major challenges remain especially in the areas of staffing and particularly for the delivery of field services, laboratory reliability and quality assurance, risk analysis and epidemiology, food safety, animal/animal product identification and traceability, the control of veterinary medicines and animal welfare.

Although the PVS Pathway has undoubtedly contributed to the strengthening of Veterinary Services, quantifying the extent is difficult due to the complex interplay between multiple other factors including national priorities of the VS (e.g. whether countries have a strong focus on export of animals and animal products), leadership, governance, economic strength and development focus, political and social stability, international relationships and support, and the level of perceived risk to global health, the livestock sector and its relative importance.

Recommendations

A number of priority recommendations from this review are summarised here. These are presented in two sections – the development of national Veterinary Services across Africa and for strengthening the PVS Pathway.

Recommendations for the strengthening of Veterinary Services

- VS should be allocated adequate human resources, from national to field level, with increasing use of qualified veterinarians, specialist qualifications in disciplines such as risk analysis and epidemiology, and the appropriate use of veterinary paraprofessionals. The functions of the veterinarians and veterinary paraprofessionals should be described in detail and effective management procedures for their performance assessment and review should be in place.
- The curricula and delivery of veterinary education should be further strengthened, taking into account the OIE Guidelines for a Veterinary Education Core Curriculum, in order to assure the all-round competencies of graduating veterinarians ('OIE Day 1 Competencies'). Training programmes of veterinary paraprofessionals should be assessed, standardised and accredited. The creation of training centres for veterinary paraprofessionals should be considered.
- National and regional strategies for continuing education should be developed, based on needs assessments. The lack of appropriate continuing education is a serious impediment in many countries and should be addressed for both day to day operations and for the more specialist needs (such as in risk analysis, epidemiology, food safety, communications, animal welfare) of the VS.

- A strengthened chain of command within the VS and also improved external coordination between Competent Authorities should be implemented through formal mechanisms and procedures.
- The funding of VS should be promoted as a public investment priority, and consideration also given to increasing cost recovery or developing joint programmes with commercial and export sectors where they benefit as private stakeholders.
- The needs, capabilities and facilities of veterinary laboratories should be reviewed and defined, and adequate ongoing national budget and well-trained staffing provided. Laboratory quality assurance with proficiency testing and a 'Laboratory Information Management Systems' should be supported.
- Border security and quarantine measures should be strengthened with increased resources and staffing and with regional coordination to harmonise sanitary requirements for imports, animal identification, animal movement control and data management systems between countries.
- The delivery of field services should be improved with increased use of veterinarians as they become available, increased veterinary supervision of veterinary paraprofessionals and other technicians to improve passive surveillance and the early detection of animal diseases. This should be combined with communications and consultation with animal owners and other stakeholders. National strategies should be established for priority diseases with appropriate funding and increased regional harmonisation to achieve a sustainable improvement of the transboundary animal disease situation.
- The capacity in veterinary public health should be increased through improved food safety legislation, increased numbers and better training of inspectors, the development of inspection programmes for slaughterhouses (including collection of disease surveillance information) and for processing and distribution establishments and facilities, in order to assure food hygiene and safety in all premises and for animal products at all levels of distribution including local markets. This should include the development of traceability systems for animal products, food safety emergency plans and residue monitoring programmes. The food safety programme should be performed in close collaboration with the public health authorities.
- The development of national strategies and legislation on animal welfare, to increase compliance with OIE standards, should be carried out with broad stakeholder consultation and increased awareness.
- The regulation of the veterinarians and veterinary paraprofessionals should be assured in every country by Veterinary Statutory Bodies with the required legislation, full autonomy and functional capacity.
- VS should formalise consultation mechanisms with other stakeholders. Organisation and representation of livestock smallholders should be facilitated in order to improve their involvement and support in sanitary programmes.
- Veterinary legislation should be developed to meet OIE and other international standards. This could be supported within the framework of the OIE Veterinary Legislation Support Programme.
- It is noted that many of the points above imply a higher level or more effective use of public sector resources allocated to the VS. This may not realistically be expected or relied on. The engagement of the private sector for service provision in areas where capacity is limited for mutual benefit (e.g. for laboratory testing, disease surveillance, vaccination, ante- and post-mortem inspection) is likely to be the most viable mechanism to increase VS capacity, effectiveness and impact. This requires established procedures with clear definitions of the tasks and official supervision, and may require

supplementary legislation. The recent development of OIE guidelines and frameworks for such Public-Private Partnerships (PPPs) is providing increasing scope for such initiatives.

PVS Pathway recommendations

The greater consistency and rigour of the more recent PVS Pathway reports is recognised and OIE is complimented in the ongoing development of the programme and implementing changes. Quite simply, no alternative information source exists which would enable any comparable analysis to the one applied here. From this perspective, the PVS Pathway is of very high value.

There are a number of constraints and limitations in the implementation and use of the PVS Pathway, many of which are not under the direct control of OIE. In an ideal situation the following recommendations should be considered:

- That the recommended sequence of missions is more strictly followed with a PVS Gap Analysis closely following a PVS Evaluation or PVS Evaluation Follow-Up mission and a PVS Evaluation Follow-Up mission taking place five years, or at least not more than seven years, after the PVS Gap Analysis mission to review progress. It is also recommended that an annual follow up assessment of progress is considered using PVS self-evaluation or an on-line survey with remote review.
- That additional PVS Pathway support ‘treatment’ missions (VLSP, PVS Laboratory, etc.) should take place shortly after either PVS Evaluation or a PVS Gap mission, ideally within one year. These should also be reviewed by a PVS Evaluation Follow-Up mission after five years.
- That categorical summary assessment criteria are developed for the VLSP, PVS Laboratory and other support missions to allow for rapid simple assessment of the missions and review over time.
- That consideration is given to increasing engagement in the development of strategies and activities to improve the VS with a broader engagement across government and with the private sector. For example, the PVS Gap Analysis reports are developed in participation with the VS typically with more senior staff based at headquarters, with varying numbers from academia, the regions and from other Competent Authorities and little representation from administrative and financial services. The result tends to be overly optimistic and unrealistic and is driven by a cohort of veterinary staff with little diversity. It is recommended that the importance of developing an annual work plan with milestones is emphasised. It is understood that the new PVS Strategic Planning support should address many of these issues.
- That PVS Evaluation Follow-Up reports undertake a detailed critical review of the workplans put in place following previous PVS Pathway missions, identify challenges and provide feedback to the country. The recently updated PVS Evaluation Follow-Up report template, which specifically references the results and recommendations of the previous PVS Evaluation, and highlights significant changes made (by critical competency), needs to be developed to address this issue.
- That PVS missions are able to provide an intermediate score as indication of progress being made but which is insufficient to reach the next LoA but recognises the commitment and resources being made available. A syntax such as level 2+, level 3+, etc. might be considered.

- That greater emphasis should be placed on ensuring that the PVS Pathway report Executive Summaries are clear, well written, succinct and focused on critical issues for action. The quality of the Executive Summaries is critical as this section will often be the only part read in what are long reports.
- That the PVS Pathway reports are made more easily accessible by developing standardised infographics that the PVS experts can populate. Areas to consider should include summaries of LoAs by FC, the coverage of veterinary legislation, livestock demographics, export/import of animals, animal products and veterinary medicines and biologicals.
- That Member States are strongly encouraged to allow the outputs of PVS Pathway assessments to be placed in the public domain, or if there are particular sensitivities, to reserve these for partners and donors. The imposition of strict confidentiality means that the report outputs cannot be scrutinised or applied by anyone other than the country VS, and cannot be shared by OIE. From this perspective, the utility of performing these missions (also for OIE) is more limited, and there will probably be a lower return on the investment.
- That the PVS Pathway Theory of Change is further developed to allow easy understanding by those less familiar with the programme of the broad range of activities undertaken via the PVS Pathway in developing national VS. This expansion would also enable the elaboration of impact pathways, as well as development of tools such as log frames which can be applied for monitoring and evaluation; in addition to being helpful for the identification of assumptions and risks.
- The focus of the evolved PVS Pathway programme in recent years has been on further promoting the use of PVS Pathway reports as leverage to try and improve both the level and allocation of resourcing to strengthen VS. Given this renewed focus, a more in-depth analysis at national (case study) level of progress made or not in strengthening VS, including success factors and challenges in leveraging the use of PVS reports, is recommended for the future.
- More in-depth analysis should be undertaken at national (case study) level of progress made in strengthening VS, including success factors and challenges in leveraging the use of PVS reports, and this should guide the continuing evolution of the OIE PVS Pathway programme.

1. Introduction

1.1 Context and background

Animals, and the Veterinary Services (VS)² which protect them, are recognised as a global public good as they are recognised as being crucial for human health and well-being, the supply of safe food and economic development, through the prevention, early detection and control of animal diseases including zoonoses. The rationale for strengthening health systems to counter emerging disease threats has never been more convincing, with animal health a key component.

To protect human health, there has been increasing realisation that targeting ‘risk at source’ in animal populations is a vital strategy to safeguard against risks from emerging zoonoses, neglected zoonoses and antimicrobial resistance (AMR); some 75% of recently emerging human infectious diseases are of animal origin, and approximately 60% of all human pathogens are zoonotic.

To support food security and improved nutrition, high quality animal protein (meat, milk and eggs) makes an invaluable contribution to key nutritional indicators such as childhood mortality and stunting, in all populations, particularly in rural subsistence communities. Demand for animal protein is increasingly rapidly and becoming more demanding in terms of food safety and quality, and the management of risks from animal diseases. Stronger, adapted national VS make food safer and promote improved value chains and better market access and economic development.

Livestock are also a valuable asset of the rural poor, serving as a store of wealth, collateral for credit and a safety net during times of crisis. Livestock consume food and feed waste, produce manure for fertilization and provide draught power for ploughing and transport.

OIE is a unique intergovernmental organisation that has built international consensus on the principles of good governance and the quality of VS. OIE has the mandate to establish international standards for safe trade in animals and animal products as set down in the Sanitary and Phytosanitary (SPS) Agreement of the World Trade Organization (WTO). WTO Members are bound by the provisions of the SPS Agreement. The SPS Agreement affirms the right of each member country to protect plant, animal and human life or health; the SPS Agreement requires countries to base these actions on scientific principles. For animal health and zoonoses, OIE is the reference organisation for standards, guidelines and recommendations covering international trade in animals and animal products. The OIE also has other important mandates based on their international standards including strengthening VS to reduce the global, regional and national incidence of animal and zoonotic diseases and promoting transparency via the official reporting and/or recognition of disease status.

The approach of implementing international standards, guidelines and recommendations developed by OIE with its Member Countries aims to ensure that international trade is safe, diseases are controlled and/or eradicated, and livelihoods are improved. To support good governance, improve the quality of VS and to increase their compliance with international standards, OIE has developed the Performance of Veterinary Services (PVS) Pathway (Figure 1). The PVS Pathway is a voluntary programme – that is it is optional for countries to engage in the programme, in comparison with the obligation for countries to comply with the

² As defined in the Terrestrial Animal Health Code (TAHC), VS means the combination of governmental and non-governmental individuals and organisations, responsible to relevant Competent Authorities, that perform activities to implement standards and recommendations of the Terrestrial Code.

International Health Regulations of the World Health Organization. More information can be accessed at <https://www.oie.int/solidarity/pvs-pathway>.



Figure 1. The OIE PVS Pathway

The PVS Tool was introduced in 2006 as a specific methodology to evaluate the performance of VS and to assess progress. Following the baseline PVS Evaluation, the PVS Pathway can be used to provide support to country VS through a series of modules, including:

- PVS Gap Analysis
- Veterinary Legislation Support Programme (VLSP)
- PVS Education and Laboratories assessment and support
- PVS Evaluation Follow-Up

PVS Evaluation and PVS Evaluation Follow-Up missions

The PVS Evaluation and PVS Evaluation Follow-Up missions follow a well-defined protocol to assess a standardised set of Critical Competencies (CCs). The CCs are grouped under four Fundamental Components (FCs):

1. Human, Physical and Financial Resources;
2. Technical Authority and Capability;
3. Interaction with Stakeholders;
4. Access to Markets.

The PVS Tool has undergone a number of changes, revisions, modifications and expansions since its inception. The number of CCs increased from 33 CCs in the 1st edition (2006) to 47 CCs in the 6th edition (2013) and 45 CCs in the current 7th edition (2019). A table showing the CCs and the changes that took place in the PVS Tool editions is provided in Annex B. Definitions of the Levels of Advancement (LoAs) were also modified as the PVS Tool evolved. In this review the 6th edition of the PVS Tool was used as the reference standard – as this was the most commonly used and only three reports used the current 7th edition. Further, changes

were made to the actual implementation of the different PVS missions and their report writing, and also to the scheduling and organisation of the PVS Pathway missions.

Previously the PVS Pathway was depicted as a linear pathway with the following steps: ‘Diagnosis’ (PVS Evaluation), ‘Prescription’ (PVS Gap Analysis), ‘Treatment’ (various other assessments including the Veterinary Legislation Support Programme), and follow up or ‘Recovery’ (PVS Evaluation Follow-Up), the PVS Pathway is now represented as a cyclical process (Figure 1) since it is regarded as an ongoing iterative process for improvement.

The first assessment step on the PVS Pathway is the PVS Evaluation which provides the baseline and also recommendations for the country on the strengthening of their VS. The order of subsequent assessment/support missions (including PVS Gap analysis, VLSP and PVS Laboratory missions) varies as does the time interval between missions. The variability is mainly due to the timing of country requests, which are voluntary, and the availability of funding.

PVS Evaluation missions are carried out by teams of accredited experts who have received specialist training from OIE with missions being led by experienced team leaders. In-country missions are typically of two to four weeks duration, depending on the size and complexity of the country. To assist in standardising the assessment procedure, a ‘Manual for Assessors’ is provided with relevant information and procedures.

Assessment is based on evidence derived from pre-mission background information and documentation, mission findings from interviews, visits and observations, and access to further documentation. The LoA of each CC is then scored on a scale from 1 (no/minimal compliance with international standards) to 5 (fully compliant/going beyond compliance with international standards). A PVS Evaluation or PVS Evaluation Follow-Up report is drafted by the mission team following a standard template which includes an executive summary, background information, mission planning and management, scoring/findings for each CC with narrative on findings and recommendations, and supporting annexes.

Limitations of the PVS Evaluations

The degree to which standardisation of the PVS Evaluations was achieved is complicated by a number of factors:

- The complexity of digesting the complex, interconnected ‘Veterinary Domain’ (that is all aspects of veterinary endeavour and responsibility in a country into a discrete number of categorical variables – see Figure 2).
- Changes in the PVS Evaluation Tool – most recently the 7th edition has been introduced (2019). With each iteration, the number of CCs as well as their specific description has changed with some reclassification of CCs within FCs and also for some of the specific assessment criteria for the LoAs.
- The variability of countries in their administrative/organisational structures and the functioning and mandate of their VS, and also the PVS team’s ability to adequately assess the country owing to limitations caused by travel logistics, safety and sometimes political will.
- In addition to the LoAs assigned to each CC, the PVS Evaluation reports contain qualitative narrative information and supplementary documentary evidence to support the assessments. This text is more nuanced and informative than the simple categorical scoring of LoAs in the CCs but analysis is more complex.

- The variability of the expert teams with ranges of experience and expertise and the change in rigour of the application of the PVS Tool since its inception.

The consequence is that there is a considerable degree of variability in the implementation of the PVS Evaluation missions over time and in the reports produced.

Scope of the PVS Evaluation

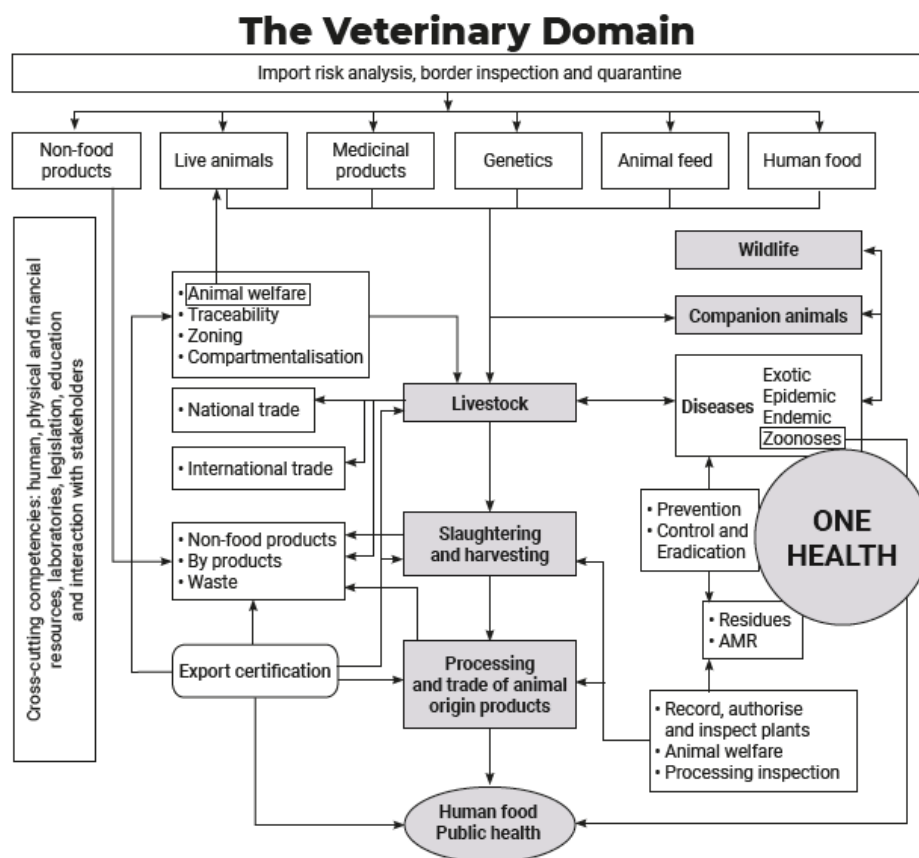


Figure 2. Schematic of the Veterinary Domain

PVS Gap Analysis

The approach taken by the PVS Gap Analysis missions differs from that of the PVS Evaluation and PVS Evaluation Follow-Up missions. Although the PVS Gap Analysis missions use the same CCs, the process for the gap analysis/strategic planning and costings is based on a ‘pillar’, that is, a target area for VS development. The defined target areas are trade, veterinary public health, animal health, laboratory services and management and regulatory services. Each CC is assigned to the most relevant pillar. The PVS Gap Analysis takes a participatory approach by working intensively with countries to identify ‘national priorities’, that is objectives for each ‘pillar’ with development strategies, activities and costings for each CC to target progress against the national priorities in a five-year period.

It is noted that the PVS Gap Analysis missions develop target LoAs. These missions do not routinely undertake any assessments or updating of the previously assigned LoAs. Typically, the PVS Gap Analysis missions were expected within one or two years of the completion of an initial PVS Evaluation. However, longer intervals occurred and sometimes, where a time interval was considered too great or if the country went through great political and/or economic

difficulties, a repeat assessment, labelled as a PVS Evaluation Follow-Up, was undertaken before the PVS Gap Analysis mission took place.

Other PVS missions

The VLSP and PVS Laboratory missions do not directly refer to the CCs, though they are used as background information. Both the VLSP and PVS Laboratory missions follow a standardised approach using templates/questionnaires for data/information collection and followed by interviews, visits and discussions. VLSP or PVS Laboratory mission report text-based assessments, needs and recommendations; these reports do not provide any categorical scoring. PVS Laboratory missions also provide costing information, as do the PVS Gap Analysis reports.

Peer-reviewed PVS reports are approved by the country before finalisation, and the countries can opt whether these reports are placed in the public domain, can be shared with development partners and donors only, or remain strictly confidential.

The PVS Pathway has been widely implemented since its introduction in 2006. At the time of this review (June 2019), 165 PVS missions of all types had been implemented in Africa. A number of reports were still being finalised and were not available for review. Of the 54 African countries (Western Sahara is not included as it is not internationally recognised), 53 countries had engaged in the PVS Pathway, that is have either had PVS missions or have requested them.

Strengthening Veterinary Services in Developing Countries

The EU Strengthening Veterinary Services in Developing Countries (SVSDC) project has been an important supporter of the PVS Pathway in Africa. SVSDC has been seeking to improve African VS by strengthening governance, health security, food security and food safety. Specifically SVSDC has sought to strengthen veterinary services in Africa, by: (1) ensuring the follow-up and the implementation of the recommendations of the PVS Evaluation and PVS Gap Analysis reports, (2) supporting the development of the required regulatory frameworks; and (3) developing a PVS-based tool to assist Regional Economic Communities, in implementing investment plans and programmes to improve compliance with OIE international standards; and (4) supporting rabies control and elimination programmes in selected African countries. No specific information on country support from SVSDC was provided for the review.

1.2 The review

For details on the terms of reference of the review, see Annex A.

1.2.1 Objectives and scope

The PVS Tool assesses country's VS performance and their compliance with OIE international standards and can be used to track progress and improvements over time. No harmonised or benchmarked mechanism for assessing the performance and development of regional or multiple country VS has been developed. A number of analyses were previously undertaken but were limited in extent and geographical scope (e.g. sub-regional assessments) or topical

areas (e.g. veterinary products, animal welfare, staffing and training, specific diseases). There has also been some country reporting on the use of their PVS reports and VS progress, such as via posters presented at the PVS Orientation trainings held in Africa in 2018.

Accordingly, there is no clear, objective assessment of the PVS Pathway reports to assess the performance or progress achieved by African Member Countries' VS since the beginning of the programme in 2006. This review is intended to address this.

Review objectives and scope
The primary objective was to assess the progress made by African countries in achieving compliance with OIE international standards, as assessed by review of all the available reports generated by the implementation of the PVS Pathway.
A secondary objective was to develop a consistent, transparent and standardised methodology for performing such an assessment, which could be applied in a wider context.

1.2.2 Reporting of results, interpretation and recommendations

The analysis of the PVS Pathway reports was undertaken in two stages: analysis of data and interpretation of the narrative information provided in the reports.

The outputs of the data analysis were used to develop summaries of the data and a range of data visualisations and infographics. Maps show the geographic dimension of the initial performance of VS (PVS Evaluation reports) and for some countries their development over a review period (PVS Evaluation and PVS Evaluation Follow-Up reports). Other chart types show trends over time.

Interpretation of the text-based information provided in PVS Pathway reports is complex with considerable variation over time and in reporting styles. Consideration was given to developing additional scoring matrices but this approach was discounted as it tended to duplicate the standard LoA approach of the PVS Tool. Some refinements were possible but the information was not available consistently throughout the reports. Further assessments were undertaken based on extensive reading and extraction of key information.

The combined results of the analysis were synthesised and interpreted holistically and are presented along with the extracted information in a narrative discussion format. Recommendations were developed for the priority areas and actions suggested in order for African VS to better comply with international standards.

Further, the outputs of this work highlight the strengths, issues and opportunities of the PVS Pathway reports, identify the limitations of the analysis, and make recommendations on a methodology for structuring future PVS and other evaluations of the performance and advancement of national VS, to achieve improved analysis and reporting.

2. Methodology

The general workflow is summarised in Figure 3. Data management was conducted primarily using Microsoft Excel (the scope and size of the dataset was insufficient to justify the

development of a bespoke relational database). Analysis was performed using Excel, the R statistical software package and QGIS GIS software.

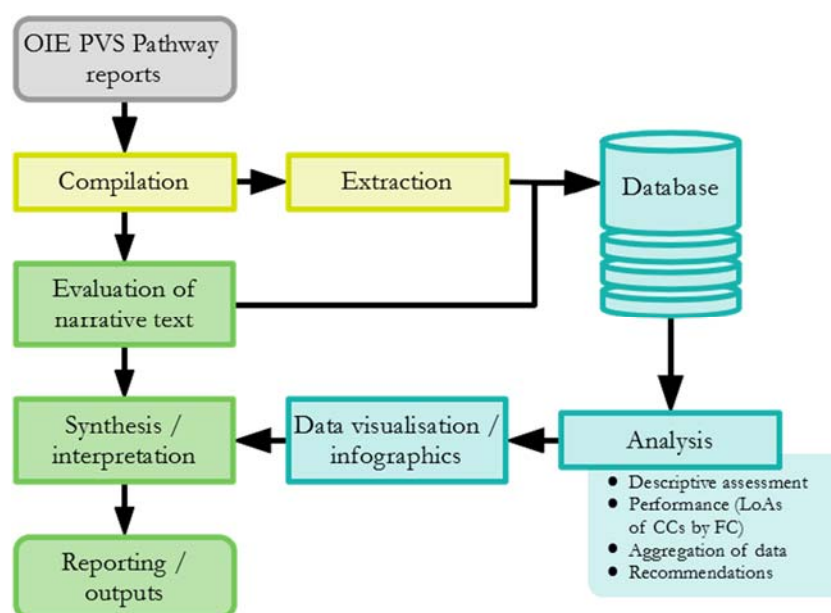


Figure 3. Workflow summarising the methodology applied.

2.1 Data availability and extraction

There are 55 African territories. However, one of these (Western Sahara) is not internationally recognised. For two other countries (Somalia and South Sudan), missions had not been performed. A PVS Evaluation mission for Sudan was carried out before South Sudan became an independent country in July 2011 and so covered the whole of country at that time; the PVS Gap Analysis missions and PVS Evaluation Follow-Up were carried out after this date in Sudan only. South Sudan had not yet participated in the PVS Pathway and so was assigned the category ‘No mission performed’.

2.1.1 Report availability

Utilisation of PVS Pathway reports for the purpose of this project was governed by a ‘Non-Disclosure Agreement’ (NDA) signed with OIE.

The PVS Tool mission status for the African continent is summarised in Table 1, and report availability at country level is shown in Annex C. As of June 2019³, a total of 40 reports (of all PVS Tool missions combined) were in the public domain; this included two PVS Gap Analyses that had been performed twice (Chad and Guinea). A further, 60 reports were classified as confidential (but could be shared with selected partners and donors), and were made available for the analysis performed for this review. This included one PVS Evaluation and one PVS Gap Analysis that had been performed twice (Egypt and Senegal respectively). Another 42 reports were classified as ‘ND’ (that is ‘no decision’ provided by the OIE Delegate) and were included in the analysis. The remaining 24 reports were classified as strictly confidential and

³ One country had its first PVS Evaluation mission in January-February 2019 but the report was not available and the country is therefore not been included.

were not provided for review. Therefore, 142 of the total 165 PVS Pathway reports were available for analysis. These reports were provided in PDF format. Note that as only 6 PVS Laboratory mission reports were listed and no further information were provided concerning the total number of missions performed, no meaningful comparative analysis could be performed and so they were not included in the analysis.

Table 1. Status of PVS Tool missions for Africa.

Report status	PVS Tool report type				
	Evaluation	Gap Analysis	Evaluation Follow-Up	Legislation Support	Laboratories
Public	11	16†	7	6	0
Partners & donors	32*	23‡	2	2	1
ND	3	8	9	17	5
Confidential	6	2	4	11	0
Total	52	49	22	36	6

*Duplicate Egypt

†Duplicates Chad, Guinea

‡Duplicate Senegal

From Table 1, the following reports were made available: 46/52 (88%) PVS Evaluation reports, 47/49 (96%) PVS Gap Analysis reports, 18/22 (82%) PVS Evaluation Follow-Up reports and 25/36 (69%) VLSP reports. Excluding the six PVS Laboratory reports, 136/159 (85%) PVS Pathway reports from Africa were included in this assessment.

2.1.2 File management

A secure file repository was established, and the available reports were classified into logical and systematic categories. A catalogue was maintained to track the document types, status and data extraction / entry status for each of the African Member Countries that had engaged in the PVS Pathway.

2.1.3 Data extraction and entry

For the purposes of assessment and development of progress indicators, information needed to be extracted and converted into a format appropriate for review and analysis. Given that the reports were made available in PDF format only, this required a substantial amount of work. For the PVS Evaluation, PVS Gap Analysis and PVS Evaluation Follow-Up reports, the LoA scores of the CCs, classified by FCs, were considered to represent standardised and repeatable categorical variables. The PVS Gap Analysis reports contained data on current and target (future) LoAs. When PVS Evaluation reports were not made available but PVS Gap Analysis reports were, the LoAs provided in the summary tables of the PVS Gap Analysis reports were used to extract the PVS Evaluation LoA scores. Excel databases were built for these report types by copying the tables from each of the PDF reports and pasting into Excel.

2.1.4 Development of indicators from narrative text

In addition to the LoAs, the PVS Evaluation, PVS Gap Analysis and PVS Evaluation Follow-Up reports contain qualitative information in the narrative text which are nuanced and

information-rich. Especially in PVS Evaluation Follow-up reports, comments were made when efforts to apply recommendations from previous PVS missions had been implemented by the country, but had not resulted in sufficient advancement for them to reach next LoA. Failing to assess such information would result in more limited interpretation of the reports and poorer outcomes of the review. In addition, the other PVS report types (specifically, VLSP reports) were dissimilar as they did not use categorical scoring of CCs or their equivalent. Key critical findings, limitations and opportunities reflecting the quality and quantity of the textual information were captured and compared across all reports in a systematic way using a combination of additional semi-quantitative parameters and identification and extraction of key issues. Requirements of the indicators developed were that they:

- Were standardised, i.e. applied to all reports of a certain type;
- Could be sufficiently well assessed by interrogating the text;
- Could be scored in a manner that minimised subjective interpretation and bias (the categorical levels needed to be clearly defined, unambiguous, mutually exclusive and comprehensive).

2.2 Data manipulation and accessory data

2.2.1 Consolidation of data: calculation of composite variables

For the numerical scoring, the individual LoA scores of the CCs per country represented the ‘raw’ data. The completeness of scoring these CCs varied from country to country, for three reasons:

1. Some CCs were introduced in more recent versions of the PVS Tool;
2. Some CCs were used in older edition of the PVS Tool and were discontinued in more recent versions;
3. Some CCs were not scored by the PVS Evaluation team (marked as ND, n/a or -) because the competency in question was considered to be not applicable or not relevant.

In addition, the raw data were not directly comparable over time because:

- The definition of LoAs for some CCs changed significantly over time and needed to be adapted. To address this issue, scoring was aligned with the LoA definitions found in the 6th edition of the PVS Tool. Annex B shows the wording used in the editions up till the current version, as well as the codes and the specifications that were developed and utilised for this analysis.
- The CCs ‘zoning’ and ‘compartmentalisation’ were considered by the evaluation mission teams in various ways. In some countries these CCs were found to be not applicable for the country but were either ‘not assessed’ (N/A) or given a score of 1, that is, they had no authority or capability. After consultation with OIE, it was agreed that for consistency and to provide a robust baseline, the LoAs were retained for countries in which these CCs were assessed, and uniformly assigned a score of 1 for all countries in which they were considered not relevant or assigned ‘N/A’.

Assuming the LoA scores were representative for the performance of the VS, stratification and calculation of summary measures for each stratum did enable direct comparison of the performance of the VS between the different countries. A number of different stratifications were applied (Figure 4):

1. Aggregation of LoA scores per CC;
2. Aggregation of CC LoA scores within FC and overall per country;
3. Stratification of countries by geographical region.

ID	CODE	COUNTRY	REGION_OAU	1.01	1.02	1.03	1.04	1.05	1.06	1.07	1.08	1.09	1.1	1.11	1.12	1.13	1.14
6	BUR	Burundi	Central			2	2	1	2	4	2			1	1	1	
7	CAM	Cameroon	Central			2	3	2	3	4	2			2	2	2	
9	CAR	Central African Republic	Central	1	1	1	2	2	2	2	3	2	1	2	1	2	2
10	CHA	Chad	Central	2	2	3	2	2	2	3	2	3	1	1	3	2	2
14	ZAI	Democratic Republic of Congo	Central			1	1	2	2	3	2			1	1	1	
20	GAB	Gabon	Central			1	1	2	2	2	3			2	2	2	
11	COM	Comoros	Eastern	1	2	1	2	2	2	2	1	2	1	1	1	1	1
18	ERI	Eritrea	Eastern	2	3	2	3	2	3	3	2		3	3	2	2	
19	ETH	Ethiopia	Eastern	2	4	2	3	4	3	4	2	3	3	4	3	3	3
25	KEN	Kenya	Eastern	2	3			4	5	3	4			2	2	2	
29	MAD	Madagascar	Eastern			2	1	2	2	3	2			1	1	1	
55	SYC	Mauritius	Eastern	3	1	2	1	2	2	4	3		2	2	2	1	
38	RWA	Rwanda	Eastern	1		3		2	4	5	3			2	4	4	3
54	MUS	Seychelles	Eastern	4	3	3	3	2	3	4	4	2	3	4	2	3	2
44	SSU	South Sudan	Eastern	4	3	4	3	2	4	4	3		3	4	3	3	
45	SUD	Sudan	Eastern	4	3	4	3	2	4	4	3		3	4	3	3	
47	TAN	Tanzania	Eastern	2	3	3	3	2	1	3	2		2	1	1	3	
50	UGA	Uganda	Eastern			2	2	1	3	2	2			1	1	1	
1	ALG	Algeria	Northern			3	4	2	4	5	4			3	4	4	
16	EGY	Egypt	Northern	3	1		1	3	2	2	2			2	2	2	
28	LAI	Libya	Northern	3	3	2	1	2	3	4	2		3	3	1	2	

Figure 4. Example of data aggregation. Rows are countries and columns are CCs with LoA scores. 1: Aggregation per CC ('summary measures down'); 2: Aggregation per country ('summary measures across'); 3: Stratification per region.

Discrepancies were found in some PVS Evaluation reports between the LoA scores reported in the summary table and those appearing in the narrative, or between the scores recorded in the PVS Evaluation report and the corresponding scores appearing in the PVS Gap Analysis report as 'actual scoring'. Rectifications were made in the database where such errors were identified.

2.2.1.1 Investigating differences between CCs

For each CC, criteria such as the completeness of scoring and variability of scoring was assessed. The most practical overall summary measure of each CC was the mean value of the LoA scores. Although each outcome was categorical as no distributional assumptions could be made, this was the most appropriate. This approach enabled direct comparison of scoring of the CCs across all the African countries in the analysis.

2.2.1.2 Investigating differences between countries

As the description and number of CCs that were assessed per country varied depending on the edition of the PVS Tool used, direct comparison of CCs between countries had to be handled with care. It was judged that for most CCs little overall change had occurred and comparisons over time could be made. More or less the same criteria were assessed within each FC, as the CCs (with a number of exceptions) remained constant across the entire period that the PVS Tool had been in use. Therefore, for each country, the logical approach was to aggregate the data to the FC level, by taking the mean of the LoA scores within each FC. Note that this assumed that all CCs were equally important, i.e. no weighting was applied. This allowed four variables per country to be analysed, each representing an overall score of the four key areas of functioning of the country's VS. Note that one CC 'Traceability' was moved from FC4 to FC2 in the 2nd edition of the PVS Tool, and split into two CCs; to be consistent, these CCs were all included in FC2.

Further consolidation was done by further taking the mean of the average FCs for each country to obtain a single summary measure for the performance of VS. Although this is a crude statistic, it was useful to assess high-level regional variation.

2.2.1.3 Regional stratification

Geographical stratification could be performed using different criteria, including African Union (AU) or United Nations (UN) regional categories, membership of regional economic bodies, e.g. East African Community (EAC), Southern African Development Community (SADC), Economic Community of Central African States (ECCAS), Economic Community of West African States (ECOWAS), etc. While membership of these economic bodies may have made sense, this was problematic in that not all countries belonged to one, and conversely, several countries belonged to more than one. After consideration and consultation with OIE, the AU regional categories appeared to be most useful.

The comparative performances of the VS at these regional levels was then investigated by applying the same aggregations as above.

2.2.2 Inclusion of economic and developmental criteria

The incorporation of economic, developmental, agricultural and social indicator data into this analysis was considered to be of interest for a number of reasons, particularly this would enable the investigation of potential associations with the assessed performance of the VS. For instance:

- Wealthier countries (e.g. with higher Gross Domestic Product, GDP, or per capita Gross National Income, GNI) may have had a higher level of investment in VS, resulting in better performance.
- Countries for which livestock and animal production were of higher priority and importance for trade, income and livelihoods might have had better functioning VS. This could be measured using criteria such as the percentage of national GDP contributed by agricultural production, live animal population data; production of, and trade in, specific animal products, etc.
- Countries which were stable politically and practiced good governance might have had better functioning VS – conversely, countries which had been in a state of civil unrest, strife and disruption would have had less well-functioning VS. This could be approximated using a composite indicator such as the [Human Development Index](#) (HDI).

Open-source country-level data from different sources were acquired, including:

- Economic indicator data, such as the [World Development Indicators](#) released by the World Bank. These included: Livestock Production Index (LPI), national GDP and per capita GNI, livestock production as a percentage of GDP, and country income level. The latter is based on the GNI and classifies economies into four groups: Low, Lower-Middle, Upper-Middle and High.
- Data on the UN's HDI which includes development criteria beyond economic indicators.
- Human population data: the [Gridded Population of the World](#) (version 4).
- Livestock live animal population data as well as production data from the Food and Agricultural Organization (FAO) [FAOSTAT](#).
- Livestock population density data from the FAO [Gridded Livestock of the World](#) (GLW) project (version 3).

2.2.3 Spatial data

Open-source geospatial data were acquired and manipulated (where required) to obtain a spatial layer showing the national boundaries of all countries included in the analysis. Additional country-level data (e.g. regional classification according to the AU or UN) were included. Subsequently, country data on LoA scores, other PVS indicators, economic and development indicators, as well as composite variables (aggregated data) were imported into the GIS software as data tables and joined with the country shapefiles to enable visualisation and analysis.

2.3 Summary analysis of all PVS report types

A high-level summary of report types showed the coverage, availability of report types / confidentiality status and year of reports. These data are provided in Annex C.

A simple, overall summary of progression of African countries along the PVS Pathway was determined based on which PVS Pathway missions had been implemented to date (including in which years these were carried out). This reflected the current level of the VS compliance as evidenced by the more recent PVS reports.

2.4 Analysis of LoA scores from the PVS Evaluation reports

2.4.1 Descriptive analysis

The completeness of scoring for each CC was assessed by expressing the number of reports which contained these scores as a percentage of the total number of reports. The variability in completeness was mainly attributed to variations in the editions of the PVS Tool used.

The distribution of the LoA scores was investigated for each of the CCs. This gave an indication of trends and differences in spread of the LoA scores across the CCs and FCs. The mean LoA score was also calculated for each CC.

Regional variability of scoring the CCs was investigated by comparing the mean LoA score using the AU recognised regions. Aggregation of CCs was performed to FC level and the mean LoA score was calculated, resulting in four outcomes per country; the overall mean LoA score per country was also calculated. The results were presented graphically and visually.

The categorical indicators developed for the VLSP reports, as outlined in 2.1.4, supplemented these data.

2.5 PVS Evaluation and analysis of progress made by African VS

The PVS Evaluations represent the baseline or benchmark against which subsequent progress could be measured. This evaluation is a snapshot in time. It is assumed to be representative of the functioning of the VS at the time of the assessment. However extraneous factors (politics, civil unrest, economic or logistics) could have affected this.

Applying the PVS Pathway terminology from Figure 1, these principles of assessing change over time are summarised in Figure 5.

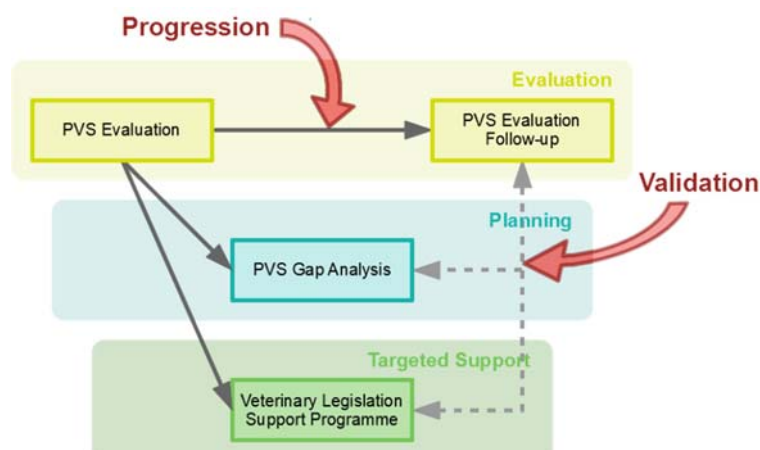


Figure 5. Schematic diagram of assessment of PVS Pathway progression / change and validation using different PVS Tool outputs.

2.5.1 PVS Gap Analysis: anticipated progress

The PVS Gap Analysis, which is typically the next PVS Pathway step to be performed, after a PVS Evaluation, estimated for each CCs the LoA which the country expected to reach in five-years. A comparison of the outcomes of the PVS Evaluation Follow-Up with those of the PVS Gap Analysis provided a validation of the extent to which the intended targets had been achieved. In parallel, PVS ‘targeted support’ missions (VLSP, PVS Laboratory, etc.) might have been performed and could also be assessed in this way.

The approach taken by the PVS Gap Analysis is to establish ‘National Priorities’ in discussion with the national VS. This is a participatory process during which national priorities and constraints are considered in consultation with the leaders and senior managers of the VS. Following the establishment of National Priorities, the PVS Gap Tool is used through a ‘pillar’ approach, considering Trade/Livestock Development, Veterinary Public Health, Animal Health, Laboratories and Management of the Veterinary Services, to identify strategies to be adopted to achieve the National Priorities with details under each CC of the specific strategies and activities to be undertaken. In addition, a budget is developed based on the planned activities. Note that no detailed assessments of the budgets are provided in this review.

The difference between the LoA assessed during the PVS Evaluation and the desired / anticipated LoA was calculated for each CC. As it was always assumed that either progress would be made, or that there would be no change, this difference was always positive. This difference was averaged for each CC and FC, and the overall country mean was also calculated.

The size of this difference therefore reflected the amount of progress the VS anticipated making at the time of the mission. It also provided an indication of the level of investment the VS were hoping to receive to strengthen their VS.

2.5.2 PVS Evaluation Follow-Up: assessed difference

It is only through a PVS Evaluation Follow-Up that direct comparison with the initial PVS Evaluation could be performed, to assess whether progress had been achieved in the intervening period. Ideally, PVS Evaluation Follow-Up missions were conducted some five years after the original PVS Evaluation or PVS Gap Analysis.

The difference between the LoA assessed during the PVS Evaluation and the LoA assessed during the PVS Evaluation Follow-Up was calculated for each CC. As the LoA could be higher or lower as evaluated during the PVS Evaluation Follow-Up (signifying an improvement or a regression of the VS for the CC concerned), this difference could be positive or negative. This difference was averaged for each CC and FC, and the overall mean was also calculated.

The size of this difference therefore represented the actual difference in performance of the VS, in the intervening period. Of course, this assumed that the assessment was standardised and objective. It should be noted that there were only 18 PVS Evaluation Follow-Up reports available, relatively few making regional stratification not meaningful, and it was not possible to generalise the results for the African continent as a whole.

2.5.3 VLSP reports: evidence of strengthening of the legislative framework

The Veterinary Legislation Support Programme (VLSP) missions are intended to strengthen the country's legislative frameworks. If PVS Evaluation Follow-Ups were conducted after the VLSP missions, improvements in this area could also be assessed.

The VLSP reports were entirely narrative with no categorical assessment of gaps or progress made in veterinary legislation. A simple categorical scoring system was developed based on quality of the legislation and its coverage based on the VLSP reports.

The narrative text of the VLSP reports was also assessed to provide a more nuanced assessment of the state and progress of veterinary legislation.

3. Results

3.1 Summary analysis of report types

3.1.1 Coverage and availability of PVS Pathway reports

Coverage refers to the extent and completeness in which the different PVS Pathway missions had been carried out. The reports made available are summarised in Table 1, above. Maps and a bar chart of the different PVS Pathway report types are shown in Figure 6. The reports have been stratified by their confidentiality status. Confidential reports were not made available for review. Annex C provides a summary of the country-level report status by type. Figure 7 and Table 2 show the implementation of PVS Pathway missions stratified by date. It is noted that one country had its first PVS mission in January-February 2019 but the information was not made available in time to be included in the report. This country appears as ‘mission requested’ in the map (Figure 6) and as a ‘no mission’ (Figure 8) even though the PVS Evaluation mission already taken place.

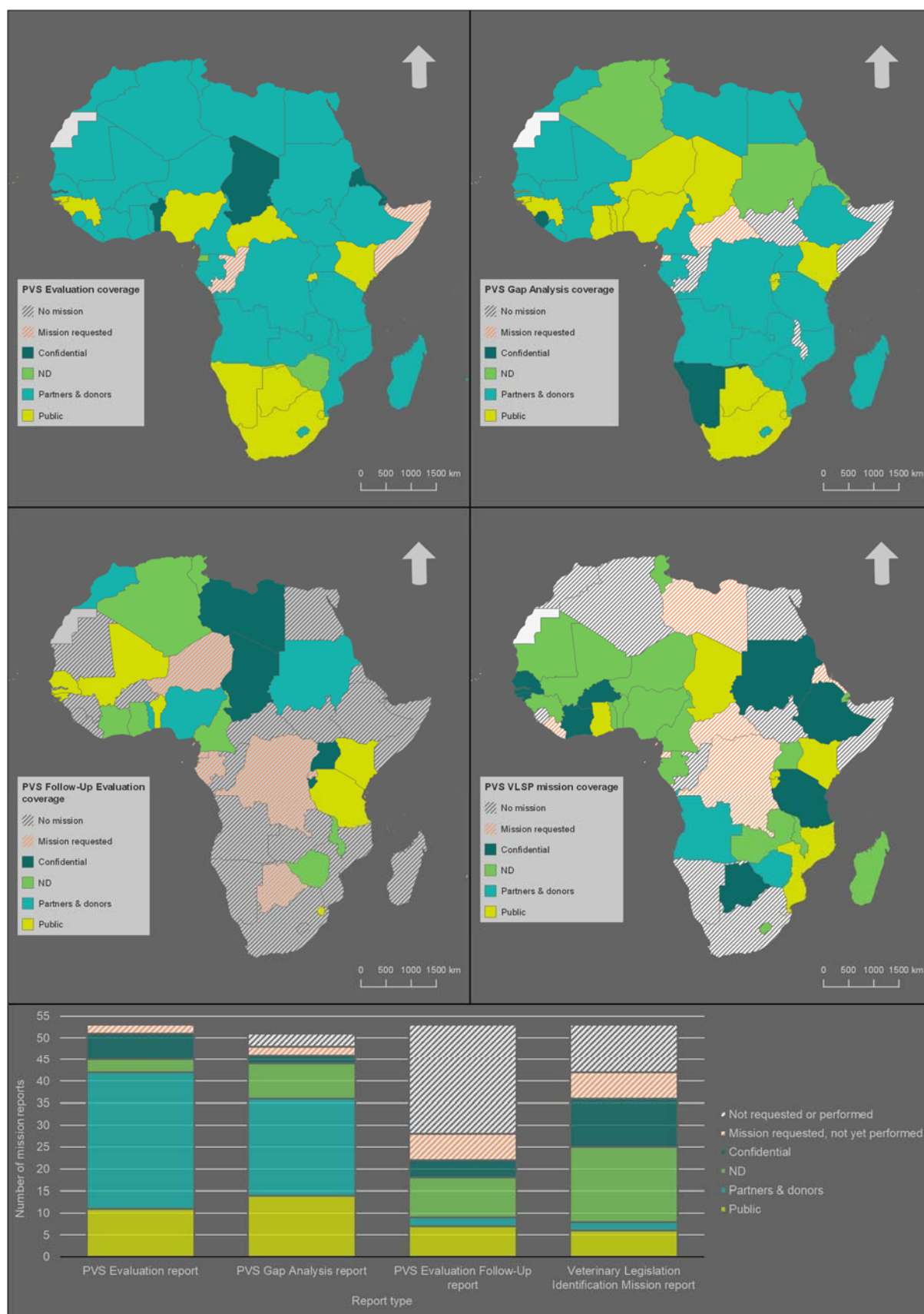


Figure 6. Maps and column chart showing the PVS Pathway missions that have been carried out, stratified by the confidentiality status of the mission reports.

The time periods for the PVS Pathway reports available for review are shown in Figure 7.

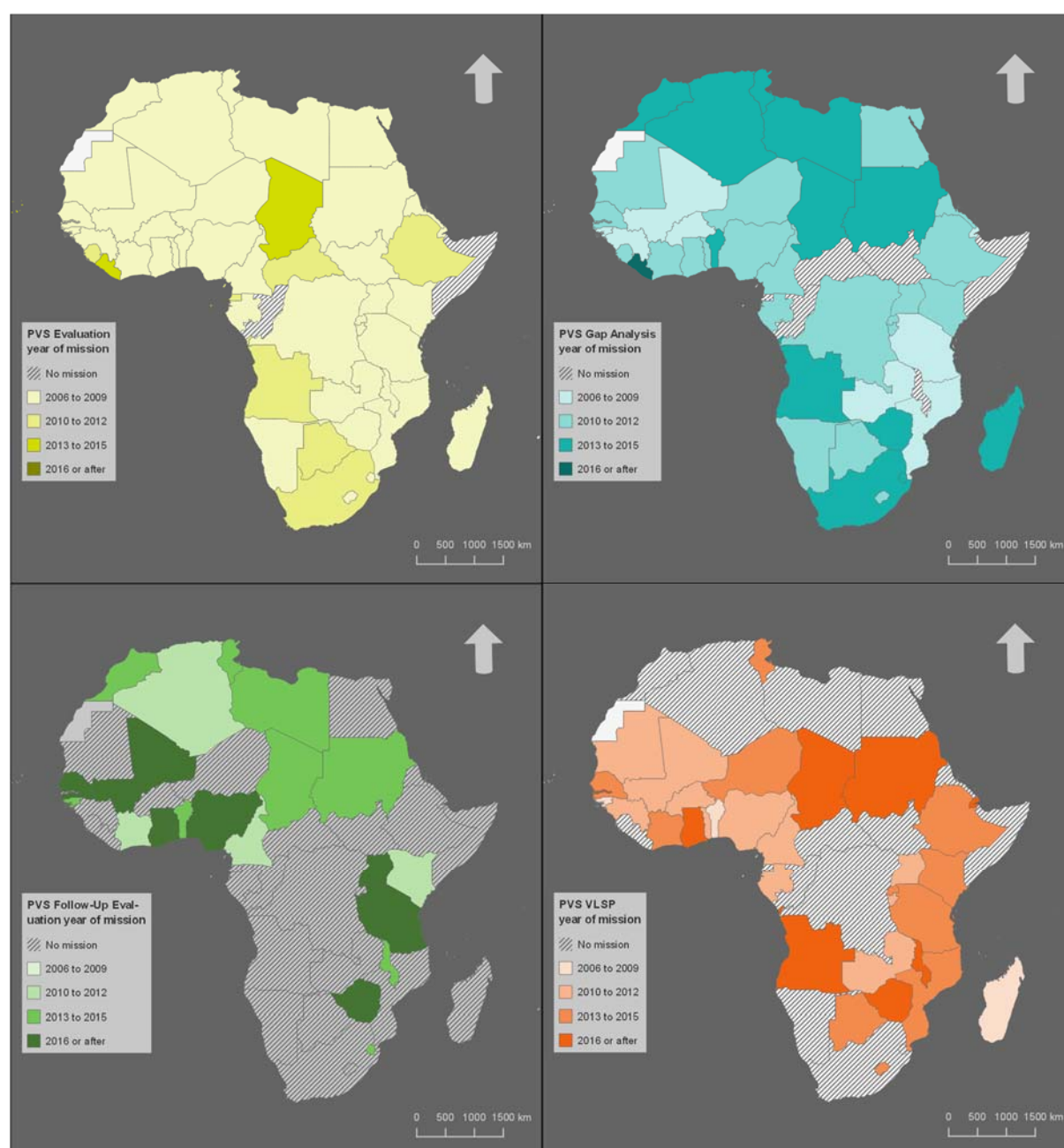


Figure 7. Maps showing implementation of PVS Pathway missions, stratified by date.

Table 2. PVS Pathway missions carried out per time period. PVS Laboratory and other support missions have been excluded.

Year of mission	PVS Evaluation		PVS Gap Analysis		PVS Evaluation Follow-Up		VLSP	
	n	%	n	%	n	%	n	%
2006-2009	38	75%	8	17%	0	0%	3	8%
2010-2012	9	18%	23	50%	4	18%	12	33%
2013-2015	4	8%	13	28%	9	41%	12	33%
2016 and later	0	0%	2	4%	9	41%	9	25%
Total	51	100%	46	100%	22	100%	36	100%

The majority of the PVS Evaluation missions were implemented between 2006 and 2009 when 75% of the missions were conducted; the most recent PVS Evaluation was conducted in 2014. At the time of writing, of the two remaining countries: one country (Somalia) had requested but not yet undertaken a PVS Evaluation and the other country (Republic of Congo) had completed a PVS Evaluation mission early in 2019, but the report was not available for review.

PVS Gap Analysis missions started in 2009 and the majority (82%) took place from 2010 onwards. It was noted that two countries had two PVS Gap Analysis missions one following another because of the profound changes that had taken place in the country, invalidating the objectives determined during the first PVS Gap Analysis mission. A third country, more advanced in the PVS Pathway, had had a second PVS Gap Analysis mission two years after its PVS Evaluation Follow-Up mission.

PVS Evaluation Follow-Up missions began in 2011. As can be seen in Figure 7, the coverage is much lower than for the initial PVS Evaluation and PVS Gap Analysis missions, with only 22 countries undertaking a PVS Evaluation Follow-Up mission, and 18 reports being made available for review. For 29 countries, the time interval was greater than the recommended five years since their PVS Evaluation. It is understood there has been a recent boost in the number of PVS Evaluation Follow-Up missions but these reports were not available for this review. Reports made available up to the end of June 2019 were included.

3.1.2 Progression of African VS along the PVS Pathway

The PVS Pathway is considered an ongoing process of iterative and sustained VS support and improvement (see Figure 1). The current status of African countries in the cycle is summarised in Figure 8. South Sudan, an independent country only since 2011, has been assigned the status of ‘No missions performed’.

Analysing PVS Pathway steps to provide an overall expression of the degree of progress was not straightforward because:

- Although the stated intention was to follow the sequence PVS Evaluation – PVS Gap Analysis – PVS Evaluation Follow-Up, the missions were not necessarily carried out in this sequence. Of the 18 available PVS Evaluation Follow-Up reports, eight were conducted following the expected process of PVS Evaluation – PVS Gap Analysis – PVS Evaluation Follow-up missions. The other ten PVS Evaluation Follow-up reports were performed as an update of the initial PVS Evaluation in order to prepare for a forthcoming PVS Gap Analysis mission; of these ten countries, one had not yet performed a PVS Gap Analysis (Figure 9).
- The intervals between missions were very variable as requests for missions were voluntary and submitted at the discretion of the Member Country. Funding, politics, logistic and organisational considerations contributed to this variability.
- Requests for VLSP, PVS Laboratory and other support missions could be made at any time during the PVS Pathway sequence, though always after a PVS Evaluation. At the time of this review, only single missions had been undertaken with no direct follow up, it was therefore not possible to utilise these to directly assess the progress made by VS in these focal areas.

To summarise the progression and current status of African countries along the PVS Pathway, the VLSP missions were not included, as this would have resulted in too many possible

categories for a meaningful assessment of progression. However, note that the VLSP missions were analysed separately and are shown in Figure 7 above.

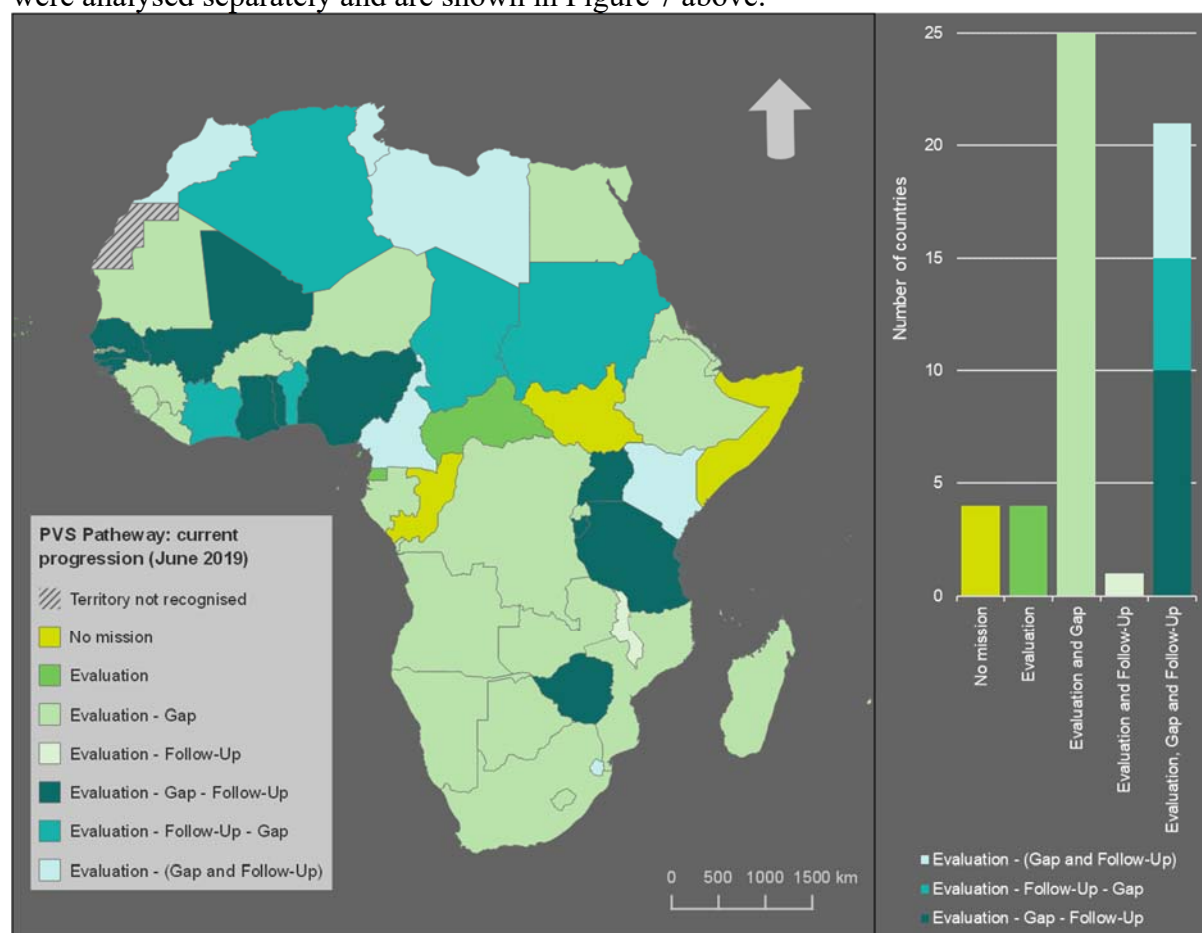


Figure 8. Map of countries showing type and order of PVS Pathway missions carried out, and column chart displaying numbers of countries per category. The category Evaluation – (Gap and Follow-Up) signifies that the latter missions were carried out in the same year.⁴

⁴ One country (DRC) shown in this map as ‘no mission’ had a PVS Evaluation mission in January-February 2019 but the information was provided too late to be added to the data set and so to adjust this map.

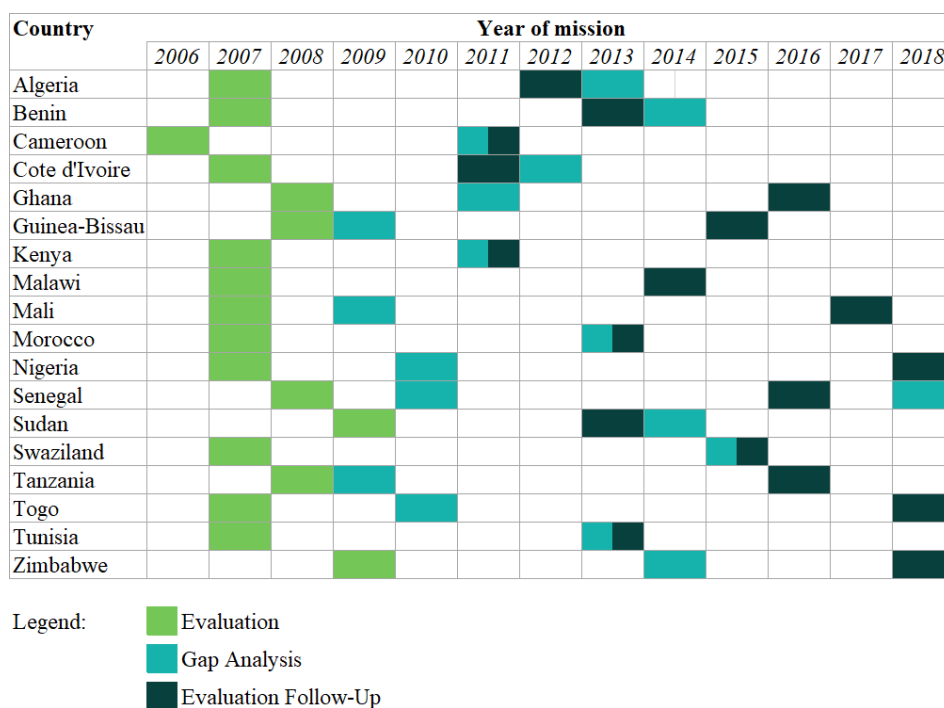


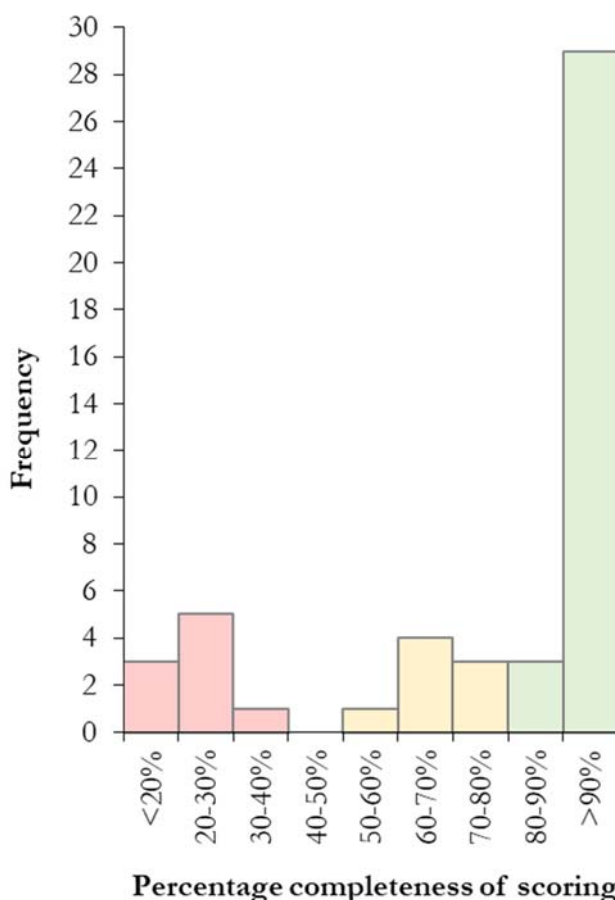
Figure 9. Chart showing sequence of PVS missions for the 18 countries for which PVS Evaluation Follow-Up reports were available.

The PVS Pathway had been completed as follows (at June 2019): 51 countries (94%) had performed a PVS Evaluation; 49 countries (91%) had undertaken a PVS Gap Analysis, and 22 countries (41%) had a PVS Evaluation Follow-Up mission.

3.2 Initial assessment: Analysis of LoA scores from the PVS Evaluation reports

Annex B provides the codes and the specifications that were developed and utilised for this analysis. Table 3 shows the CCs that were evaluated for the total set of 46 PVS Evaluation reports. Where possible, the wording of the 6th edition (2013) was used; obsolete or older CCs were described using the wording in the edition of the PVS Tool that was current at the time.

Per CC, the overall degree of completeness of assessment (as coded in Annex B) was calculated as the percentage of reports for which it was assessed. This was therefore not a reflection of how well each mission completed the CCs, but more a function of the variability and changes between editions. It was classified as low (<40% of all reports), medium (40-80% of all reports) and high (>80% of all reports). The variation in the completeness of assessment of LoA score for each CC was most evident for the CCs in FC2. The attached figure shows in red the CCs with completion less than 40%, yellow with between 50 and 80% completion and green completion above 80%.



Where the completion rate was low, this may have been because the CC in question was introduced in a more recent version, or because the CC was in an older edition of the PVS Tool and became obsolete in more recent versions. Where the differences in wording were very minor but it was evident that the CCs were effectively identical to the CCs in the 6th edition, the LoA scores were classified as relevant according to the current edition.

Table 3. Percentage of completion of scoring of the LoA for all PVS Evaluation reports combined (n=46), stratified by FC. The wording of the sixth edition (2013) is used insofar as possible.

FC	CC	Description	Proportion of reports with completed CC
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1	01	Staffing (veterinary and other professionals with university qualifications)	Medium	75%
1	02	Staffing (veterinary paraprofessionals and other technical personnel)	Medium	73%
1	03	Professional competencies of veterinarians including the OIE Day 1 competencies	High	90%
1	04	Competencies of veterinary paraprofessionals	High	86%
1	05	Continuing education	High	100%
1	06	Technical independence	High	100%
1	07	Stability of structures and sustainability of policies	High	100%
1	08	Internal coordination (chain of command)	High	98%
1	09	External coordination	Low	25%
1	10	Physical resources	Medium	65%
1	11	Operational funding	High	98%
1	12	Emergency funding	High	100%
1	13	Capital investment	High	100%
1	14	Management of resources and operations	Low	25%
2	01	Access to veterinary laboratory diagnosis	High	96%
2	02	Suitability of national laboratory infrastructures	Low	12%
2	03	Laboratory quality assurance	Medium	65%
2	04	Risk analysis	High	100%
2	05	Quarantine and border security	High	100%
2	06	Passive epidemiological surveillance	High	94%
2	07	Active epidemiological surveillance	Medium	71%
2	08	Emergency preparedness and response	High	100%
2	09	Disease prevention, control and eradication	Medium	69%
2	10	Regulation, authorisation and inspection of establishments for production, processing and distribution of food of animal origin	Low	14%
2	11	Ante- and post mortem inspection at abattoirs and associated premises	Low	25%
2	12	Inspection of collection, processing and distribution of products of animal origin	Medium	55%
2	13	Veterinary medicines and biologicals	High	100%
2	14	Residue testing	Medium	67%
2	15	Animal feed safety	High	96%
2	16	Technical innovation	High	84%
2	18	Animal identification and movement control	Low	35%
2	19	Identification and traceability of products of animal origin	High	90%
2	20	Animal welfare	Low	27%
3	01	Communication	High	100%
3	02	Consultation with interested parties	High	100%
3	03	Official representation	High	100%
3	04	Accreditation/authorisation/delegation	High	98%
3	05	Veterinary Statutory Body: authority	High	94%
3	06	Veterinary Statutory Body: capacity	Low	27%
3	07	Participation of producers and other interested parties in joint programmes	High	94%
4	01	Preparation of legislation and regulations	High	100%
4	02	Implementation of legislation and regulations and compliance thereof	High	100%
4	03	International harmonisation	High	100%
4	04	International certification	High	100%
4	05	Equivalence and other types of sanitary agreements	High	100%
4	06	Transparency	High	100%
4	07	Zoning	High	90%
4	08	Compartmentalisation	High	88%

3.2.1 Analysis of LoAs per CC

This section reviews the 46 PVS Evaluation reports. These reports provide the baseline information on the status of Member Country VS as assessed by the initial PVS Evaluation missions. Following sections consider the PVS Gap Analysis, PVS Evaluation Follow-Up and the VLSP reports.

In the assessment of PVS Evaluation reports, balloon plots give an overall indication of how LoA scores have been allocated for each of the CCs, classified per FC (Figures 10 to 13). The size and shading of each balloon is proportional to the number of LoAs as assessed for each CC. This is technically considered the best way to display these data. The ridge plots treated

the LoAs as continuous, which is not strictly the case as they are categorical variables; however, this allowed the distribution to be easily visualised for categorical data such as this, for which no distributional assumptions can be made, the mean is the most appropriate summary measure which could be taken.

3.2.1.1 FC1 - Human, Physical and Financial Resources

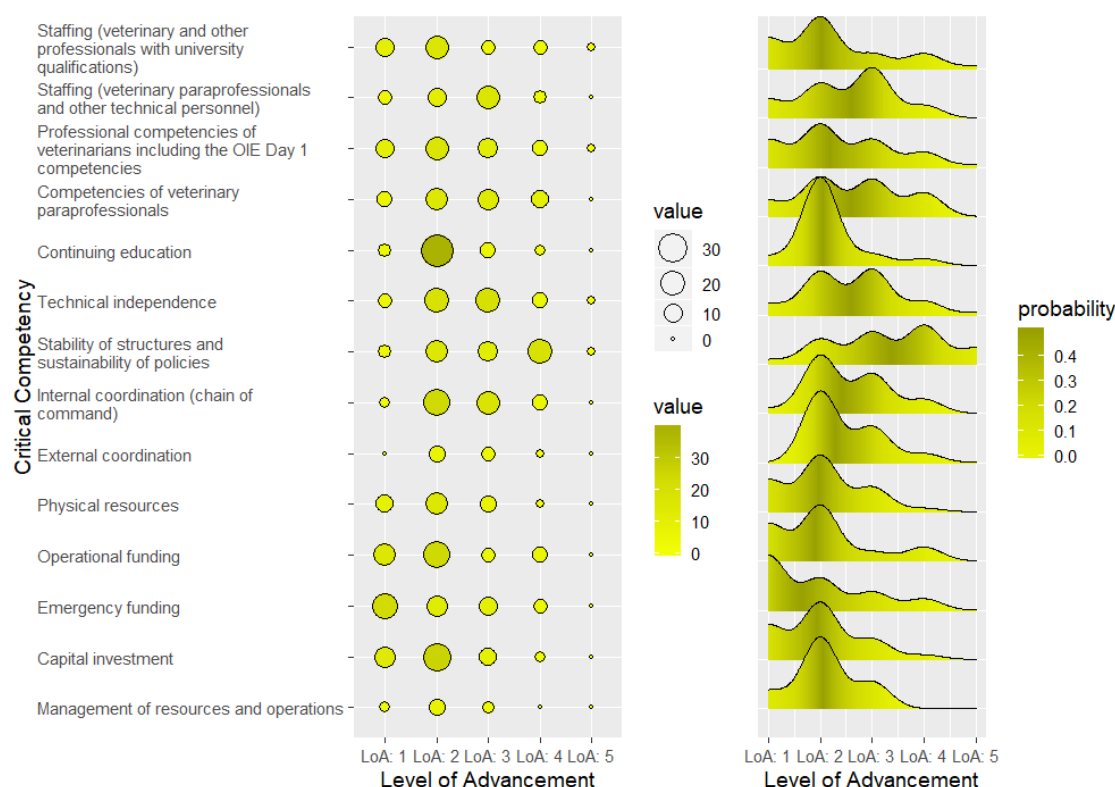


Figure 10. Balloon plot and ridge plots showing distributions of the LoA scores for FC1 (Human, Physical and Financial Resources). The size and shading of the balloon plots are proportional to the number of outcomes per LoA score.

Staffing

As can be seen from the balloon and ridge plots, the PVS Evaluation of staff numbers and competencies (ref CCs I.1A, I.1B, I.2A, I.2B, I.3) in many countries was only assessed as level 2 though a number of countries did perform better at level 3. Only three countries scored level 4 and above for the first four CCs and only one country scored level 5 for these CCs.

The shortage of veterinarians in the African VS, at central, regional and/or field level, was a common weakness identified in almost all PVS Evaluation reports. In only ten countries were veterinary staff numbers considered adequate at all levels of the VS. This critical issue resulted in key positions in the VS, though formally established, not being filled, and the heavy reliance on the VPPs to deliver field services, often with little veterinary supervision. The PVS reports commonly cited a lack of veterinarians in regular contact with farms and livestock, especially in the more remote and extensive production systems and also with smallholders or in communal grazing areas. Limited staff numbers also commonly restricted the ability to conduct on-site inspections of animal slaughtering and processing facilities, leaving this responsibility to insufficiently trained and unsupervised staff. This situation limited the quality of the VS across the veterinary domain – including disease outbreak detection and investigation

(surveillance), disease control and eradication activities, the prudent use of veterinary medicines and biologicals, food safety and animal welfare.

In only a few countries were veterinary staff numbers considered adequate at all levels of the VS. In many countries key positions in the VS, though formally established, were not being filled resulting in critical shortages of professional and technical staff. In part this situation had developed in response to recruitment freezes caused by weak economies and government budget pressures. It was noted that the availability of veterinarians was particularly limited in countries with no veterinary school. Countries without a veterinary school were forced to send abroad their students to be trained as veterinarians, and often, there was no financial support for those students and, once back, their diploma often had to be validated by the government. The aging workforce (both veterinarians and VPPs), was regularly identified as a problem and there was commonly no specific work force development or succession planning in place. In some countries this staffing situation was being partly addressed by positions being filled with ‘acting’ officials, that is those operating without permanent tenure.

In contrast VPPs were found in much greater numbers and, with the exception of three countries, VPPs provided the main staff resource in delivering veterinary field and other services. At the time when most of the PVS Evaluations were conducted there was no clear definition of VPPs with reference only to ‘appropriate qualifications’; in the 7th edition of the PVS Tool (2019) VPPs have now been defined with reference to the OIE standards of VPP categories and are expected to have formal qualifications, recognised by government and/or the VSB. As such the definition and qualifications of VPPs are unclear in almost all the reports that were conducted using the earlier editions of the PVS Tool; this lack of clarity was exacerbated by the widespread use of staff with less training than the VPPs – these included staff with varying titles such as diptank assistants, community animal health workers, livestock attendants, etc. Overall there were significant numbers of non-veterinarians operating and these provide the core human resource for many VS.

The competency of veterinarians was generally endorsed as being ‘appropriate for the clinical and administrative activities of the VS’. The PVS Evaluation reports recognised the excellence of some veterinary schools and how these had been sustained in spite of severe economic pressures. Some countries were investing significantly in veterinary (veterinarian and VPP) training with an increase in both the number and throughput of veterinary and VPP schools. One country had recently increased from one to nine its number of veterinary schools – though commendable the long-term sustainability of such a major increase was questioned and also the ability to provide high standards of training. Veterinary schools were improving in many countries with better curricula and increasing compliance with OIE Day 1 competencies, but there was little support available for training in the specialist technical and management skills required for the CVO leadership role, as epidemiologists, risk analysts, food safety and veterinary public health specialists.

The training and capability of VPPs varied with some countries having robust programmes and specific schools to ensure their personnel were appropriately qualified at both central and field levels, whereas others had no coherent programme and VPPs and other animal health officers were of variable standard. Issues faced included poor infrastructure, no/little course evaluation and sudden increases in student numbers. NGOs often took the lead in training community animal health workers, but their curricula were not defined in collaboration with the VS and no formal quality assurance programmes were in place.

It was noted that, in the SADC region, a regional harmonisation programme for the veterinary schools was in place.

Generally, staff recruitment and management were poor with a lack of job descriptions or formal appointment procedures, no staff development plan and no performance assessment.

Continuing education training and staff development programmes were almost universally poor with 84% of the countries scoring level 1 or level 2 for this CC. Only eight of the assessed countries scored level 3 or level 4 for this CC which requires that 'the VS have access to continuing education that is reviewed annually and updated as necessary' and only two countries 'implemented continuing education for more than 50% of the relevant personnel'; some of these countries required continuing education for the renewal of registration by their Veterinary Statutory Bodies (VSBs). Most of the continuing education that was being provided in the African countries was through *ad hoc* training provided by international agencies and donors particularly in the face of major TAD risks.

Management

In the PVS Evaluation reports, Technical Independence was commonly assessed as being at level 2 or level 3 (78% of the countries), that is technical decisions were subject to change based on non-scientific considerations to a greater or lesser degree. Issues raised were the weakness of the VS and so the lack of integrity of the available 'scientific evidence' e.g. poor disease surveillance data owing to limitations of the field service with the over-dependence on VPPs and community-based animal health workers, and few guidelines and SOPs. In some countries, technical government VS staff were also involved in private business and this was identified as compromising their independence. Poor remuneration was noted as a high risk for compromised technical independence with the resulting incentive for staff to supplement their low salaries. In some countries, it was noted that the funding of VS activities at field level was directly dependent on drugs sales and/or veterinary activities and this created 'unfair competition' with private veterinarians and limited their technical independence. In addition, sometimes private veterinarians were making inspections without official delegation.

Most countries had stable policies for animal health and veterinary public health with national strategic plans and frameworks in place that were not being adversely affected by changes in the political leadership, restructuring or leadership changes of VS (60% of countries were level 3 or level 4). The strategic plans tended to focus on a number of priority disease control programmes – often these plans had been developed with the assistance of international or regional organisations. Some countries had no strategic plans and others emphasised high priority TADs and not the broader issues of improved animal health and production limiting endemic diseases.

The coordination of the VS was assessed as a single CC until the 5th edition (2010) when it was split into two – internal coordination, that is the chain of command within the VS, and external coordination, that is coordination with other Competent Authorities. Coordination of the VS was almost universally regarded as sub-optimal and something that needed urgent attention, only 16% of the countries were assessed at level 4, that is with a 'clear chain of command, ..., uniformly implemented throughout the country', and 50% of the countries were assessed at level 1 or level 2. The line management and authority of the VS was commonly described as weak with government VS often fragmented or decentralised through 'matrix management' systems under which the Veterinary Authority provided policy and technical leadership but

resources (funding, staff, equipment and materials) were provided by a sub-national entity such as a province, state or district. Many reports identified the need for revised legislation to address this issue. Common problems were undefined organisational structures and no clear accountabilities, with unclear lines of delegation or reporting to senior veterinarians/managers and others. For example, positions essential to the functioning of the VS, such as the heads of laboratories and epidemiology, sometimes did not report to the CVO but to some other higher directorate or directorate general level in the ministry resulting in a disconnected inefficient system.

External coordination between the VS and the human health agencies continued to be limited. External funds, to support HPAI preparedness and response programmes, had increased engagement with other ministries and institutions in many countries. In some countries no external coordination was recognised. For one country it was stated that external coordination was good with a broad range of other institutions (such as customs, wildlife and security) but that further improvements with human health could be achieved particularly to promote the control of zoonoses, better management of veterinary medicines, residues and food safety.

Most countries were identified as having little or no capacity to audit, evaluate or to implement quality control of their programme implementation. In many cases major disease control, veterinary public health and food safety programmes had been in place for several years with no critical reviews being undertaken and no assessment of problems faced or whether any progress was being made. The need to develop leadership, financial, human resource and project management capacity and other key organisational skills was frequently identified.

In one country, VS management systems were seen to have benefitted from a nationwide government policy focused on improving service delivery and ‘incorporating approaches based on sound planning, efficiency, stakeholder service, transparency and accountability’. Data management and analysis was also being streamlined through the introduction of improved IT systems.

Resources

In the PVS Evaluation reports, access to funding for physical resources and capital investment was often evaluated as poor, 50% of the countries were assessed at level 1 or level 2 and operational funding was also evaluated as being very poor with 78% of countries scoring level 1 or level 2. A lack of capacity in financial management with insufficient ability or understanding on how to develop and manage budgets with the appropriate planning and monitoring was identified as a critical issue. A common problem noted in many reports was that it was hard to evaluate funding as reporting was poor and funding was often also provided at a sub-national level and/or through multiple funding streams. This finding was true for both operating budgets and for capital investment. In many countries funding was regarded as stable but inadequate for the VS to undertake even base level operations. It was also found that in some countries the high number of staff vacancies was being used to cover for the inadequate operating budget.

The main consequence of the insufficient budgets was inadequate infrastructure/buildings, poor transport, equipment and staffing and limited operational resources resulting in the inability of the VS to deliver effective veterinary services. Less than 12% of countries were assessed as receiving reasonable funding for operations, good physical resources with ongoing investment. The same observation applied to emergency funding and response with 30% of

countries having a contingency and compensatory funding arrangement in place for an emergency but only 10% having sufficient resources to be able to implement an effective response. Sometimes, funding for emergency response was under the responsibility of the national disaster agency, though in these situations it was not made clear how quickly funds would be provided.

3.2.1.2 FC2 – Technical Authority and Capability

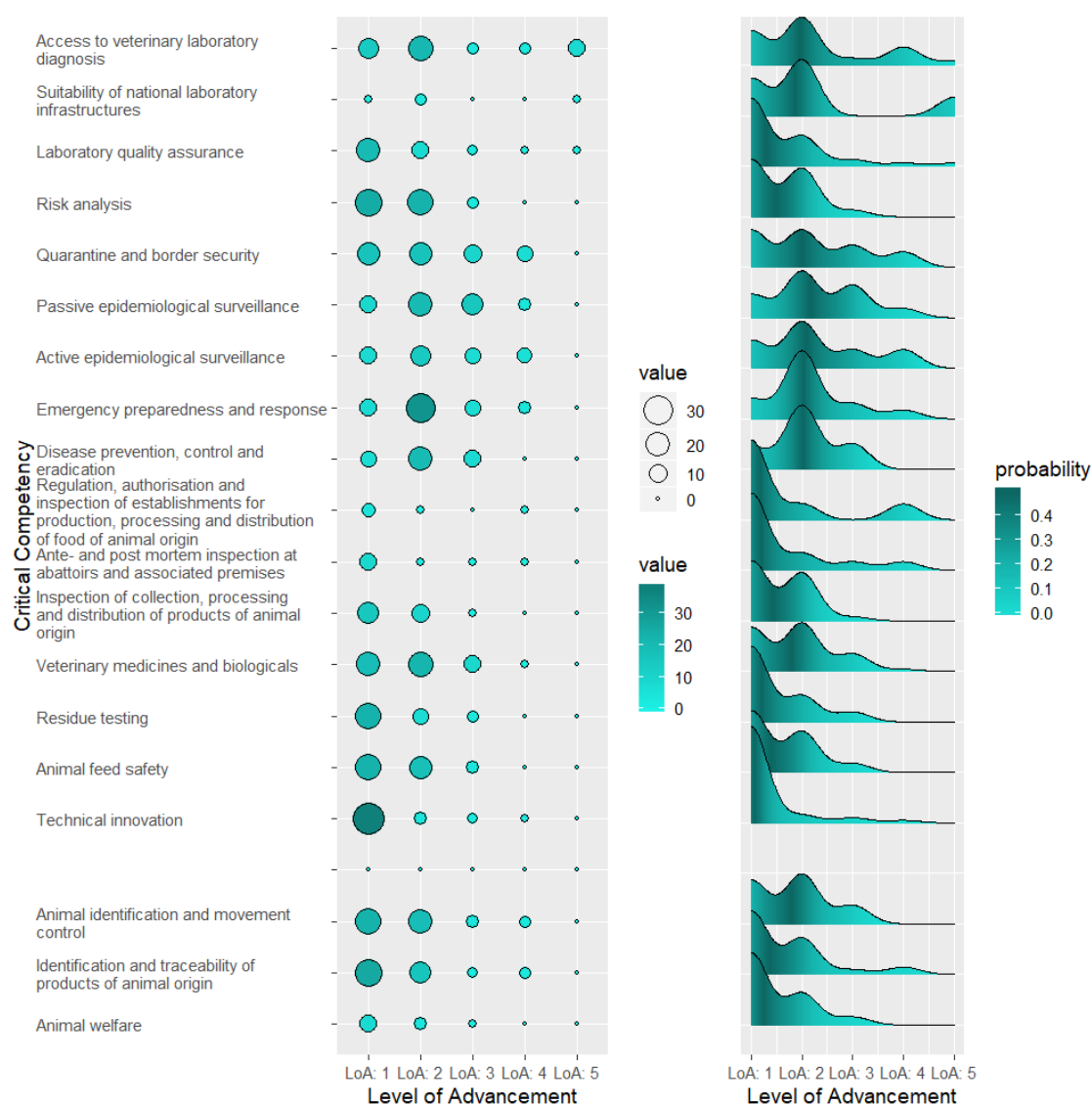


Figure 11. Balloon plot and ridge plots showing distributions of the LoA scores for FC2 (Technical Authority and Capability). The size and shading of the balloon plots are proportional to the number of outcomes per LoA score.

This FC was considerably modified in the successive editions of the PVS Tool. Some of the CCs were deleted in the 6th edition (‘Emerging issues’ and ‘Technical innovation’) and therefore were not reviewed. Also, some CCs were sub-divided in two or three new CCs in the 5th and 6th edition to allow for a more detailed assessment of the VS situation, and therefore were assessed in only a few countries (e.g. ‘Suitability of the national laboratory system’, ‘Regulation, inspection, authorization and supervision of establishments’, ‘Animal feed safety’, ‘Animal welfare’).

Laboratories

In the 6th edition of the PVS Tool, the laboratory CCs were reviewed with veterinary laboratory diagnosis being split into two CCs covering separately ‘Access to veterinary laboratory diagnosis’ and ‘Suitability of national laboratory infrastructures’. A third CC covered quality assurance and management systems. Some further changes occurred in the 7th edition (2019) with re-numbering and increased definition between the CCs.

In general, the veterinary diagnostic laboratories were assessed as being seriously run down and frequently under-utilised. It was commonly suggested that there was a need for a review of the role, capacity and capabilities of the laboratory system to identify their core mission and develop strategic plans as the basis for investment decisions.

In more developed and more export orientated countries the laboratory system – its structure, its use and quality assurance - were all strong. One country was assessed as having access to a comprehensive range of laboratory diagnostics through suitable national laboratories, supported by approved private laboratories, with many laboratories having received ISO 17025 certification; this country was also providing referral services to its neighbours. In other countries, FAO and other international agencies had provided staff training and modern laboratory equipment, though this equipment was not always functioning owing to maintenance issues or a simple lack of a secure water or electricity supply. In some countries the laboratories were said to be well equipped, but no proficiency testing was being undertaken. Very few countries had any formal laboratory quality assurance programmes – 62% of countries were assessed at level 1 for this CC.

Sample collection also posed a problem in many countries with the common practice of laboratory staff going into the field to collect samples – which both compromised the timeliness of outbreak investigations and limited the availability of technically capable staff in the laboratory. A further sampling issue faced was the lack of sampling equipment and cold chain for the transport of samples with inadequate refrigeration and freezing systems available.

Risk analysis and border control

The PVS Evaluation reports indicated that most countries had no capacity to use risk analysis in designing and implementing their programmes – 94% of the countries were assessed at level 1 or level 2 for risk analysis and no country above level 3. One more advanced country was using risk analysis regularly for imports but even in this country there was no dedicated unit of staff for the adoption of a full range of risk assessments. Most countries had no policy on risk analysis, nor did they have trained staff. One problem faced by many countries was the lack of good quality animal health data that would allow for some risk analysis to be undertaken – few national animal health information systems were in place.

For only 14% of countries, border control and quarantine inspection was assessed as being satisfactory with well-established and well-staffed border inspection posts and sometimes extensive fencing to limit incursions of foreign livestock and wildlife. For the majority of countries some basic level quarantine and border security procedures were in place but these were generally not based either on international standards or on any risk analysis. Often, the activities were managed by VPPs with a tendency to focus on administrative procedures and a lack of proper training, guidelines, supervision and logistics support. Even in better performing

countries there was no auditing in place or assessment of their resources and procedures. In one of the weakest countries it was stated that, though the VS had the legislation, they could not apply any type of quarantine or border security for animals or animal products with their neighbouring countries or trading partners and that there was no database for information on the import of animals or animal products.

Animal health programmes

The core animal health CCs have remained largely unchanged since the 2nd edition of the PVS Tool (2007) allowing a high level of comparability over time.

The difference between passive surveillance, that is the reporting/detection and investigation of disease outbreaks, and active surveillance, that is disease searching most commonly through surveys, is commonly misunderstood and some of the PVS Evaluation reports were ambiguous in their assessments of these CCs.

In the PVS Evaluation reports, the surveillance CCs were assessed commonly at level 2 and level 3. For all countries, the biggest concern expressed over the limited competency of their surveillance was the lack of staff, and particularly of veterinarians. As indicated under 'staffing' above, this limitation was greatest in remote areas; surveillance of smallholders and transhumance pastoralists was also cited as a concern. One country was assessed as having 'no operational passive surveillance programme nor any means to implement any active surveillance programme'. In some countries, their surveillance programme had been boosted by increased investment and international support following concerns over HPAI. One country had introduced subsidies and also compensation had been provided and so the passive surveillance system was considered to be working; however, documented procedures were limited and there was no list of notifiable diseases.

Active surveillance, critical to provide a better understanding of disease and its epidemiology and to monitor disease control programmes, were generally weak with inadequate funding and technical knowledge of animal populations, their demographics and the target diseases and their epidemiology. Active surveillance was most commonly being supported by external donors as part of priority TAD control programmes with only limited analysis and reporting of findings.

Most countries (66%) were assessed as having a field network with an established procedure for sanitary emergencies but they lacked the necessary legal and financial support. The incursions of epidemic diseases – such as HPAI and FMD – in some African countries had led the implementation of an emergency response. In some countries, the rapid response mounted by the VS had been effective but it was recognised that more detailed contingency planning was required in all countries and that emergency preparedness would be improved with greater development of response systems, increased staff training, development of a compensation policy and simulation exercises. The VS commonly lacked the established procedures necessary to make timely decisions on whether or not a sanitary emergency existed and lacked the legal framework and financial support to respond effectively.

Countries had a range of competences in disease prevention, control and eradication with most (80%) having some programmes in place but these programmes varied from minimal activities to being broader based; in only 23% of countries was reference made to scientific reviews of progress being made. There were few well-structured disease control plans with coherent

strategies and realistic expectations. The related activities were not being well implemented and often varied from district to district. Substantial resources were sometimes available but there was often little or no proper evaluation and control. Inadequate cold chains were cited as a common problem and, thus, vaccine efficacy was being compromised. No country was assessed at above level 3 for this CC.

Food safety

The approach to veterinary public health and food safety has changed since the inception of the PVS Tool in 2006. Veterinary public health and food safety was present from the 2nd edition of the PVS Tool and was then divided into three CCs in the 5th edition (2010); the 7th edition (2019) reduced the number of CCs back to two, with the removal of the CC on the ‘Inspection of collection, processing and distribution of products of animal origin’ as these were considered to be very rarely under the control of the VS or the Veterinary Authority. The remaining two CCs cover the ‘Regulation, inspection, authorisation and supervision of establishments for production and processing of food of animal origin’ and the ‘Ante- and post-mortem inspection at slaughter facilities and associated premises’.

Overall, the PVS Evaluations assessed the authority and capability of VS to assure food safety as being very low – at level 1 or level 2 for more than 85% of the countries (note though that the ‘completion rate’ for those CCs was low from 14 % to 55%). Issues identified included that in many countries, veterinary public health for food safety was properly handled only in export abattoirs, whereas in many national slaughter facilities and local slaughter slabs, meat inspection was either not undertaken at all or being undertaken only by VPPs with limited training, few guidelines and without SOPs, proper data reporting or veterinary supervision. In addition, slaughterhouse infrastructure was frequently inadequate at the national or local levels – this was particularly the case for poultry and small ruminants. In higher achieving countries, the VS mandate was often limited to meat safety, the accreditation of all slaughter facilities and slaughter inspection with the accreditation and auditing of food inspection of facilities processing animal products for export; non-export processing facilities were commonly under the mandate of another Competent Authority, commonly the health agency. There was almost no reference in the reports to the benefit of using slaughterhouses and ante and post-mortem findings as part of the national animal health surveillance network.

Veterinary medicines and residues

In 80% of the countries, the VS had no capability or very limited capability to exercise administrative control, including registration, the import and production, the distribution and usage of veterinary medicines and biologicals. It was even mentioned in one report that the retail of veterinary medicines was ‘out of control’. The country organisation varied with control often lying outside the Veterinary Authority, most commonly with the Ministry of Health. Several countries recognised this limitation and were taking steps to draft new legislation and to implement awareness and compliance programmes. In one country a stronger drug registration programme was being well managed but the regulations still did not allow for the effective control over drug distribution and usage. In many countries, antimicrobial drugs and parasiticides were being sold over-the-counter with no veterinary oversight; concerns over the distribution of fake drugs were also noted.

Most countries (70%) had no residue testing programme. The exceptions were the livestock exporting countries which had to meet international standards as required by the importers

– this resulted in two-tier systems with lower levels of product quality assurance in their domestic market.

Animal feed safety

The CC for animal feed safety was only introduced in the 6th edition of the PVS Tool (2013) so few assessments had been made.

Of the four PVS Evaluations in which this CC was assessed, no country had any authority or capability to regulate its animal feed safety (all were assessed at level 1), that is considering the processing, handling, storage, distribution and use of both commercial and on-farm produced animal feed and feed ingredients. No controls existed in the majority of countries for managing the risk of swill feeding, ruminant feed bans or the use of growth promoters.

Animal and animal product identification and traceability

Traceability was included in the FC4 in the 1st edition of the PVS Tool (as CC IV.6) and was subsequently moved to FC2 and divided into two CCs (II.12A and II.12B) covering animal identification and movement control and product identification and traceability.

The PVS Evaluation reports indicate that more than 85% of the countries had no animal or animal product identification or traceability system in place. Neither had an effective movement control system been developed. In countries with an export focus, systems for the mandatory identification of animals and the identification and traceability of animal products had been established with the necessary supporting legislation but with varying levels of enforcement. Methods of identification were not always specified but often included traditional methods such as branding. One country reviewed had mandatory animal identification in a disease-free zone with individual ear tags and the recording of all animal movements was also mandatory and monitored through a well enforced permit system; this traceability system also covered small ruminants, but these were identified as lots/herds/batches and not as individuals.

Animal welfare

The CC for animal welfare was only introduced in the 5th edition of the PVS Tool in 2010.

Over the 15 countries in which this CC was assessed, ten had no or only limited legislation or any programme on animal welfare. In one of the countries it was noted that animal welfare concerns were a high priority for parts of the community and that many NGOs were involved. Even in this country, the current legislation was considered to be outdated, and not harmonised with OIE standards, and there were no VS staff dedicated to addressing animal welfare. In other countries, animal welfare was considered to be at the early stages with policies and legislation evolving, sometimes being led by an established working group which was coordinating with NGOs. In many countries there was no animal welfare programme with some cultural traditions being identified as particularly challenging for good animal welfare.

3.2.1.3 FC3 – Interaction with Stakeholders

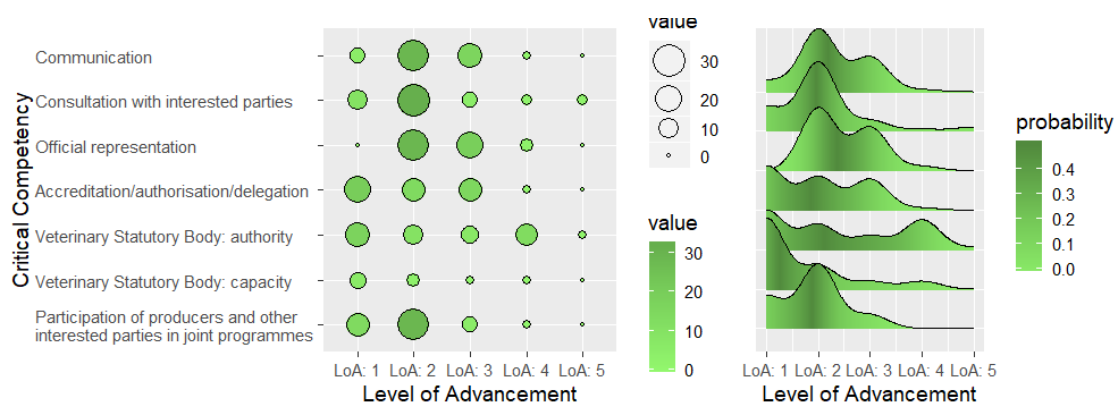


Figure 12. Balloon plot and ridge plots showing distributions of the LoA scores for FC3 (Interaction with Interested Parties). The size and shading of the balloon plots are proportional to the number of outcomes per LoA score.

Communications, etc

In the PVS Evaluation reports, communications and consultations were assessed as being level 2 or level 3 for 88% of the countries with half of them having only informal channels for communications. One third of these countries, had more formal mechanisms with designated staff; five countries had no mechanisms in place to identify and inform stakeholders of VS activities and programmes. External donor programmes were supporting communications through various VS development and specific disease control programmes, e.g. the EU-funded SPINAP. Countries generally provided no budget for communications and had no access to specialist skills or staff trained in communications. Even in more advanced countries, communications were assessed as not adequately engaging and providing sufficient information to smallholders and communal farmers. A further issue identified was the limited industry representation for livestock farmers and so the lack of focal points to develop and facilitate communications and consultations. In some countries, industry groups existed that represented the larger commercial, and often export focused, sector but not in other sectors.

With few exceptions (13%), joint programmes (CC III.6) were assessed at level 1 or level 2, that is producers and other stakeholders were merely passive participants in the implementation of programmes with no role in their preparation or active engagement. The few exceptions were the countries that were actively engaging with producers and others to develop and review programmes and actively participate in their implementation. Most countries had no mechanism to formulate and implement joint programmes for animal health or food safety with stakeholders. A few countries had introduced a level of cost-recovery or financial support for joint programmes.

Most countries participated in meetings of regional and international organisations including the OIE, Codex Alimentarius Commission and WTO SPS Committee, where applicable, but participation tended to be limited with no preparation of discussion papers and little feedback being provided to stakeholders following the meetings.

Management and regulation of the veterinary profession

The CC on VSB was divided into two CCs in the 5th edition of the PVS Tool (2010). As such the CCs were not directly comparable over time.

The overall assessment of the VSB, its authority and capacity, to regulate the veterinary profession was highly variable across the PVS Evaluations with LoAs varying widely from a low level 1 to high level 5. One country was assessed at level 5 with the ability to register and regulate all veterinarians and VPPs, requiring continuing education to maintain registration and applying penalties as necessary. In 35% of the countries, there was no legislation for the regulation of the veterinarians and the VPPs, and no VSB or even a professional veterinary association; in 20% of countries, a VSB existed but with no legal framework. Other countries had VSBs that required registration of veterinarians with sometimes a requirement for continuing education at varying intervals. Almost no countries formally regulated VPPs through a VSB.

The concept of accreditation/authorisation/delegation to the private sector was not considered possible in many countries because no, or only very limited, private sector expertise existed. The problems faced by the private sector in competing with subsidised government services were identified as limiting its development and the ability to out-source official tasks. In specific countries, some delegation and authorisation was taking place particularly for meat inspection, to support disease control and vaccination programmes and for some aspects of animal health certification. In countries with a private veterinary sector, it was recommended that the VS consider a stronger partnership with private veterinarians as a source of surveillance information on priority animal diseases.

3.2.1.4 FC4 – Access to Markets

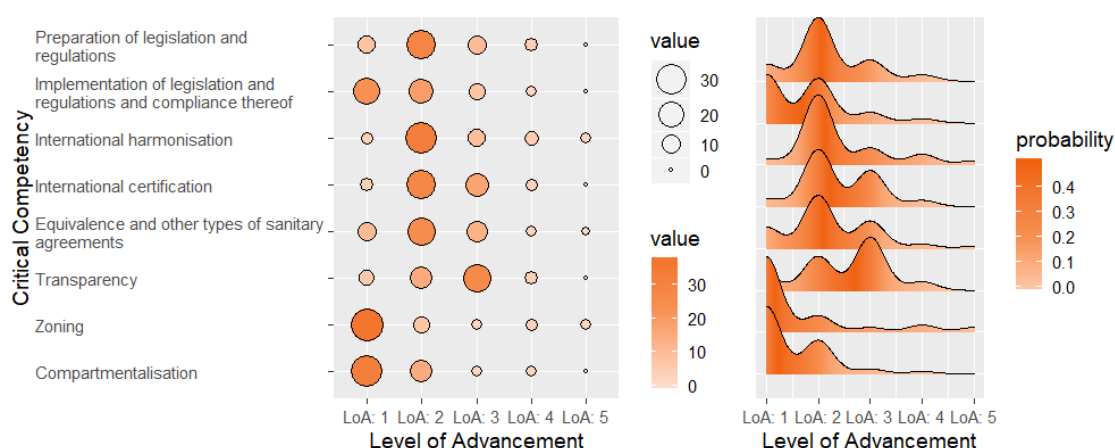


Figure 13. Balloon plot and ridge plots showing distributions of the LoA scores for FC4 (Access to Markets). The size and shading of the balloon plots are proportional to the number of outcomes per LoA score.

Apart from the CC on ‘Traceability’ being moved from FC4 to FC2 in the 5th edition, this FC had remained stable over time and therefore comparable.

Legislation

Legislation was seen as a critical cornerstone of an effective VS and is required to comply with established international standards. The CCs covering legislation had undergone only minimal changes as the PVS Tool evolved with a more significant change being introduced in the latest 7th edition (2019). In recognition of the importance of veterinary legislation and its poor state in many countries, OIE developed its Veterinary Legislation Support Programme (VLSP), a

component of the PVS Pathway – a review of the VLSP reports made available for this review is included in Section 3.3.

Considering the PVS Evaluation reports, the baseline assessment of veterinary legislation, its harmonisation with international standards and its enforcement, countries varied widely with assessments commonly varying from level 1 to level 3; four countries were assessed at level 4. Overall, the authority and capability of the VS to actively participate in the preparation of national legislation and regulations in domains under their mandate was limited.

In most countries the VS had some authority and capability to develop national legislation but the legislation had often been developed with little recognition of external factors such as conflict/overlap with other laws and regulations, insufficient consultation with interested parties and a lack of practicality and ability to enforce the law.

Not uncommonly, legislation was outdated and in need of revision to better comply with international standards. Often new laws had been drafted, sometimes many years previously, but had stalled in the review and approval process. Common major gaps in veterinary legislation included such critical areas as the licensing and control of veterinarians and VPPs, the management and implementation of animal health programmes, meat inspection, and the control of prescription drugs and monitoring for drug residues. Secondary legislation and/or enabling regulations was frequently limited or missing.

More developed and export orientated countries tended to have more comprehensive legislation with higher levels of compliance with international standards. Seven countries were assessed at level 4 or 5 for international harmonisation.

The PVS Evaluations assessed compliance with VS legislation and regulations as varying considerably by country. Only two countries had effective compliance programmes, and the majority had limited enforcement activities, though they did have the legal mandate. There was generally a poor level of reporting of enforcement activities and of non-compliance making specific assessment difficult. It was stated that often decisions and regulations were not being implemented due to a lack of staff and resources. Sometimes it was found that regulations were not technically sound or realistic and so the VS could not take further action. To complicate enforcement further it was also found that some legislation was not under the responsibility of the VS and, therefore, the VS had no power for its implementation e.g. slaughterhouses or imported animal products.

Trade

As might be expected, countries with significant export markets consistently had higher LoAs for the CCs that focused on international trade.

International certification varied from level 1 to level 4. Four small, non-exporting countries had no capability to certify animals or animal products, whereas 20 other countries had established certification programmes for certain animals and three more developed countries had well established certification programmes with guidelines and SOPs. One weakness commonly cited was that weak surveillance programmes compromised the ability to certify animals or animal products with any confidence. Sometimes, reference was made to the need for updated legislation to support international animal health certification.

Most countries had some authority to negotiate equivalence or other sanitary agreements, but the actual development of such agreements varied with many countries having no formal agreements whereas other countries varied from a few to multiple agreements.

Transparency with the authority and capability to notify OIE, other international agencies and trading partners varied widely across the PVS Evaluations. Developed, exporting countries achieved high LoAs, other countries were highly variable with some notifying but only occasionally or inconsistently with established procedures. Only a few countries ‘rarely or never’ provided notifications of changes of animal health status.

Disease-free zones had been an important component of developing safe trade in animals and animal products from a number of leading export countries in southern Africa. Such disease-free zones had been officially recognised by the OIE and trading partners such as the EU. Disease-free zoning had been implemented variously for a number of diseases including FMD, CBPP, ASF and AHS. Disease breakdowns have occurred and had usually been appropriately addressed with a prompt return to disease-free status. In some countries disease breakdowns had resulted in a loss of status and the return to disease-free status was still pending.

In one country, compartmentalisation had been successfully implemented for PRRS, FMD, ASF and CSF in pigs and this had been recognised by some trading partners. Compartments had also been implemented for poultry and notifiable avian influenza, and were being further considered for ostriches in this country.

In more than 65% of the countries, disease-free zones and compartments had either not been assessed, as this approach was not considered relevant, or were assessed at level 1, that is the VS did not have the ability to establish such entities. As indicated in Section 2.2, all ‘Zoning’ and ‘Compartmentalisation’ that were ‘not assessed’, were assigned a score of level 1, explaining the proportion of level 1 in Figure 13 for these CCs.

3.2.2 Variation in scoring of CCs between regions

The previous Figures show distribution of the data per CC but do not reflect any geographic or regional variability. To show regional variability, the regions recognised by the AU were used to aggregate the LoA data (Figure 14).

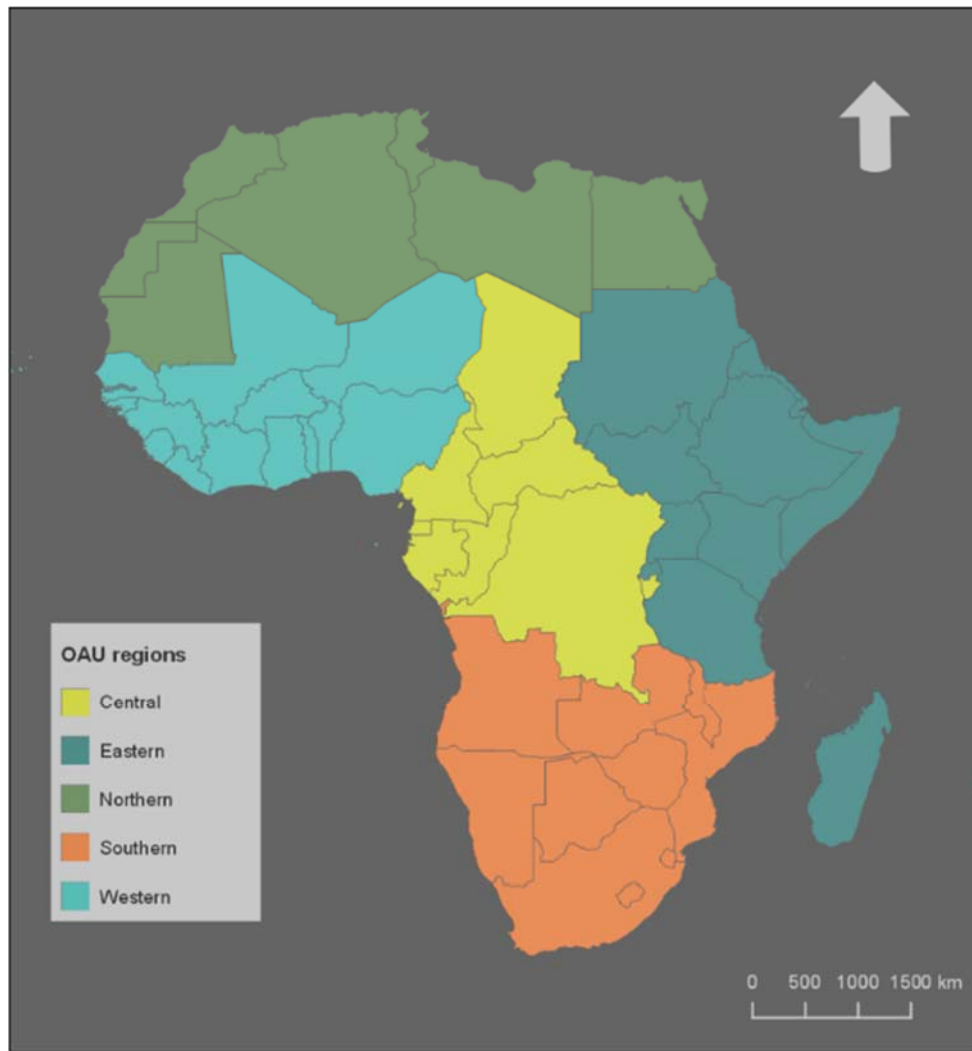


Figure 14. Regional divisions recognised by the AU.

The mean LoA score for the PVS Evaluation for the countries in each region, for each CC classified by the four FCs, is represented graphically (Figures 15 to 18). Note that the regional averages were influenced by the number of countries for which the LoAs were scored – that is the completion rate of each CC, as presented in Table 3 – which in turn was influenced by the edition of the PVS Tool.

It can be seen from Figures 15, 16, 17 and 18 that VS in the southern and northern regions of Africa were assessed at a higher mean LoA across all the FCs. The VS in central African countries performed least well, and western and eastern countries were more mixed. It is noted that the VS of the northern Africa countries were assessed at the highest level for the CC ‘Stability of the structures and sustainability of policies’ at the time of the assessment which was before 2010 and the ‘Arab spring’.

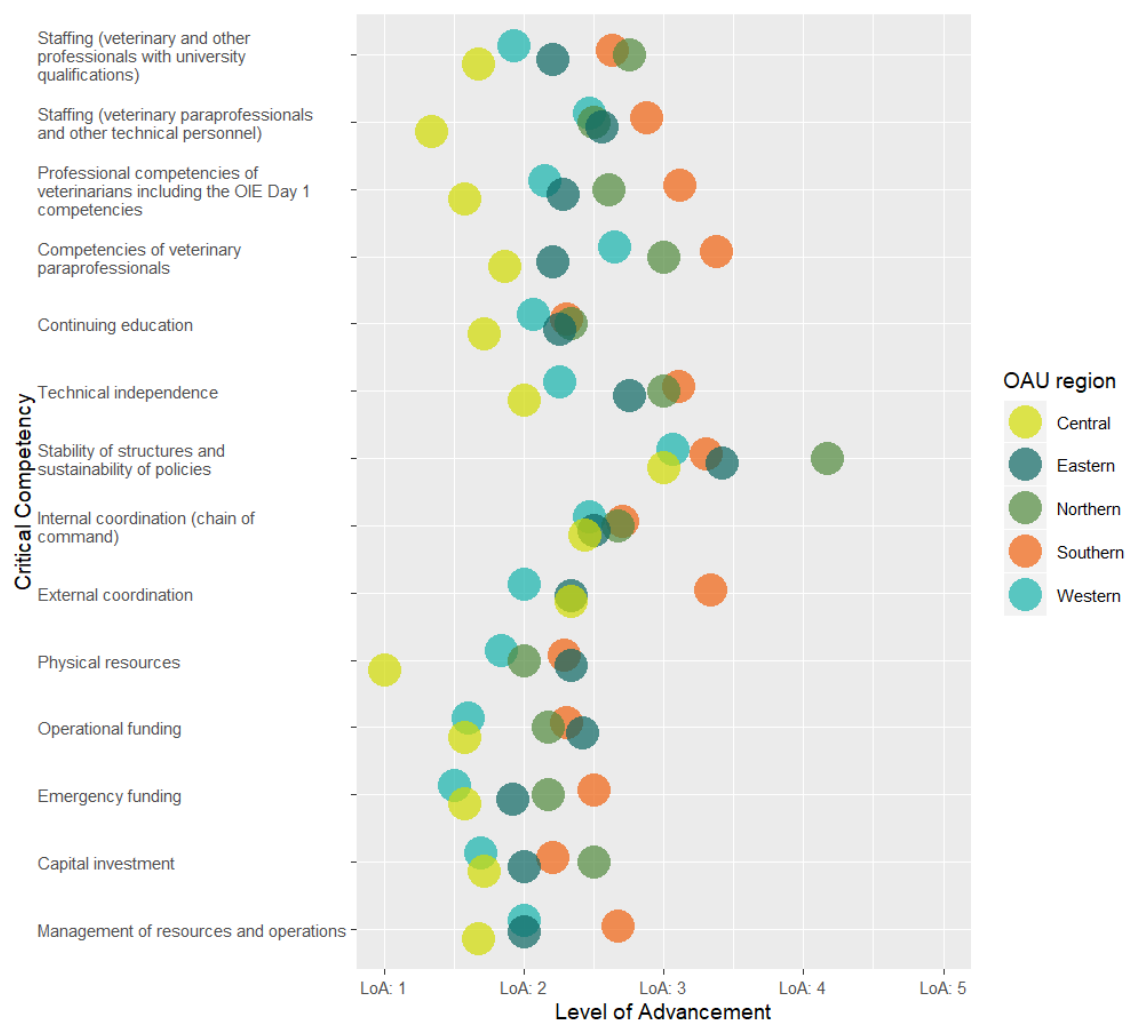


Figure 15. Regional mean LoA scores for CCs of FC1.



Figure 16. Regional mean LoA scores for CCs of FC2.

Some of the information shown in the Figure 16 must be treated with caution taking into account data from Table 3. For example, the CC ‘Suitability of the national laboratory system’ was assessed as a level 5, but only one southern African country was assessed for this CC which gives the impression that the regional average for all of southern Africa is a level 5, which is unlikely to be the case. A similar observation can be made for the CC ‘Regulation, authorisation and inspection of establishments for production, processing and distribution of food of animal origin’.

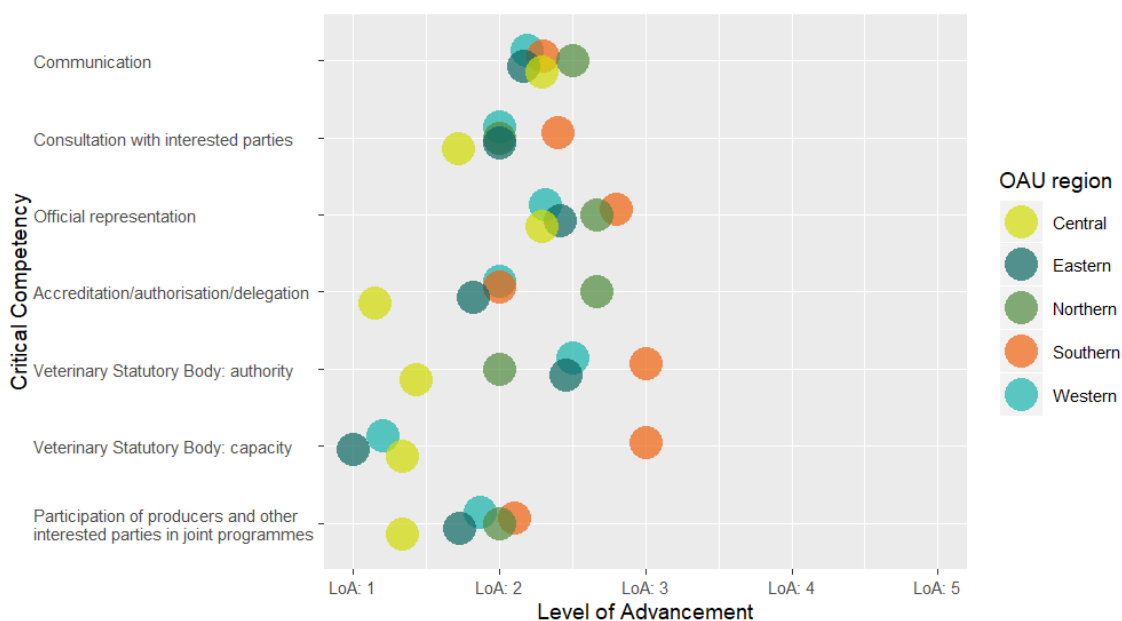


Figure 17. Regional mean LoA scores for CCs of FC3.

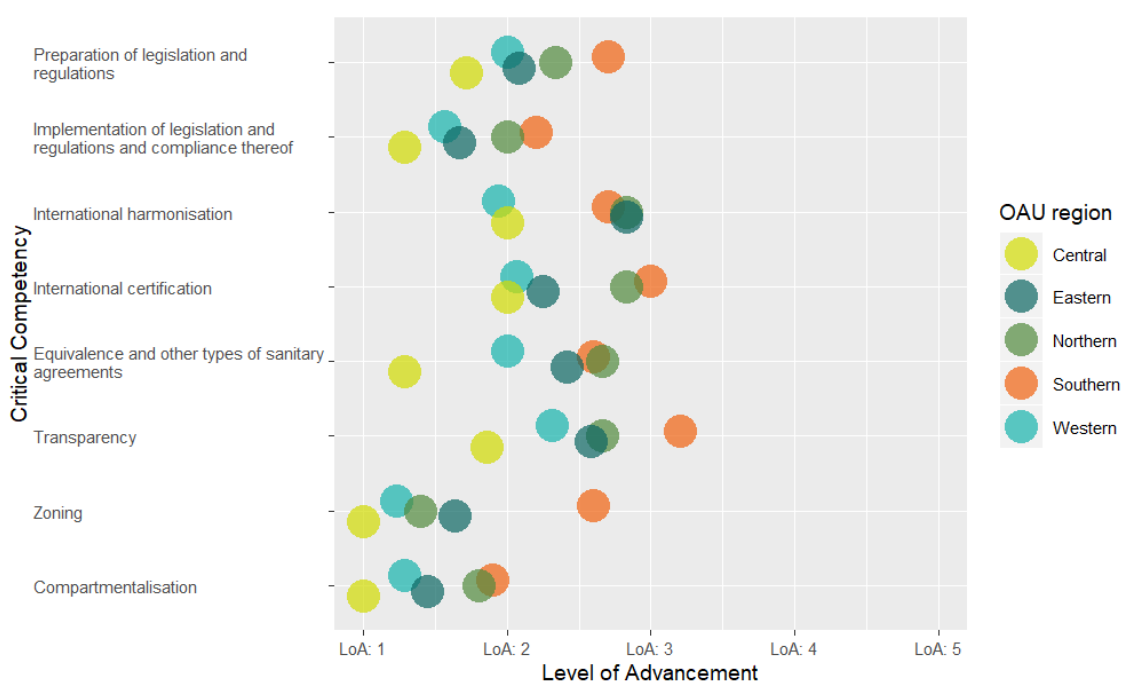


Figure 18. Regional mean LoA scores for CCs of FC4.

3.2.3 Aggregating data to FC level

The data can be aggregated from individual CC level (as in the above Figures) to FC level, with the mean LoA being taken as a summary measure of performance. These are shown at the country level in Figure 19.

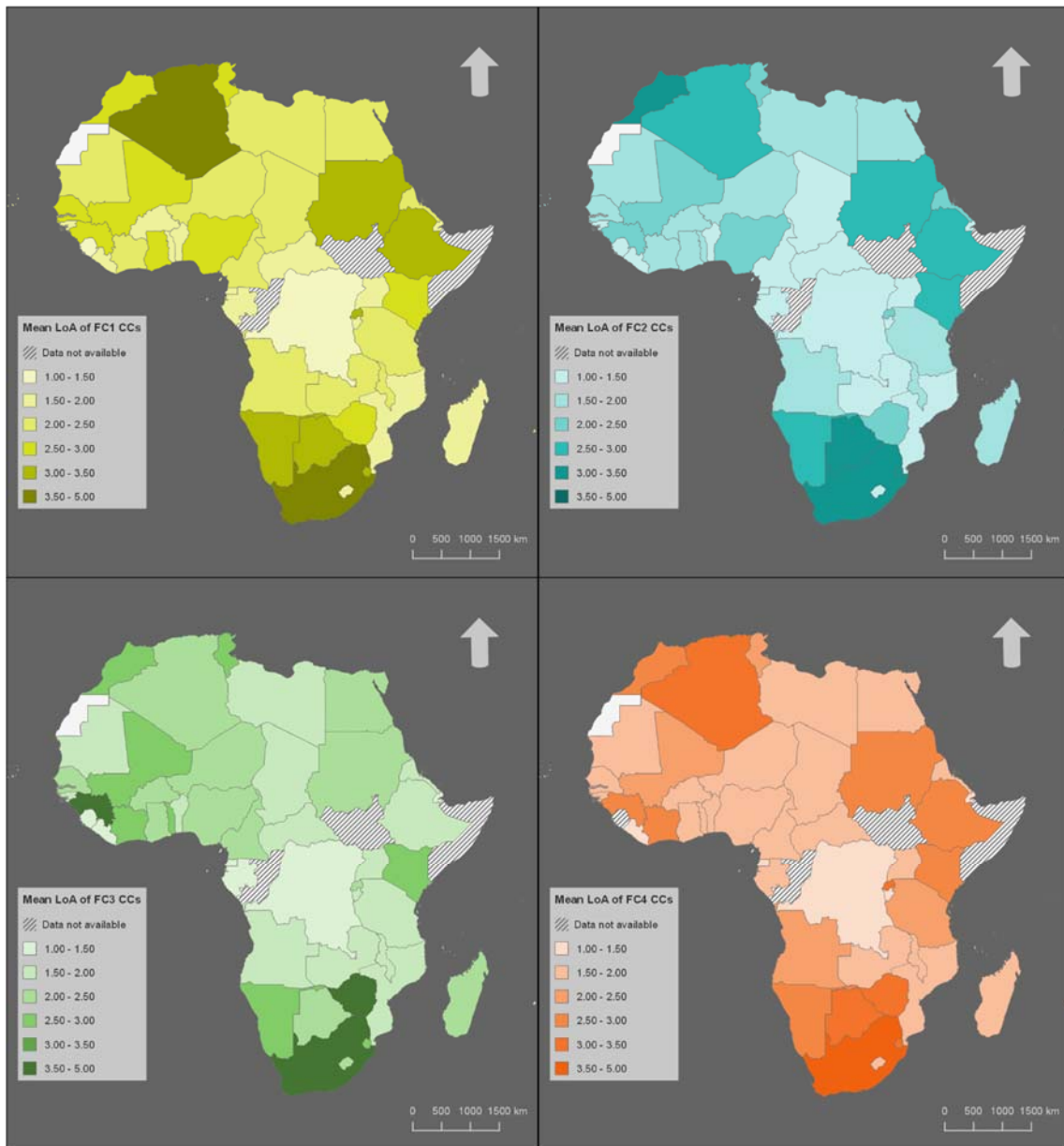


Figure 19. Choropleth map showing the mean LoA scores for the CCs, stratified by the four FCs.

The data can be further aggregated to a single, mean LoA score for each country. This is a crude proxy for the overall performance of the national VS. Figure 20 shows the results for the countries, stratified into the AU regions to highlight regional differences.

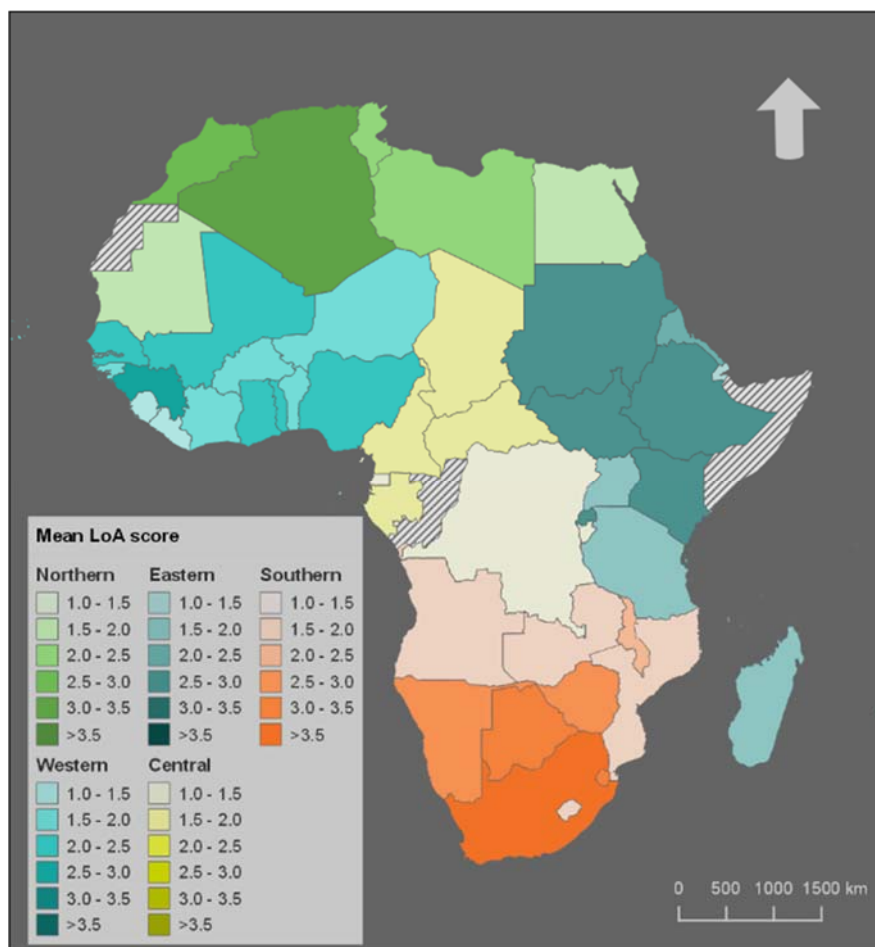


Figure 20. Choropleth map showing the national mean LoA, where countries have been stratified by AU region.

Aggregating all the data across the continent, Figure 21 shows the national mean LoA scores of member states.

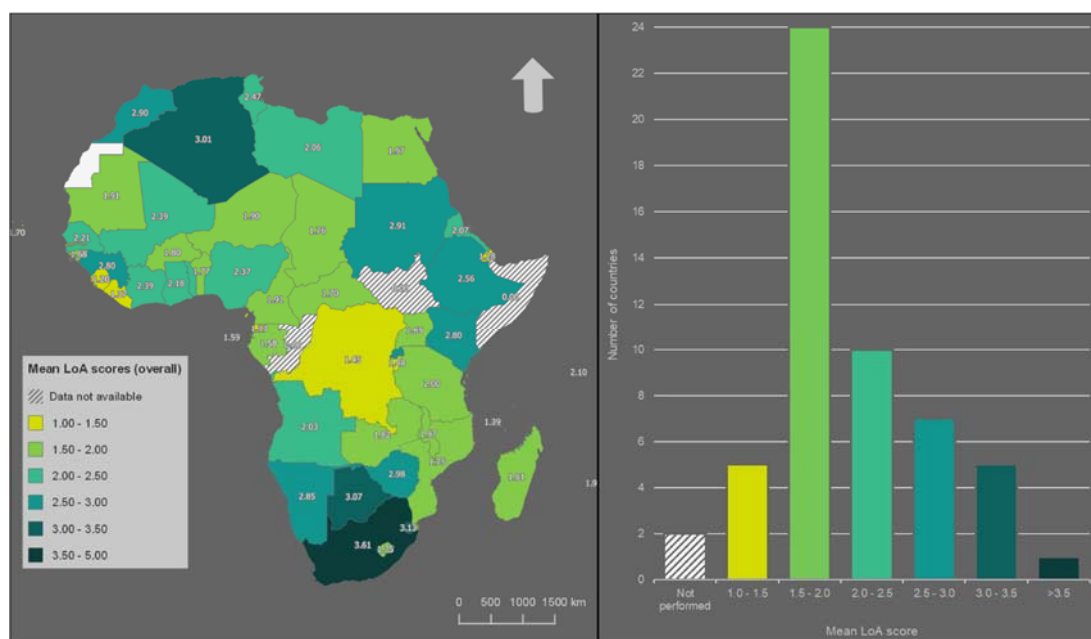


Figure 21. Choropleth map and histogram showing the national mean LoA for all CCs.

Figure 21 confirms the observation made in section 3.2.2, showing that countries with highest mean LoAs are located either in the southern part or the northern part of Africa.

3.2.3 Association of national mean LoA score with external indicator data

The national mean LoA score from the PVS Evaluations of each country was plotted against three numerical indicators: HDI, GNI per capita and agriculture, forestry and fishing as a percentage of GDP. In addition, the association with the categorical indicator of national income group (as classified by the World Bank) was examined. The indicator data were used for the year in which the evaluations were carried out.

The results are shown in Figure 22. For the scatterplots, linear models were fitted, where the outcome was the national mean LoA and the predictor was the variable of interest. The regression coefficients (R), which represent the slope of the line of best fit, were positive for the HDI and GNI per capita, but was negative for agricultural production as a percentage of GDP. None of the associations was strong, although those with HDI and agricultural production as a percentage of GDP were statistically significant (0.014 and 0.047 respectively). The differences in the distributions of LoAs for the countries categorised into the World Bank income groups (as shown by the boxplots) were not statistically significant.

As the number of PVS Evaluation Follow-Up reports was limited, investigating associations between the assessed changes in the LoAs between PVS Evaluation and PVS Evaluation Follow-Up, and corresponding changes over the same period for these external indicators, was not statistically meaningful. However, if a larger number of reports were available, such analysis would be interesting.

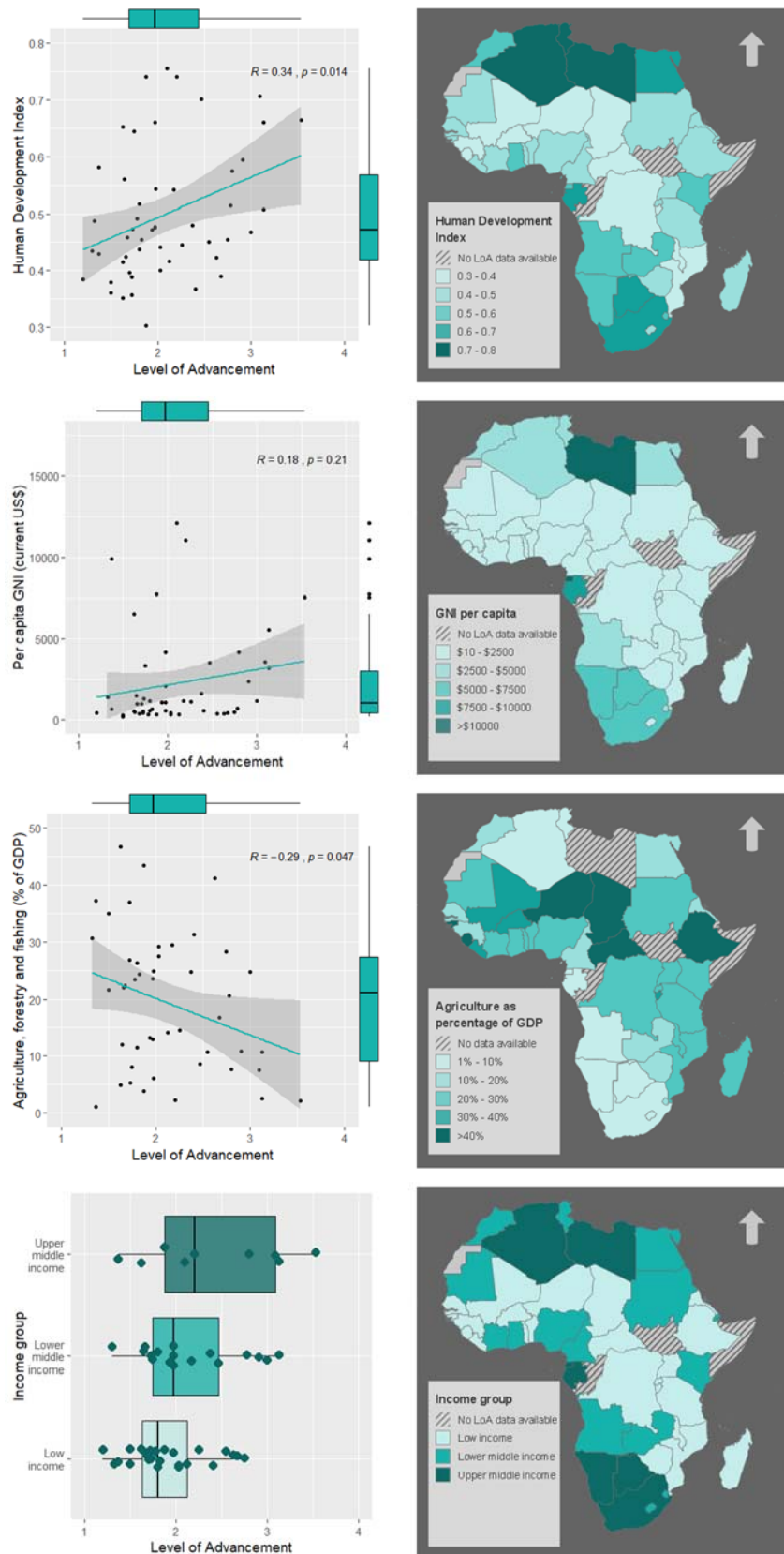


Figure 22. Associations between national mean LoA score and external indicators.

3.3 Strategic planning and Veterinary Services development: PVS Gap Analysis reports

The PVS Gap Analysis reports provide information on the progress that country VS have targeted to make in the following five years as facilitated by the PVS Gap Analysis missions.

The process of the PVS Gap Analysis missions is to establish national priorities and then to work through the PVS Evaluation results using a participatory approach and target LoAs to be reached for each relevant CC. It was noted that, for several countries, the ‘current LoA’ used in the PVS Gap Analysis was different from that of the PVS Evaluation; this lack of consistency in establishing a baseline resulted in some of these countries having a ‘negative’ for improvement in some CCs.

There were 47 PVS Gap Analysis reports made available, two PVS Gap Analysis reports were unavailable as they were classified as confidential. In total, 46 countries had received a PVS Gap analysis mission (one country had had two PVS Gap Analysis missions).

The national priorities established were generally common to all countries; some applied to only a few countries or were unique. In overview:

- Trade/Livestock Development – all countries wanted to increase livestock production. Many countries were seeking to increase their exports of livestock and animal products, to increase their food security and to increase production efficiency. A number of countries also identified the need to increase compliance with regional and/or OIE standards. Smallholders and herders were identified as being a priority by a number of countries.
- Veterinary Public Health – the majority of countries identified the need to improve food safety and the control of zoonoses generally with improved management of animal slaughter and food hygiene. Improving the control of veterinary medicines and biologicals was also identified as a priority in many countries.
- Animal Health – all countries identified the prevention and control of TADs as a national priority. Many countries identified the need for better emergency preparedness and response as a national priority and several countries identified the need to control priority endemic diseases more effectively.
- Laboratories – the main priorities for almost all countries was to make greater use of laboratory diagnosis, to improve their laboratory infrastructure and its maintenance, and to start to establish formal laboratory quality assurance programmes.
- Management of Veterinary Services – priorities were more varied. The majority of countries identified the need for an improvement in their chain of command with a modified organisation for the delivery of VS often proposed. Updating veterinary legislation was highlighted by several countries as a priority. (See also the review of the VLSP reports, Section 3.3). Other national priorities included improved delivery of field services, better communications, better human resources, the need to establish an effective VSB, the requirement for better database/information systems, to improve public private engagement and partnerships and for better risk analysis.

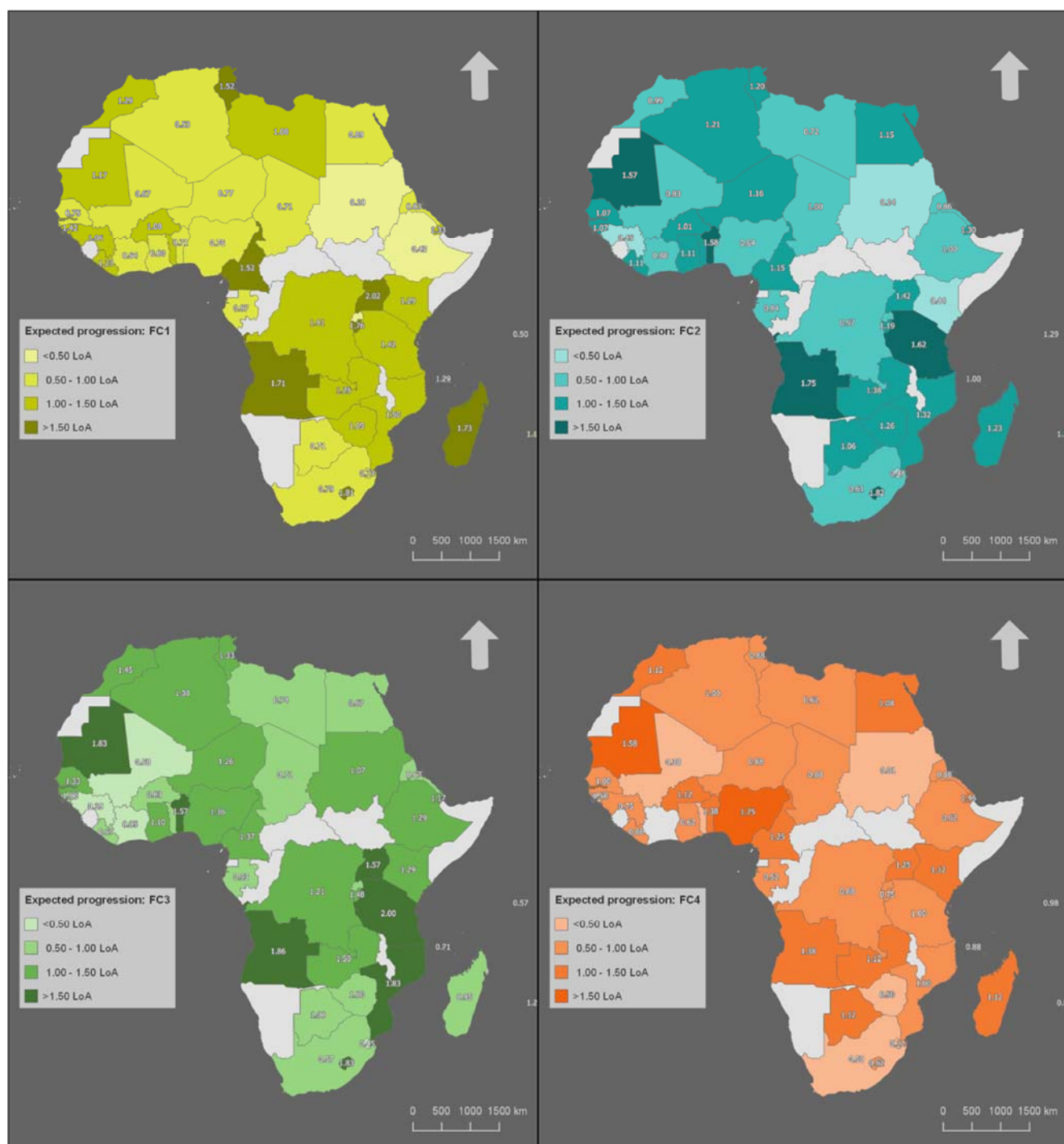


Figure 23. Expected progression of African VS based on the PVS Gap Analysis reports, stratified by FC. The numbers are averaged LoA scores.

Table 4. CC-level differences between expected and assessed LoA scores from Gap Analysis reports.

CC	Description	Mean LoA		Difference
		Evaluation	Gap	
1.01	Staffing (veterinary and other professionals with university qualifications)	2.30	3.41	1.11
1.02	Staffing (veterinary paraprofessionals and other technical personnel)	2.60	3.63	1.03
1.03	Professional competencies of veterinarians including the OIE Day 1 competencies	2.47	3.36	0.90
1.04	Competencies of veterinary paraprofessionals	2.57	3.37	0.80
1.05	Continuing education	2.14	3.41	1.27
1.06	Technical independence	2.66	3.27	0.61
1.07	Stability of structures and sustainability of policies	3.05	4.02	0.98
1.08	Internal coordination (chain of command)	2.53	3.84	1.31
1.09	External coordination	2.78	3.37	0.59
1.10	Physical resources	2.11	3.46	1.35
1.11	Operational funding	2.07	3.37	1.30
1.12	Emergency funding	2.00	3.17	1.17
1.13	Capital investment	2.00	3.21	1.21
1.14	Management of resources and operations	2.22	3.23	1.00
2.01	Access to veterinary laboratory diagnosis	2.50	3.57	1.07
2.02	Suitability of national laboratory infrastructures	3.00	3.71	0.71
2.03	Laboratory quality assurance	1.65	2.81	1.16
2.04	Risk analysis	1.61	2.84	1.23
2.05	Quarantine and border security	2.18	3.16	0.98
2.06	Passive epidemiological surveillance	2.37	3.41	1.04
2.07	Active epidemiological surveillance	2.41	3.43	1.02
2.08	Emergency preparedness and response	2.20	3.70	1.50
2.09	Disease prevention, control and eradication	2.07	3.19	1.12
2.10	Regulation, authorisation and inspection of establishments for production, processing and distribution of food of animal origin	1.75	2.83	1.08
2.11	Ante- and post mortem inspection at abattoirs and associated premises	1.75	3.10	1.35
2.12	Inspection of collection, processing and distribution of products of animal origin	1.45	2.67	1.21
2.13	Veterinary medicines and biologicals	1.82	2.95	1.14
2.14	Residue testing	1.41	2.58	1.17
2.15	Animal feed safety	1.58	2.48	0.91
2.16	Technical innovation	1.21	2.14	0.93
2.18	Animal identification and movement control	1.74	2.72	0.98
2.19	Identification and traceability of products of animal origin	1.65	2.43	0.78
2.20	Animal welfare	1.56	2.32	0.77
3.01	Communication	2.27	3.80	1.52
3.02	Consultation with interested parties	2.14	3.61	1.48
3.03	Official representation	2.57	3.30	0.73
3.04	Accreditation/authorisation/delegation	2.07	3.27	1.20
3.05	Veterinary Statutory Body: authority	2.51	3.33	0.81
3.06	Veterinary Statutory Body: capacity	2.00	2.82	0.82
3.07	Participation of producers and other interested parties in joint programmes	1.90	3.07	1.16
4.01	Preparation of legislation and regulations	2.25	3.45	1.20
4.02	Implementation of legislation and regulations and compliance thereof	1.77	3.02	1.25
4.03	International harmonisation	2.55	3.41	0.86
4.04	International certification	2.43	3.28	0.85
4.05	Equivalence and other types of sanitary agreements	2.25	2.93	0.68
4.06	Transparency	2.70	3.64	0.93
4.07	Zoning	1.55	2.13	0.58
4.08	Compartmentalisation	1.50	2.08	0.58
			Mean	1.04

In the majority of countries more than 80% of CCs were targeted to increase by at least one LoA. The least targeted CCs were ‘Zoning’ and ‘Compartmentalisation’ with a mean increase in LoA of 0.58, – not surprising as these were not a priority and/or considered to be not applicable in many countries. Other less targeted CCs were ‘External coordination’ and ‘Technical independence’. The CCs targeted to have the greatest improvement in mean LoA were ‘Communications’ (1.52), ‘Emergency preparedness and response’ (1.50) and ‘Consultation with stakeholders’ (1.48). Figure 24 shows that for most countries (n = 46) with a PVS Gap Analysis an increase of at least one LoA was expected for most CCs.

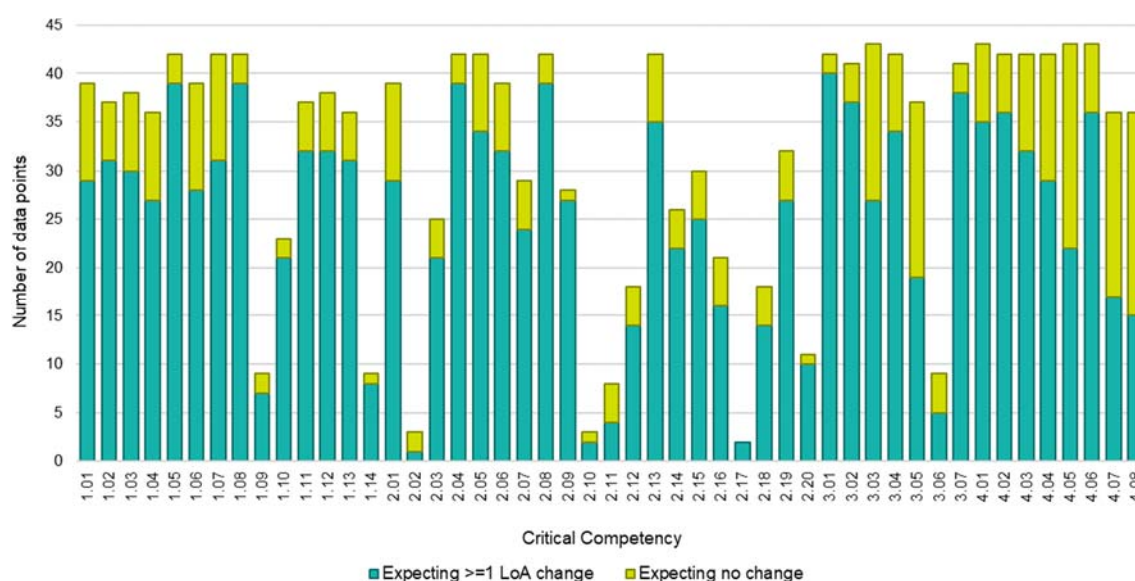


Figure 24. PVS Gap Analysis: for each CC, number of countries expressing the desire to increase their LoA by at least 1.

3.3.1 FC1 – Human, Financial and Technical Resources

Staffing

The primary strategy advocated to address professional and technical staffing issues was to review the VS staffing and organisational structures and to improve planning with better organisation and a stronger chain of command, better programme design and implementation with good quality documentation; this was to form the basis of better advocacy to senior managers and political leaders. The common problem of inadequate veterinarians in district or field offices was to be addressed by increasing the budget to allow for the recruitment of additional staff and improving staff conditions of employment. As part of the review process it was recommended that job descriptions and appointment procedures should be improved.

In almost all countries it was expected that additional veterinarians would be recruited, though in one outlier country there was considered to be an over-staffing of veterinarians.

The major task recommended for VPPs and other technical personnel was to define their roles and to improve their job descriptions and the level of veterinary supervision. In the absence of sufficient veterinarians to undertake supervision, increased training, guidelines and SOPs, communication and reporting were advocated.

Veterinary education across the continent was variable. In many countries it was recommended that additional veterinary schools should be established, or their number increased, and that they should meet the OIE Day 1 competencies. Training of VPPs was to increasingly target specified activities, such as meat hygiene and the delivery of field services.

The general expectation was that all countries would develop specific programmes for continuing education of their technical staff, and that continuing professional development would increasingly become mandatory.

Management

The PVS Gap Analysis missions identified a number of priority issues in management of the VS that needed to be addressed.

The main activity recommended to address the issue of limited Technical Independence was to document all decisions and to support decision making with better information management. The issue of low salaries was also recognised and the need for adequate salaries was to be advocated with senior managers.

To increase the stability of policies and programmes the need for strengthened organisational structures was recommended to restore the essential lines of authority, the chain of command, between the VS headquarters and regions and to better define the roles, responsibilities and accountabilities of senior officials of the VS. It was also commonly recommended that formal procedures be developed for the management, communications, monitoring and reporting of programmes. In some countries the PVS Gap Analysis also identified that policies were actually too stable with no reviews or evaluation taking place and no opportunity being provided for improvement.

The problem of service delivery to remote areas was a major issue in some countries and this was to be addressed by greater resources and improved information management.

Many countries had informal coordination mechanisms in place with their ministries of health and some other relevant agencies such as customs and the police however coordination was considered poor and it was commonly recommended that formal external coordination mechanisms should be established.

Resources

A major problem in the funding levels proposed in the PVS Gap Analysis was that many countries were funding their VS through a decentralised process at province/state levels and it was not possible to obtain overall, consolidated funding. A further complication is that the organisational structure and the role of other Competent Authorities for the delivery of animal health, animal production and veterinary public health varied – it was generally not possible to identify a budget specifically for all veterinary activities. In addition, in some countries, salaries were provided as part of core government funding and were not separated out as part of the costs of providing VS. Given these issues, no detailed assessment of budgets and funding of the VS has been undertaken by this review.

Notwithstanding the problems faced there was a common requirement to improve funding for VS operations and to improve physical resources. Suggestions as to how to address the low levels of funding varied from the retention of fees charged, increased reliance on the private sector and the need to provide the necessary legal mandate. Emergency funding particularly was seen to need improved legislation with better definition of access to funding with SOPs, and the development of policies and the mechanisms for paying compensation. A few countries also identified the need to move to multi-year budgets and funding in order to develop more sustainable policies and programmes.

The assessment of the physical resources available to the VS indicated a wide variation. Predictably the more developed countries had better physical resources whereas the less developed countries had poorer physical resources particularly at district and field levels, though often also at central and state/province levels. The main strategy to improving physical resources was to increase advocacy of the VS and the benefit from animal health programmes and so to increase central funding. Specific needs varied by country but most countries needed new or refurbished buildings, improvement to border inspection posts and quarantine stations, increased transport (both cars and motorbikes), better phone and computer systems and to establish maintenance programmes for buildings, transport and equipment. There was a recognised need to improve asset management with establishment of an inventory of assets with maintenance and replacement schedules; several countries identified the need to develop a resources management database.

3.3.2 FC2 – Technical Authority and Capability

Laboratories

The need for a full review of laboratory diagnostic services was identified in a number of countries. Some countries had large numbers of laboratories but these had insufficient capabilities and were little used. In some reports a sound logic was advocated in developing fewer more competent laboratories and using these costly facilities more efficiently and maximising sample throughput.

The critical limitation of the lack of samples being collected in the field from the passive and active surveillance programmes and also from the limited activities in implementing food safety and veterinary public health programmes were to be addressed by strengthening surveillance and food safety programmes and investing in laboratory infrastructure, improving operating budgets and increasing staff training. In many countries it was proposed that basic quality management systems be implemented with some countries expecting some laboratories to progress to formal accreditation.

Risk analysis and border control

A number of countries recognised the need to develop their use of risk analysis both to support the import of animals and animal products through the development of an 'Import Risk Analysis' programme, and to improve the efficiency and effectiveness of programme delivery by using risk analysis to more efficiently use finite resources. Many countries proposed to train staff and to establish risk analysis units. Further issues identified were the need for better data management and the establishment of information management systems and to focus their efforts on high priority issues.

Almost all countries identified the need to prevent the entry of TADs and so improving their quarantine and border security was seen as a priority. Strategies to address this priority consistently focused on improving border inspection posts, including directing trade through main entry points, providing quarantine stations, improving communications and public awareness and, in a few countries, efforts were also to be made to address informal/illegal activities. A number of countries identified problems with their organisational structure and the weak chain of command between central government and the border inspection posts. This problem was to be addressed by better staff training and improved awareness, increased use of guidelines, SOPs and increased communications and reporting.

Animal health programmes

In the PVS Gap Analysis reports, animal health was identified as a key national priority of the VS and the area that had the most ‘ownership’ with strong recognition of the roles and activities required and the ability to advocate to senior managers and political leaders. All countries identified the need to prevent and control TADs and to improve emergency response. Many countries had received considerable donor support in recent years to address the threat of major epidemics, but many gaps remained.

The expectation was that in most countries the VS would be able to conduct surveillance in compliance with scientific principles and OIE standards for priority diseases with the provision of technical training and ongoing support. The greatest need identified was the requirement to strengthen field services and lines of reporting and information management.

The expectation following the implementation of OIE PVS Gap Analysis was that countries would have the necessary legal framework and the financial support to be able to respond rapidly to emergencies with developed/updated contingency plans for priority diseases. The preparation of contingency plans and the development of well-prepared, well-resourced emergency preparedness and systems was advocated.

Priority disease control programmes in Africa varied widely country by country with most countries having a number of priority control programmes – most commonly for the major TADs such as FMD, PPR, HPAI, CBPP, AHS, ASF, LSD, etc and also major endemic zoonoses such as rabies, TB and brucellosis. The levels of advancement were initially low at less than level 3 (note some countries were not assessed as this Critical Competency was defined later), following the PVS Gap Analysis the average LoA was expected to increase to above level 3. To achieve this, the major challenge identified was the VS organisational structure and the weak chain of command for the delivery of animal health services at the field level. Further common limitations to be addressed were insufficient technical and specialist skills and inadequate budget resulting in insufficient supplies of vaccine and limiting operations.

Food safety

All countries identified improving food safety as a national priority with a focus on the primary control of food borne zoonoses through effective and safe livestock production and good management of the hygiene of animal products. Food hygiene was recognised as a ‘farm to fork’ concept that must start with healthy, uncontaminated animals, through hygienic slaughter/processing/distribution to end-use. It was generally proposed to strengthen the legal mandate, with sometimes meat inspection powers being returned to the VS from some other

Competent Authority, to provide increased budget and resources, increase staff numbers and their training, and to make greater use of guidelines and SOPs with better data capture and reporting. It was noted in some countries that the high standards being applied to export slaughterhouses should be extended to the domestic slaughterhouses and processors.

Veterinary medicines and residues

The primary strategy identified by the PVS Gap Analysis missions was to strengthen control by providing a stronger legal mandate for the registration, import and manufacture (limited in most countries), distribution and use. The priority activities were to update/upgrade legislation with the necessary subsidiary regulations and to implement awareness programmes and undertake inspections.

Following on from the concerns over the abuse/overuse of antimicrobials was the issue of residues in food. Concerns were also expressed over the contamination of food with pesticides chemicals, hormones and other agents. All countries identified the need to develop/strengthen their residue testing and control programmes. This was to be achieved in various ways through feasibility studies, risk analyses, pilot studies, and broadening of activities beyond export products to domestically consumed animal products.

Animal feed safety

As a recently introduced CC, this was considered in only a few countries. Proposals were to establish a programme, introduce legislation, develop capacity and pilot activities.

Animal and animal product identification and traceability

The PVS Gap Analysis reports proposed the development of a strategy for identification and then a trial using a pilot programme for a small target population such as pure-bred cattle or more broadly for cattle in association with a disease control programme such as for FMD. Movement control was also recognised as a priority both in terms of border control but also to mitigate the risk from livestock movements within countries.

There was almost no capacity in any country for the identification and traceability of products and this was not seen as a priority; in some countries the role of the private sector was recognised and was to be promoted. It was recognised in many countries that there was a need to develop new legislation and regulations to allow the development and implementation of animal and product identification.

Animal welfare

The PVS Gap Analysis reports recognised the need to improve animal welfare and to increase their compliance with OIE standards, to protect their domestic market and to allow improved access to export markets. Countries variably committed to improving legislation, developing guidelines and programmes, and establishing an animal welfare unit and training staff.

3.3.3 FC3 – Interaction with Stakeholders

Communications, etc.

The PVS Gap Analysis reports recognised communication as a critical component of an effective VS with all countries endorsing the need for improved communications, recognising their existing weaknesses. Countries endorsed the need to set up communications units with designated trained staff and a designated budget. Some countries also identified specific target groups for communications such as the smallholders and commercial sectors of the livestock industry. Raising public and producer awareness for early detection and emergency preparedness and response was recognised as a key objective of improved communications. Increased funding and staff training was to be provided for improved communications in all countries.

All countries endorsed the need for improved consultation with stakeholders and the better development of joint programmes. This was to be achieved by the development of formal procedures for consultations, by identifying and supporting the development of farmer and producer groups, and working more closely with producers to develop joint programmes. Funding was to be provided to support improved consultation.

Though all countries participated in international meetings and conferences, the number of meetings attended varied with the priority given to OIE regional and international meetings; attendance at Codex Alimentarius meetings was more variable. Other regional meetings for disease control also received a high level of attendance. The PVS Gap Analysis reports advocated for a strengthening of official representation which was to be accomplished by improved advocacy and commitment, increased budget, better staff training and improved consultation with stakeholders. In some countries emphasis was also placed on the need for greater preparation of papers prior to meetings and better feedback following the meetings.

Management and regulation of the veterinary profession

The lack of an operational VSB with their management of professional standards, including of ethical standards and the implementation of disciplinary measures, was to be addressed by increased advocacy and lobbying to political leaders and senior managers with the drafting of additional legislation to provide the necessary mandate. With one exception, there was no regulation of VPPs with no definition of roles, standards or any registration process and this was to be addressed in some countries in the five year plan of the PVS Gap Analysis. In one country it was categorically stated that establishing an independent VSB was to be established but that it would be managed under a government agency.

A number of PVS Gap Analysis missions recommended the increased use of the private sector through authorisation, accreditation and delegation of activities to provide the necessary services most efficiently and effectively. In more developed countries the private veterinary sector was significantly more widespread and better established; the plans for these countries recommended increased use of delegation to the private sector particularly in the delivery of clinical and laboratory services.

3.3.4 FC4 – Access to Markets

Legislation

From the PVS Gap Analysis reports, strengthened legislation was recognised by all countries as a priority. Countries variously identified the limitations of their legislation and a need to develop new laws, to prepare subordinate legislation (regulations, orders, decrees, etc.) and/or to update and revise existing legislation, and so to become more compliant with OIE standards. Many countries had new legislation in draft but progress through the approval processes had frequently been delayed. Recommendations were for increased support for legislation programmes with increased consultation with stakeholders and advocacy to senior managers and politicians. The need to monitor and update legislation with international standards was also commonly recommended using the approach of 'international harmonisation'. The use of the OIE VLSP approach to strengthening veterinary legislation was strongly advocated.

Enforcement of legislation was identified as a weakness in every country and emphasis was placed on the need to develop effective compliance programmes. Such programmes should include communications and awareness campaigns, enforcement of compliance activities and regular reporting on activities and responses to non-compliance.

Trade

The PVS Gap Analysis reflected the importance of trade in setting national priorities, in the competence already achieved and the desire to ensure export markets remained open; other countries had much lower aspirations.

International certification of animals and animal products was to be improved with better information being provided by strengthened surveillance and food safety systems, and this was often to be supported by updated legislation and improved chain of command for the VS. Guidelines and SOPs were also advocated. Transparency was regarded as acceptable in most countries but recommendations were also made on the need for the timely notification of OIE and others – again emphasis was made on the need to upgrade surveillance and information management systems. Equivalence and sanitary agreements were identified as a priority in some countries with the expectation that greater consultation would take place with trading partners.

In the established exporting countries zoning and compartmentalisation were identified as priorities and the need to invest in risk analysis, improved surveillance and better animal identification and movement control recognised; increased support from the private sector was also advocated. In most other countries no recommendations were made as disease-free zoning and compartmentalisation were not seen as relevant/as a priority. A few middle ranking countries were to assess opportunities and consider establishing either disease-free zones or compartments in partnership with the larger commercial producers and processors.

3.4 Assessment of progression: PVS Evaluation Follow-Up reports

For the 18 countries for which the PVS Evaluation Follow-Up reports were available, the mean LoA scores (at the FC level) from the PVS Evaluation reports were subtracted from the mean LoA scores from the PVS Evaluation Follow-Up reports.

Table 5. Evaluated progression of VS for the 18 countries for which PVS Evaluation Follow Up reports were available, stratified by FC and overall.

Country	Year of FU mission	Difference between mean LoA score				
		FC1	FC2	FC3	FC4	Overall
Algeria	2012	-0.24	0.06	0.17	0.42	0.04
Benin	2013	-0.49	0.24	-0.14	-0.13	-0.19
Cameroon	2011	-0.09	-0.03	0.23	-0.13	-0.02
Ivory Coast	2011	0.57	0.35	0.71	-0.48	0.36
Ghana*	2016	-0.27	0.06	0.24	0.13	0.01
Guinea Bissau*	2015	0.1	-0.06	0.45	0	0.06
Kenya	2011	-0.29	-0.67	-0.14	0	-0.37
Malawi	2014	0.16	0	-0.12	0.13	0.03
Mali*	2017	-0.71	-0.44	-0.67	0.38	-0.45
Morocco	2013	0.91	0.44	0.6	0.5	0.64
Nigeria*	2018	-0.48	-0.48	0.00	0.13	-0.31
Senegal*	2016	0.19	0.33	1.12	0.11	0.36
Sudan	2013	-0.98	-1.10	-0.07	-0.88	-0.87
Swaziland	2015	-0.11	-0.33	-0.40	-0.13	-0.24
Tanzania*	2016	0.26	0.29	0.74	0.04	0.29
Togo*	2019	0.42	0.15	0.17	0.13	0.14
Tunisia	2013	0.26	0.00	0.33	0.00	0.11
Zimbabwe*	2018	0.16	0.47	-0.70	0.25	0.13
Mean		-0.04	-0.04	0.14	0.03	-0.02

Table 5 shows the progress made by the VS for the 18 countries. It is noted that 66% of countries which undertook a PVS Gap Analysis before the PVS Evaluation Follow-Up, improved their mean LoA, whereas the proportion was 50% for the countries that did not. However, this observation must be treated with caution as the number of countries in each group is low (eight and ten respectively) and, they are not necessarily representative.

Table 6. Evaluated progression of VS for the 18 countries for which PVS Evaluation Follow-Up reports were available, for each individual CC.

CC	Description	Mean LoA		Difference
		Evaluation	Follow-Up Evaluation	
1.01	Staffing (veterinary and other professionals with university qualifications)	2.59	2.44	-0.14
1.02	Staffing (veterinary paraprofessionals and other technical personnel)	3.12	2.94	-0.17
1.03	Professional competencies of veterinarians including the OIE Day 1 competencies	2.76	3.06	0.29
1.04	Competencies of veterinary paraprofessionals	3.12	2.94	-0.17
1.05	Continuing education	2.17	2.39	0.22
1.06	Technical independence	2.89	2.89	0.00
1.07	Stability of structures and sustainability of policies	3.28	3.17	-0.11
1.08	Internal coordination (chain of command)	3.00	3.06	0.06
1.09	External coordination	3.00	2.53	-0.47
1.10	Physical resources	1.86	2.06	0.20
1.11	Operational funding	2.12	2.11	-0.01
1.12	Emergency funding	2.28	2.44	0.17
1.13	Capital investment	2.22	2.33	0.11
1.14	Management of resources and operations	2.00	2.20	0.20
2.01	Access to veterinary laboratory diagnosis	3.12	2.89	-0.23
2.02	Suitability of national laboratory infrastructures		2.47	NA
2.03	Laboratory quality assurance	1.67	1.83	0.17
2.04	Risk analysis	1.78	1.89	0.11
2.05	Quarantine and border security	2.33	2.22	-0.11
2.06	Passive epidemiological surveillance	2.80	2.33	-0.47
2.07	Active epidemiological surveillance	3.00	2.17	-0.83
2.08	Emergency preparedness and response	2.44	2.78	0.33
2.09	Disease prevention, control and eradication	1.88	2.17	0.29
2.10	Regulation, authorisation and inspection of establishments for production, processing and distribution of food of animal origin		1.80	NA
2.11	Ante- and post mortem inspection at abattoirs and associated premises		1.83	NA
2.12	Inspection of collection, processing and distribution of products of animal origin	2.00	1.79	-0.21
2.13	Veterinary medicines and biologicals	1.89	2.22	0.33
2.14	Residue testing	1.67	1.56	-0.11
2.15	Animal feed safety	1.63	1.69	0.06
2.16	Technical innovation	1.31	1.60	0.29
2.18	Animal identification and movement control	1.88	1.89	0.01
2.19	Identification and traceability of products of animal origin	1.88	1.56	-0.32
2.20	Animal welfare		1.50	NA
3.01	Communication	2.44	2.82	0.38
3.02	Consultation with interested parties	2.33	2.61	0.28
3.03	Official representation	2.67	2.83	0.17
3.04	Accreditation/authorisation/delegation	2.22	2.50	0.28
3.05	Veterinary Statutory Body: authority	3.19	2.67	-0.52
3.06	Veterinary Statutory Body: capacity	2.00	2.06	0.06
3.07	Participation of producers and other interested parties in joint programmes	2.18	2.22	0.05
4.01	Preparation of legislation and regulations	2.50	2.44	-0.06
4.02	Implementation of legislation and regulations and compliance thereof	2.17	2.11	-0.06
4.03	International harmonisation	2.83	2.56	-0.28
4.04	International certification	2.61	2.56	-0.06
4.05	Equivalence and other types of sanitary agreements	2.39	2.59	0.20
4.06	Transparency	2.94	3.00	0.06

4.07	Zoning	1.50	1.50	0.00
4.08	Compartmentalisation	1.89	1.44	-0.44
				Mean
				-0.02

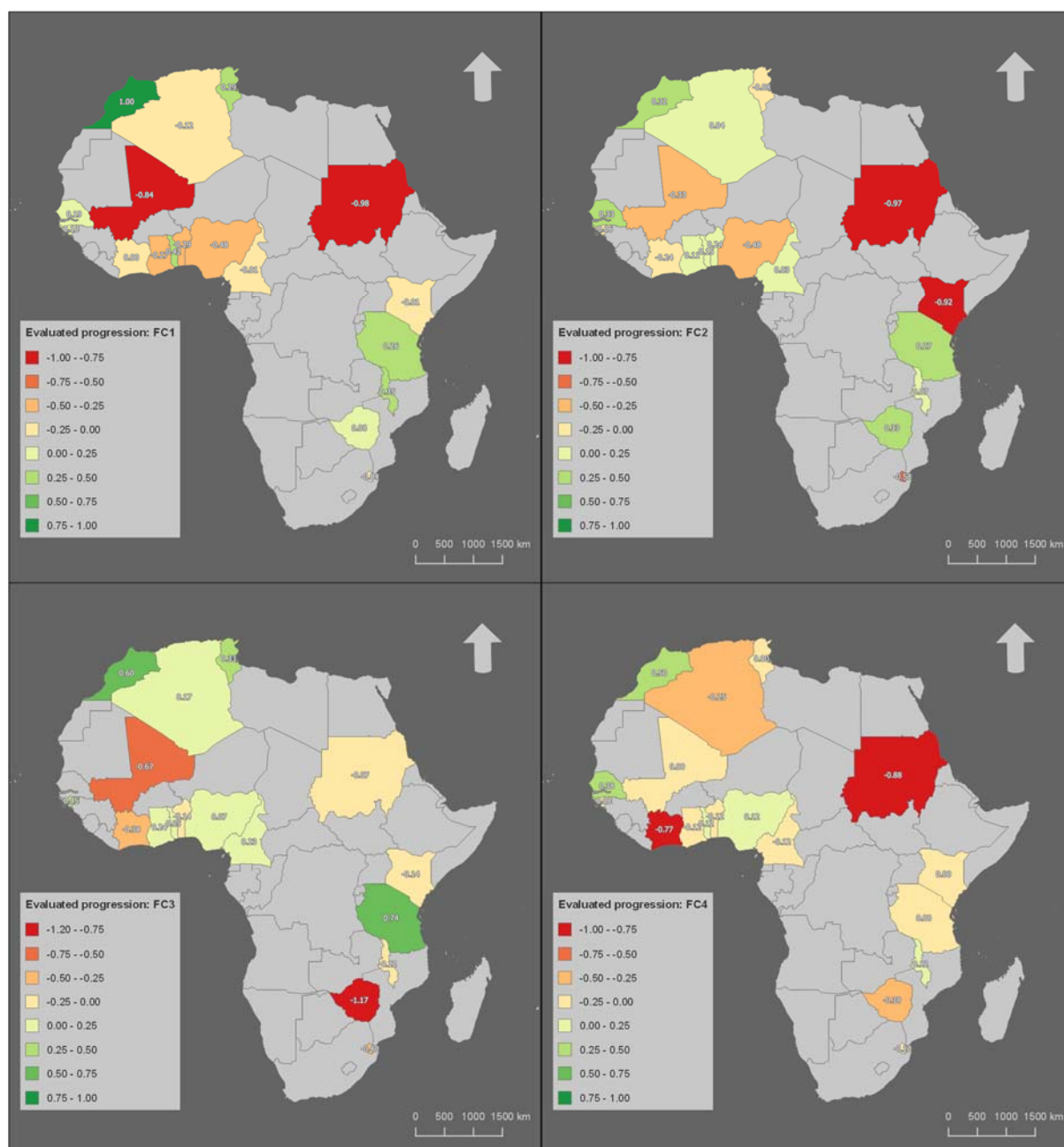


Figure 25. Evaluated progress of African VS based on the PVS Evaluation and PVS Evaluation Follow-Up reports.

In assessing the LoAs, the overall average difference in the country-level LoA score was -0.038. This suggests that the overall performance of the VS across the 18 countries was static, and with no marked improvement. At the FC level overall averages also showed little change – FC1: -0.089, FC2: -0.49, FC3: 0.85 and FC4: 0.49 (see Table 6 and Figure 25). These statistics provide a high-level summary and mask variation within countries and between CCs.

If individual countries are considered much more variation is seen. In some countries, quite dramatic improvements were seen with a gain of more than 0.6 in average LoA observed in

one country, more than 0.4 in another and over 0.3 in a third country. Conversely, some countries regressed with average LoAs falling by more than 0.25. It was noted that one country was an outlier with average LoA falling by more than 0.87 (owing to major civil unrest and political upheaval). The overall LoAs of the remaining seven countries were static ranging from -0.13 to +0.15.

Staffing

A common finding in almost every report was the limited technical staffing of the VS particularly in the delivery of field services. In comparing the PVS Evaluation Follow-Up reports with the PVS Evaluations, five countries had improved their veterinary staffing by one LoA (one country by two LoAs), another eight countries had no change for this CC, and four countries declined by one or two levels. Some changes for VPPs staffing were observed with five countries improving their VPPs staffing by one LoA (three countries improved by two LoAs) another six countries had no change for this CC, and three countries declined by one or more LoAs.

Despite notable progress in some countries, the lack of veterinary staff and supervision in the field remained an issue and was exacerbated by the lack of private practitioners in rural areas, attributed to the lack of incentives and ability to develop an adequate income.

A number of countries were still suffering from an ‘aging’ profession with many staff retiring and no succession plans being in place. One country had staffed only 16% of sanctioned veterinary positions. The deterioration in the numbers of veterinarians and VPPs continued to be attributed to freezes on government recruitment. One country had made significant progress in developing its veterinary services by enabling the development of private veterinary practice and this had benefited from a previous freeze in government recruitment, though concerns were expressed that private practice would not be sustainable owing to low income generation.

The PVS Evaluation Follow-Up assessment of improvements to veterinary competencies indicated little overall change with 50% of countries remaining at the same LoA for this CC. Four countries improved their LoA by one, and four declined by one or more LoA. Veterinary training was being strengthened with the opening of new veterinary schools and some increase in compliance with OIE Day 1 standards. The training of VPPs was also largely unchanged. More than half of the countries remained at the same LoA for the VPP competency (CC I-2B), three countries improved by one LoA and four declined by one or more LoAs.

Continuing education continued to be generally *ad hoc* and mostly provided by external agents/donors who tended to focus on their priorities, not necessarily those of the country. In 66% of countries the LoA for this CC remained unchanged. In one country the PVS Evaluation Follow-Up report indicated that a formal needs assessment and a strategic plan for continuing education for either veterinarians or VPPs had been developed. In only a few country reports was it stated that continuing professional development had been made mandatory.

In many countries in addition to veterinarians and VPPs, further categories of ‘animal health assistant’ continued to exist; these were variously referred to as diptank assistants, community-based animal health worker, animal health technicians, livestock attendants, etc. Whereas VPPs had more formal training, though generally not at the standard of the OIE standards for VPPs (graduates plus specialist training), these animal health assistants had only short course informal training of one or two weeks, or even with only on-the-job training. These staff were

government or private sector and often provided clinical services including treatment including with antimicrobials; they tended to operate independently with little or supervision by veterinarians or VPPs in more remote areas.

Management

Technical independence was assessed as being unchanged for 50% of the countries. One third of countries show improvement and in the remaining countries the LoAs declined. One country was assessed as dropping from level 5 to level 3, a very significant decline. On review it appears that the PVS Evaluation Follow-Up review in this country took a more broad-ranging approach in assessing this CC considering the engagement and delegation with the private sector and the lack of documentation for procedures being undertaken. This finding is considered an outlier caused by the different interpretations of the two missions, and cannot be attributed to a significant change in policy or management. Another country had followed up its expected improvement, following the PVS Gap Analysis mission, by improving awareness on requirements by running workshops and strengthening the chain of command.

Overall the stability of policies and programmes remained unchanged between the PVS Evaluation and PVS Evaluation Follow-Up missions, one third of the countries improved, one third declined and one third remained unchanged, though some of the reduction was an artefact caused by a reclassification of the LoAs. The main causes identified for a decline were political uncertainty, changes in administrative structure and reduced VS budgets following the effects of international and national financial problems and the reduction in national incomes, particularly this was identified as an effect in the South Africa Customs Union region. In some countries the CVO had been replaced frequently resulting in a lack of continuity. No references were made in the PVS Evaluation Follow-Up reports to the development of longer-term visions, increased strategic planning and the need for strengthened veterinary leadership.

Internal coordination mechanisms had either improved (three countries) or remained unchanged with generally a clearer and more effective national chain of command. In part this was owing to restructuring and organisation of government services and the return to more direct management of the VS; in other situations, decentralisation was creating additional coordination difficulties. In some countries a well-defined organisational network with increased feedback and information flow was supporting improved internal coordination.

The PVS Gap Analysis reports proposed a significant improvement in external coordination but this had not been achieved as assessed by the PVS Evaluation Follow-Up reports. Some strengths in external coordination were identified but overall there was a lack of formal, ongoing engagement with other Competent Authorities, particularly the health sector. Reference was also made to much of the external coordination being driven by donors.

Resources

Physical resources had not significantly changed and remained highly variable – it should be noted that the physical resources were not assessed in the first edition of the PVS Tool (2006) and so for nine countries included in this PVS Evaluation Follow-Up review, no baseline LoA on this CC was available, though some inferences could be made from the budget CCs.

Review of the CCs for physical resources and the associated CC for capital investment indicated minimal change for half the countries, improvement for two and decline for one with

countries still having limitations in many aspects including buildings, particularly at the sub-national level (offices, border posts, quarantine stations, etc.), including transport, laboratory facilities and equipment, IT/internet access and miscellaneous equipment. The countries which had been able to purchase additional transport, mostly motorbikes and also to improve their laboratories often achieved this with support from external donors. Budgets for refurbishment and renovation were generally not available/not referenced in the reports.

It was anticipated that operational funding would improve markedly in the five years following the PVS Gap Analysis missions, but this had not generally been achieved. For this CC, 59% of countries were assessed as being at the same LoA, one country had some improvement noted in the narrative but not enough to increase their LoA. Three countries improved their LoA for this CC with one country increasing from level 1 to level 4; however, no specific explanation was given in the PVS Evaluation Follow-Up report and a comparison with the previous situation could not be made as the PVS Evaluation report was not available for the review as it was classified as confidential. The LoAs for four countries declined for this CC. Overall, the mean LoA for this CC remained largely unchanged and this continued to result in limited baseline activities being undertaken particularly in the delivery of field services. In one country a significant policy change had led to increased revenue retention and this had compensated for some of the underlying budgetary pressures as the government tried to deal with the broad financial issues it was facing. In another country the problems of a decentralised governance structure had been identified with problems faced in estimating the required budget and in analysing expenditures.

The majority (66%) of countries did not change their LoA for 'Emergency response and preparedness' but two countries had made good progress in developing funding mechanisms and contingency plans for emergency response and had improved their LoA by two levels. One of these countries had suffered from a series of emergency situations and had been forced to prepare national response plans along with some disease-specific contingency plans, especially those focusing on HPAI. It was generally acknowledged that much more development in emergency preparedness with clear funding mechanisms was still required.

The CC on the management of resources and operations was only introduced in the 5th edition of the PVS Tool in 2010 so only one PVS Evaluation was available with a baseline LoA. Some countries using the PVS Gap Analysis expected high LoA levels to be achieved but this had not been borne out in subsequent PVS Evaluation Follow-Up assessments. Some countries were recognised as having improved their reporting and data capture systems but there was still little analysis or critical review being undertaken.

Laboratories

In the first edition of the PVS Tool, laboratories were only covered as one CC. Laboratory quality assurance was introduced in the 2nd edition and since the 6th edition the PVS Tool has assessed the veterinary laboratories diagnosis as two separate CCs – laboratory access and laboratory infrastructure/network. In assessing the progress in strengthening the veterinary laboratories, as determined by the PVS Evaluation Follow-Up reports, the laboratory CCs are considered together.

Overall little progress was identified in the national veterinary laboratory systems. Most countries continued to lack the necessary infrastructure to be able to conduct safe and reliable diagnostic testing – laboratory buildings were sub-standard and in need of replacement or

major refurbishment, laboratory equipment was outdated or broken, reagents were not always available, staff training was variable, and only few quality assurance programmes were in place. Where comments were made in the reports, laboratory submissions were almost invariably very low – and so the benefit of specific disease diagnosis and agent identification was unrealised. Some countries had received considerable external support and their laboratories had been provided with improved capacity and capabilities; importantly staff training and biosafety had been significantly improved. Though the need was recognised in some countries, even in the better performing countries, quality assurance programmes were not being implemented owing to funding constraints and concerns over the ‘benefit-cost’ of such programmes. Further it was commented that there was inadequate calibration and proficiency testing being undertaken.

Risk and border control

An increase in the use of risk analysis was recognised with four countries significantly improving their LoAs and three others having improvements highlighted in the narrative of their reports but not sufficient to raise them to the next LoA; half the countries did not improve their LoA for this CC. Some countries had used risk analysis in specific disease control and mitigation programmes, and a few were undertaking formal import risk analyses. However, most countries (89%) were still only achieving level 1 or level 2 – and much more use could be made on using risk analysis to focus on priority programmes and to maximise the efficient use of scarce resources.

Using the PVS Evaluation Follow-Up reports, the authority and capability of the VS to maintain border control to prevent the entry and spread of diseases and other hazards of animals and animal products remained limited in 13 countries scoring a LoA of level 1 or level 2 for this CC. Generally, the VS were able to apply some basic quarantine and border security, but these were generally not based on international standards and not on any risk analysis. One country was systematically addressing legal pathways and illegal activities. The PVS Gap Analysis in every country suggested a marked improvement was to be expected. In comparison with the baseline PVS Evaluation and the improvements proposed under the PVS Gap Analysis little change had occurred with 11 country scoring same LoA, three countries registering a decline (one country by two LoAs) and three countries showing progress.

Animal Health programmes

Overall, no significant progress was observed in the area of epidemiological surveillance with no improvement in the LoAs observed for all countries except one. It was noted that surveillance was divided into two CCs in the second edition of the PVS Tool in 2007 – only nine countries were available with PVS Evaluation and PVS Evaluation Follow-Up reports.

The capacity and capability of the VS to undertake passive surveillance, as assessed in the PVS Evaluation follow-up reports, generally remained at only a ‘basic’ level, though with one or two notable exceptions. Lack of trained staff, quality supervision on the field and operational funding contributed to limiting the capabilities of the VS to undertake effective passive surveillance. In many countries field veterinary services were delivered by VPPs or the minimally trained animal health assistants and this along with uncertain lines of reporting and the lack of easy communication, limited the quality and timeliness of surveillance information.

For the CC for ‘Active surveillance’, an improvement was only identified in one country with the other eight countries being assessed at the same LoA or declining by one or two levels. Countries had some capacity to undertake active surveillance programmes, but much was still being supported by external donors for priority TADs such as RVF and HPAI. The technical epidemiology skills to design, implement and analyse surveillance data remained limited.

Generally, ‘Emergency preparedness and response’ LoAs remained the same for 66% of the countries. Four countries registered improvements for this CC, with two countries improving by two LoAs; the LoAs in the remaining two countries declined. Of the two countries that had markedly improved their capabilities, one was attributed to the response to HPAI outbreaks and post-response reviews, through an improved chain of command and also the preparation of contingency plans and SOPs; the other country had improved owing to good veterinary and VPP staffing and staff competencies and the creation of a strong network in the field and increased capacities at national level to prepare contingency plans. It was noted that very few countries were undertaking simulation exercises in developing their emergency preparedness. Disease control programmes showed little improvement with few changes being identified. Major constraints continued to be a lack of strategic planning and little use of epidemiology and risk analysis, insufficient resources (financial and physical) to implement effective programmes, and little or no monitoring and evaluation of effectiveness.

Food safety

As the CCs that directly address food safety were variously introduced in the PVS Tool 5th or 6th editions comparative data were available for only six countries. The country PVS Gap Analysis reports proposed a mid-ranking level 3 but this level was generally not being achieved when the PVS Evaluation Follow-Up missions were undertaken. Progress was observed for two countries with additional legislation being developed, increasing registration and inspection of particularly export and major slaughterhouses and the increased use of specialist trained VPPs for meat inspection.

Veterinary drugs and residues

Almost all countries continued to have very limited authority and capability to regulate and control the import, distribution and use of veterinary medicines and biologicals though progress was noted in seven countries.

The capabilities to undertake residue testing continued to be extremely limited in most countries. Some capacity was in place for countries with major export markets, and some small scale research projects were being undertaken in a few countries. Overall, there was little change in capacity and improvement in the LoAs.

Animal feed safety

Only one PVS Evaluation Follow-Up report refers to this CC and it proposed a basic capability that had been achieved. Other countries had only developed ‘some’ basic capacity – level 1 or 2 – with limitations on enabling regulations, funding, weak laboratory support and insufficient human resources.

Animal and animal product identification and traceability

For most countries (78%) the PVS Evaluation Follow-Up assessed animal identification and movement control at level 2, that is the VS were able to identify some animals by premises or location and control some movements to deal with a specific problem. Overall it was assessed that little progress had been made in improving animal identification, traceability and movement control with only two countries registering some progress for this CC.

Most countries (62%) still had no programme and no ability to identify and trace animal products. Two countries, both more export-oriented, had developed programmes to support food safety and export certification and had been extended into the major national market suppliers. Some legislation was in place in countries, but the subsidiary regulations were often missing.

Animal welfare

Animal welfare was only introduced in the 5th edition of the PVS Tool in 2010 and only one country with a PVS Evaluation Follow-Up mission had had a baseline PVS Evaluation for this CC. In addition, many countries did not have a proposed LoA from the PVS Gap Analysis mission – the majority of those that did were expected to achieve a level 3 in which the national legislation on animal welfare covered most OIE standards, with implementation in some sectors. However, the great majority of the countries (94%) were assessed at level 1 or 2 in the PVS Evaluation Follow-Up reports with the overriding limitation being the lack of any effective public awareness and implementation programme, with few resources being provided and inadequate enforcement by officials.

Communications

In the PVS Evaluation Follow-Up reports most countries were assessed for the CC on communications as level 2 (33%) or level 3 (56%), even though almost all the PVS Gap Analysis reports (88%) targeted a level 4 or level 5. It was noted that in some countries the assessment of this CC was compromised by a lack of clear understanding and the inclusion of material that would have been better included elsewhere e.g. risk analysis and coordination with Competent Authorities. Progress had been made when compared with the PVS Evaluation assessments for eight countries particularly in the establishment of focal units for communications and the use of websites. The lack of a communications strategy was noted in a number of countries.

As for communications, high LoAs were expected for ‘Consultations with interested parties⁵’ following the PVS Gap Analysis missions. Four countries had achieved level 4, a high LoA with strong programmes of engagement with industry stakeholders in the development of new legislation and the introduction of new programmes; two countries had already reached this level during their initial PVS Evaluation. It was noted that consultations and the development of joint programmes took place more often with the larger scale commercial producers and that engagement with small holders and remote pastoralists remained a major challenge. In the PVS Gap Analysis, four countries had identified the need to improve the development of joint programmes with the private sector and had targeted an increase in LoA, however none had achieved this. The majority of countries had some base level joint programmes being implemented but these were limited by the of lack of formal mechanisms of engagement and

⁵ Consultations are considered to be a two-way process (CCIII.2), whereas communications are only one way (CCIII.1)

the availability of resources. Four countries expected to maintain their relatively high LoA and had succeeded in achieving this. Some specific progress was made in developing the joint management of diptanks as these were seen as a key tool to strengthen the connection and involvement of the smallholder livestock production sector.

The PVS Evaluation Follow-Up observed few changes in the regional and international engagement of the VS, that is in ‘Official representation’. The better resourced and more accessible countries tended to perform better with greater preparation and engagement in international forums. All countries were participating to some extent in such meetings. The main constraints identified were limited funding and staff availability.

Management of the veterinary profession

As assessed in the PVS Follow-Up missions, VSBs were operating in the majority of countries (94%) with some legal mandate though the legislation was often outdated and not fully compliant with the established OIE standards. The VSBs were not always fully autonomous or ‘independent organisations’ and so their integrity was being compromised. Some of the VSBs had authority to regulate VPPs but this was not usually operational. There were few examples of strong disciplinary programmes being implemented. Overall only limited progress had been made in strengthening the VSBs.

The authority and capability of the public sector VS to accredit/authorise/delegate official duties to the private sector showed only minor changes. Country PVS Gap Analysis reports mostly proposed that level 3 or level 4 should be achieved over the five-year timeframe of the strategic plan. On review of the PVS Evaluation Follow-Up reports five countries which had had PVS Gap Analysis missions, were assessed at level 3 and one at level 5. The main constraints to improvement were the lack of a private sector that could be delegated to and the lack of legislation and procedures to allow delegation.

Legislation

The three CCs covering legislation in the PVS Tool remained largely unchanged until the latest revision made for the 7th edition in 2019. For three countries, the PVS Evaluation Follow-Up report made available for review used the draft 7th edition and so direct comparisons cannot be made for this country.

In the PVS Gap Analysis reports, all countries identified the need to strengthen the legislation available to their VS, however the PVS Evaluation Follow-Up missions indicated that little progress had been made. One country had made significant improvement in the preparation of legislation of good ‘internal’ and ‘external’ quality, one other country experienced significant deterioration of their legislation, across all three legislation CCs but particularly in its ability to harmonise its legislation with international standards, though this finding must be tempered by a rather unrealistic assessment of level 5 in the original PVS Evaluation.

Further information on legislation is provided in the section on the VLSP reports (section 3.5).

Trade

International trade and transparency of animal health information is covered in the final five CCs of the PVS Tool. With the exception of some re-numbering, these CCs have changed little

since the first edition of the Tool. Overall the PVS Gap Analysis reports proposed moderate improvement in LoAs for these CCs for most countries. Countries for which disease-free zoning and compartmentalisation were not relevant were either not considered for improvement or predicted to remain at a low level.

As might be expected, export certification continued to be stronger in countries with significant export markets with the necessary legislation and procedures in place to certify animals and animal products in full compliance with international standards. A key weakness to be addressed was the lack of coherent animal health information systems and so the inability to reliably certify animal and animal products but little progress had been made. This observation is consistent with the limited capabilities identified for 'Animal and animal product identification and traceability'.

Though little change was observed in establishing equivalence and sanitary agreements, most countries (71%) had implemented some equivalence or sanitary agreement with trading partners for some specified selected animals or animal products. For transparency, little change was reported in the PVS Evaluation Follow-Up missions, though the PVS Gap Analysis missions had predicted an improvement across almost all countries. Again, a common problem identified was the weakness of surveillance systems and poor data handling and information management.

Disease-free zoning is a concept that has been well endorsed in the major livestock exporting countries, particularly in southern Africa, to support international trade and access to high value developed markets. In the PVS Evaluation Follow-Up reports, disease-free zoning was described in one country as being in place with 'good utilisation for disease control and eradication' and this included a step up from the PVS Evaluation with better collaboration with producers and interested parties to improve implementation and maintenance. Four countries expressed a desire to use a disease-free zoning approach and were developing legislation and identifying possible zones but no actual progress had been made. Some countries were also interested in establishing disease-free compartments but none had yet been established.

Case study A: Lower-middle income country

This lower-middle income country followed the recommended pathway of a PVS Evaluation with a PVS Gap Analysis three years later and by a PVS Evaluation Follow-Up after a further five years. In this eight-year period, the GNI per capita increased by 50%. A comparison was made between the targeted progress established during the PVS Gap Analysis and the actual progress observed during the PVS Evaluation Follow-Up. This was done using the same methodology as described in sections 2.5.1 and 2.5.2. CCs were categorised and percentages calculated for the targeted progress as follows: ‘**Progress expected**’, ‘**No change**’ (Fig 2), and for the actual progress made ‘**Significant progress**’, ‘**No change**’, ‘**Decline**’ plus a specific category ‘**Relative progress**’ for CCs in which significant efforts were highlighted by the expert team in the narrative but were insufficient to raise the CC to the next LoA. (Fig 3). Data was aggregated by FC and for the country providing four variables for analysis and comparison throughout the country PVS process. As a baseline, the mean score for each FC and for all CCs was calculated from the PVS evaluation data (Fig 1).

Fig 1: Mean scoring of each FC and the all averaged of the country calculated from the PVS Evaluation data



Fig 2: Percentage of progress expected on CCs per FC and for all CCs

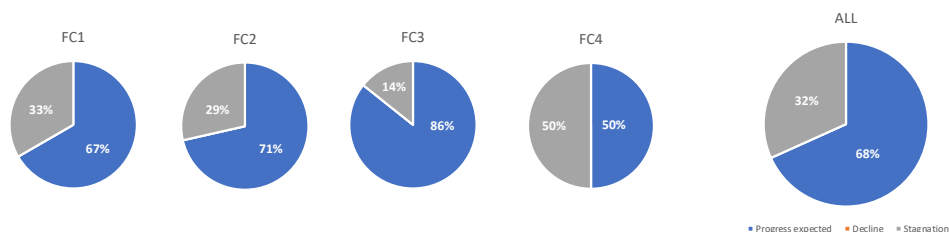


Fig 3: Percentage of progress made per FC and for all CCs

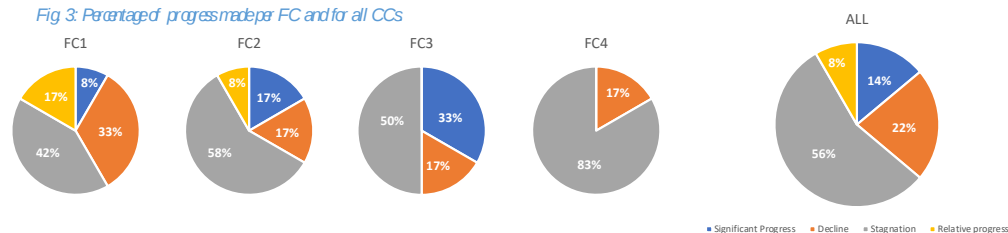


Fig 2 shows that the country aimed to improve more than 66% of its CCs with a main focus on FC2 and FC3, with FC2 being the ‘weakest’ FC as shown in Fig 1. Fig 3 shows that these targets were not achieved with 22% of CCs declining in the eight-year period, especially in FC1 in which 33% of CCs declined – specifically staff numbers (CC 1.01 and CC 1.02 which dropped from level 4 to level 2 and from level 3 to level 2 respectively). The PVS Evaluation Follow-Up mission identified the main obstacle as being a ‘severe shortage of personnel and operating funds’ which prevented the other FCs from improving. It was noted that in the time since the first PVS Evaluation, two veterinary schools had been established and veterinarians were now being trained in-country. The investment made to achieve this was very encouraging, however, the issue of shortage of personnel had not been resolved due to a government-wide freeze on recruitment. No specific economic or political issues were highlighted in the PVS reports explaining these results which appeared to be due mainly to a lack of coordination and commitment from the government.

Case study B: Lower-middle income country

This lower-middle income country also followed the recommended pathway of a PVS Evaluation with PVS Gap Analysis within two years by a PVS Evaluation Follow-Up six years later. In this eight-year period, the GNI per capita remained static. The same methodology was used as for the previous case study, as presented in Case Study A.

Fig 1: Mean scoring of each FC and the all averaged the country calculated from the PVS Evaluation data.

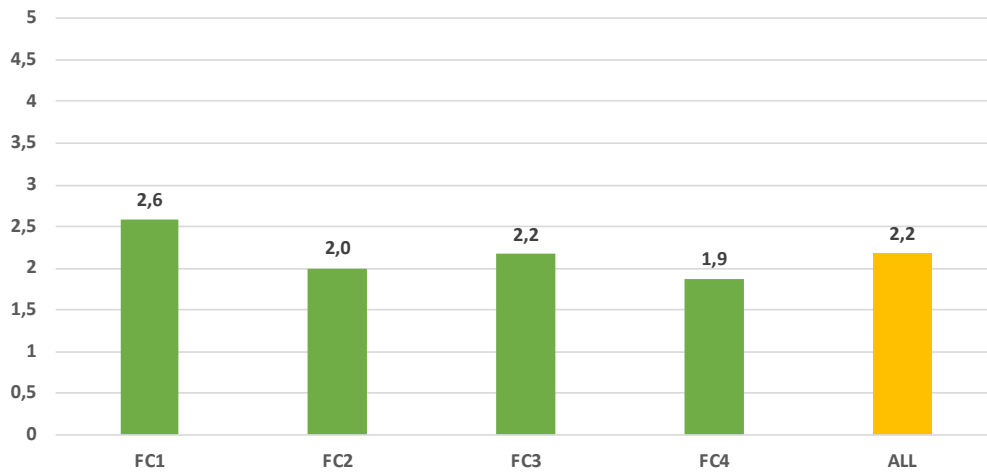


Fig 2: Percentage of progress expected on CCs per FC and for all CCs

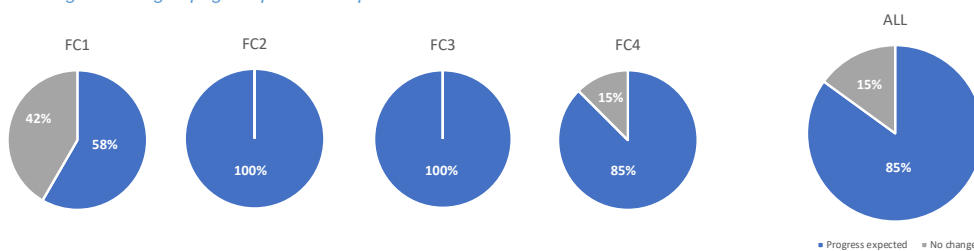


Fig 3: Percentage of progress made per FC and for all CCs

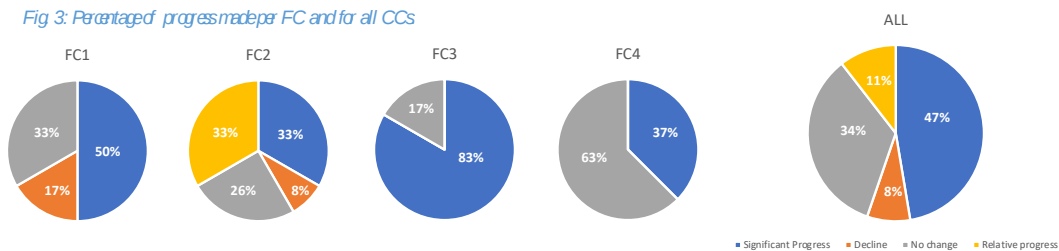


Fig 2 shows that the country set a very ambitious target, expecting 85% of the CCs to improve, including that all of the CCs in FC2 and FC3 would improve. It is noted that the mean of the CCs in FC1 is the highest of the FCs, which may explain why it was less targeted than the others. Fig 3 shows that these targets were not reached. Nevertheless, the country managed to improve 47% of its CCs by at least one LoA, and efforts were underway for a further 11% of the CCs. For FC3, 83% of the CCs improved, nearly achieving the targets set. For FC2, only 33% of the CCs significantly improved but efforts being made to improve were highlighted in the report narrative for a further 33% of CCs. Despite 8% of CCs declining, the overall result of the PVS Evaluation Follow-Up was very encouraging, with significant improvements and positive commitment by both the country VS and the government being highlighted by the PVS team. The engagement and motivation of this country to strengthen its VS capacity was reinforced by the fact that three years after the PVS Evaluation Follow-Up mission, the country engaged in a second PVS Gap Analysis mission, to revise its objectives.

Case study C: Low income country

This low-income country followed the recommended pathway of a PVS Evaluation with a PVS Gap Analysis undertaken within a year and a PVS Evaluation Follow-Up seven years later. In this seven-year period, the GNI per capita of this country increased by 60%. The same methodology was used as for the previous case studies, as in Case Study A.

Fig 1: Mean scoring of each FC and the all averaged the country calculated from the PVS Evaluation data

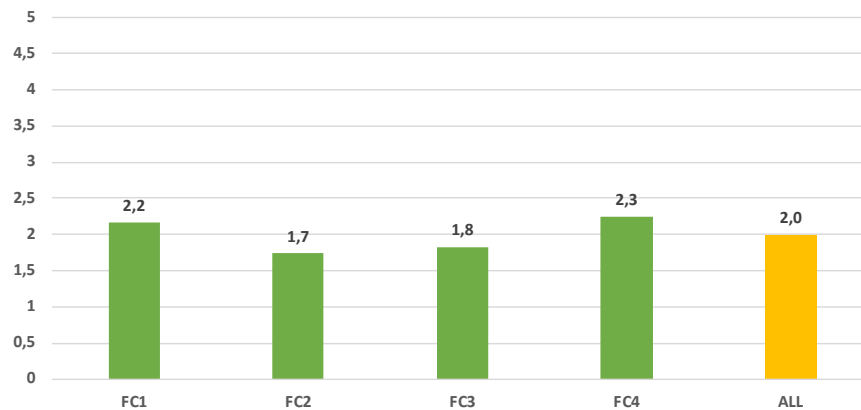


Fig 2: Percentage of progress expected on CCs per FC and for all CCs

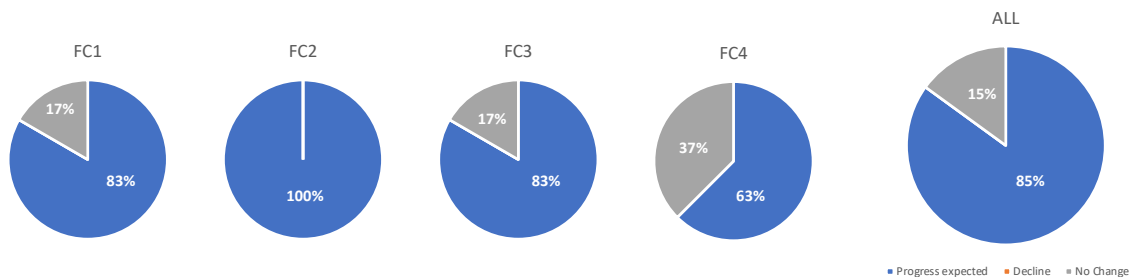


Fig 3: Percentage of progress made per FC and for all CCs

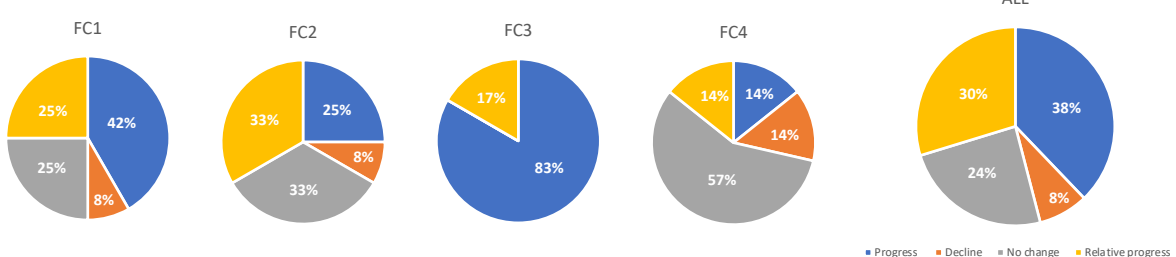


Fig 2 shows the ambitious targeted LoAs with 85% of the CCs to be improved with a strong focus on FC – FC2 being the ‘weakest’ FC as shown in Fig 1. This country was targeting, not only to improve 85% of its CCs but also to improve more than 50% of CCs by two or three LoAs.

The country did not reach its rather unrealistic targets but it did significantly improve 38% of its CCs and efforts being made were highlighted in the narrative of the reports for another 30% of the CCs. Overall, this country demonstrated a positive outcome. A very significant improvement can be seen in FC3, with 83% of CCs improving by one LoA. The key explanations highlighted by the expert team in the PVS Evaluation Follow-up report were ‘an excellent cadre of veterinarians that continues to grow in numbers and expertise’ (number of veterinarians and VPPs multiplied by 2.5), ‘new laws on animal welfare and on livestock identification, registration and traceability’ and a marked improvement in the chain of command. The creation of a national laboratory agency had also supported the strengthening of veterinary investigation centres for the implementation of animal health and food safety programmes.

3.5 Assessment of the VLSP reports

This section reviews the 25 VLSP reports that were made available; 11 VLSP reports were unavailable as they were classified as confidential and 17 countries had not participated in a VLSP mission. For three countries, the reports shared provided a quick overview only of the VLSP mission findings, that is they were not full VLSP reports. The VLSP missions started in 2008, and the majority of missions (76%) were undertaken after the PVS Evaluation and the PVS Gap Analysis missions. A few VLSP missions (14%) were undertaken the same year or before the Gap Analysis missions.

Comprehensive and effective veterinary legislation is considered to be an essential element of a functional VS and should provide the power and authority for the VS to carry out key functions in the veterinary domain to support animal health, veterinary public health including food safety and to promote the overall public good. These functions include disease prevention and control, disease surveillance with early detection and reporting of animal and zoonotic diseases, rapid response to animal disease and food safety emergencies, animal product food safety, animal welfare and the certification of animals and animal products for export.

Table 6. Percentage of categorical indicators from all VLSP reports (n=25) for which information was available, stratified by area. The same bands were used as in Table x: Low <40%; Medium 40-80%; High>80%.

Code	Area	Topic	Percentage for which information was available	
A.01	Quality of legislation	Drafting - internal	Medium	76%
A.02		Drafting - external	Medium	76%
A.03		Definitions and clarity	Medium	64%
A.04		Chain of Command	Low	20%
A.05		Competent Authorities	Medium	64%
B.01	Coverage of legislation	Secondary legislation	Medium	40%
B.02		Veterinary profession	Medium	56%
B.03		Veterinary laboratories	Low	36%
B.04		Animal production	Medium	48%
B.05		Disease surveillance and control	Medium	60%
B.06		Animal welfare	Medium	52%
B.07		Veterinary medicines and biologicals	Medium	56%
B.08		Food safety	Medium	56%
B.09		Quarantine, imports and exports	Low	36%

3.5.1 Descriptive analysis of categorical indicators

3.5.1.1 Quality of legislation

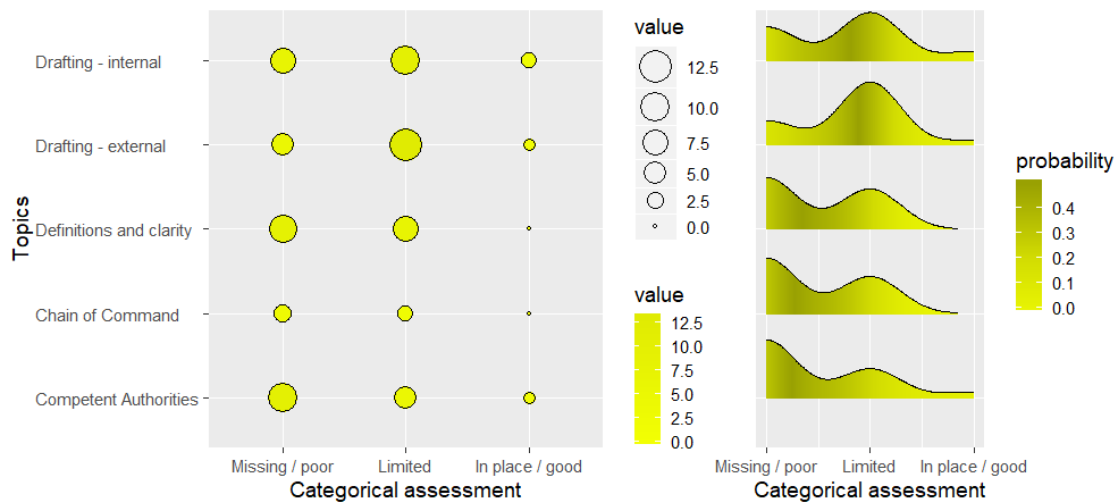


Figure 25. Balloon plot and ridge plots showing the distributions of the VLSP categorical scores for indicators related to the quality of legislation. The size and shading of the balloon plots are proportional to the number of outcomes per score. The ridge plots show the distribution, with the Area under the Curve (AUC) = 1 for each curve, and the shading proportional to the probability.

3.5.1.2 Coverage of legislation

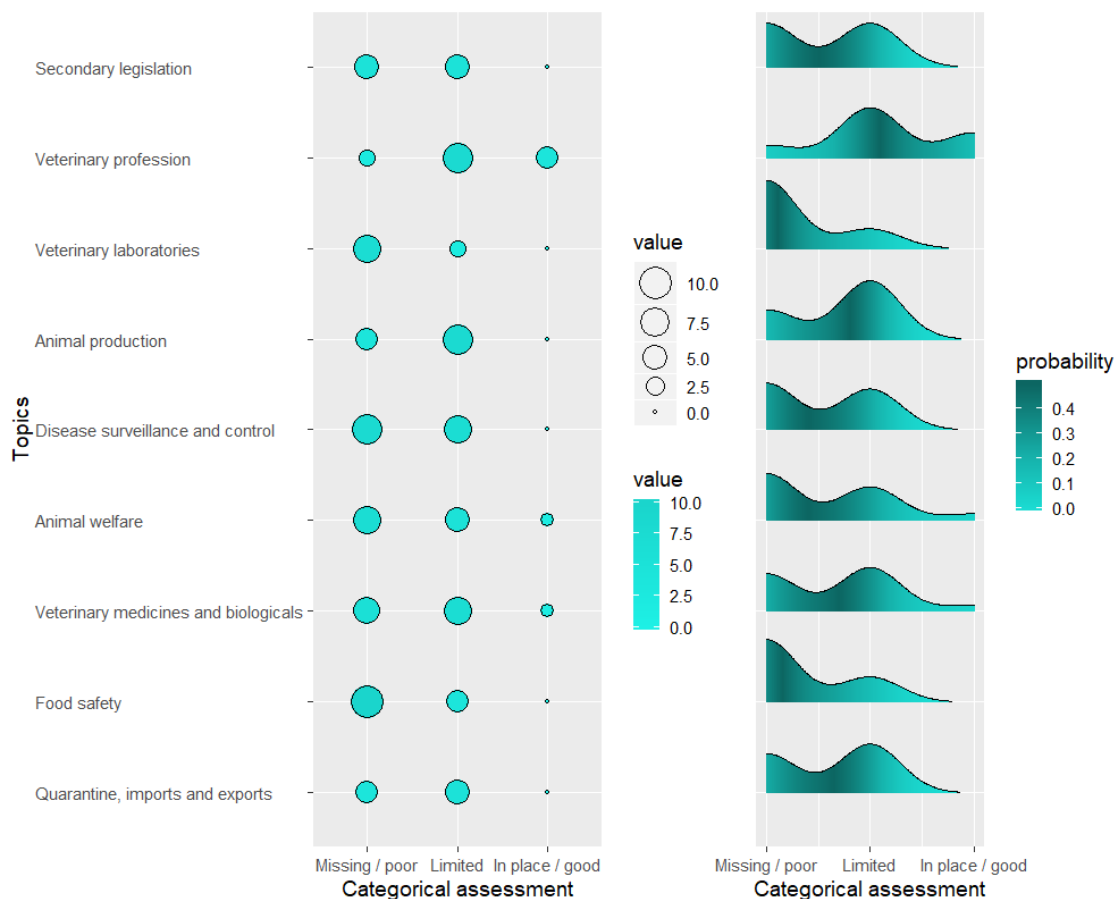


Figure 26. Balloon plot and ridge plots showing the distributions of the VLSP categorical scores for indicators related to the coverage of legislation. The size and shading of the balloon plots are proportional to the number of outcomes per score. The ridge plots show the distribution, with the Area under the Curve (AUC) = 1 for each curve, and the shading proportional to the probability.

3.5.1.3 Geographical variability

For the quality and coverage of legislation, the means of the indicators for which information was present were calculated for each of the countries. These country-level means are shown in Figure 27.

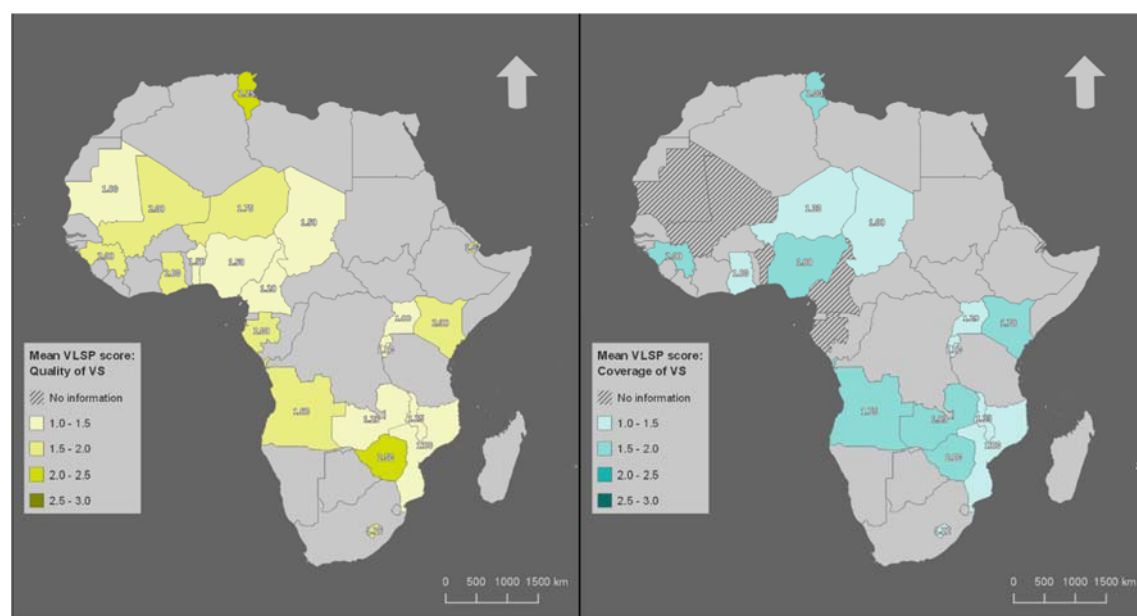


Figure 27. Mean score of categorical VLSP indicators for which information was available, for indicators reflecting quality of the legislation (left) and coverage of the legislation (right).

3.5.2 Synthesis of narrative VLSP report text

3.5.2.1 Summary

It was recognised that in many countries, veterinary legislation was outdated and inadequate to meet current and future challenges such as the growing global demand for foods of animal origin, increased participation in world trade, changing patterns of disease, and the emergence and re-emergence of transboundary animal diseases. To address these limitations, the VLSP was established in 2008 to help Member Countries recognise and address their needs for modern, comprehensive veterinary legislation.

The VLSP actually consists of two stages: the initial stage is the Veterinary Legislation Identification Mission, which aims to obtain a detailed picture of the current state of veterinary legislation in a country; if the experts of this first mission find that the country has sufficient political will and the human and financial resources to successfully undertake it, then a second stage, the Veterinary Legislation Agreement can take place, with the aim of actively supporting a country in developing its veterinary legislation. In this review, only the reports of the Veterinary Legislation Identification Mission are considered; these are commonly referred as VLSP reports.

In all countries in which a VLSP report was available for review, high levels of interest were identified along with a genuine wish from the VS to revise and update their legislation, and to more closely align it with Chapter 3.4 of the TAHC and other international standards. It was noted that the development of new and/or revised veterinary legislation should be closely aligned with the priority strategic objectives as identified in government strategic plans and also in previous PVS Pathway missions.

The approach taken in the VLSP missions was to provide structured questionnaires in advance to the country, to review previous PVS Pathway reports and to follow up with short in-country missions. The questionnaires provided baseline information on the national legal framework and legislation that was available including an initial assessment of its quality and coverage. During the mission the review team worked with country delegates, identified national and VS strategic objectives, considered the legal system, socio-economic and political context and the priority legislation required and the Gaps in legislation and so the development required. As such the VLSP did not consider the full remit of veterinary legislation but focused on priority areas.

The VLSP reports are less structured than the other PVS Pathway reports with variation in terms included in the report, provided as annexes and sometimes with context and materials not being available. In this review priority areas are highlighted in the sub-sections below.

3.5.2.2 Quality

Problems with the quality of veterinary legislation were identified in all countries reviewed.

Drafting, definitions and clarity

Internal quality was commonly poor with weak drafting skills, poor structure, lack of clarity, use of the passive voice, inadequate/missing definitions, and complicated and unclear sentence structure and use of grammar; for some countries internal quality was assessed as being good. It was noted that the more recently drafted legislation was generally of better quality, though it often required some minor adjustments to ensure correct use of definitions and language, in order to ensure legal certainty. A common finding was that the definition of the ‘practice of veterinary medicine and surgery’ was absent or poorly stated – a fundamental need for effective legislation of veterinarians and veterinary practice. A few countries had legal officers on the staff of the VS but these staff were generalists and lacked drafting experience. Drafting expertise was available at the Attorney General or equivalent offices though this support was not often readily available to the VS.

External quality was also compromised with insufficient mapping of other legal instruments and poor understanding of the hierarchical structure of legislation, which in many countries resulted in overlaps of authority given to different Competent Authorities. In some countries the VS had established good working relationships with many of the more important stakeholders in livestock production and related industries, but commonly no impact studies had been undertaken on the proposed legislation or consultations with stakeholders, nor was any consideration given to its practicality or enforcement.

As legislation was updated there is a recognised need to consolidate the provisions provided by existing laws and regulations and develop a series of harmonised legal instruments which

should remove redundancies as well as ensuring compliance with OIE and other international standards.

Further concerns were raised in multilingual countries on the need to make sure all legislation was translated into all the official languages to a high standard.

Chain of Command

A key issue faced in many countries was the lack of a clear chain of command, and this was exacerbated by the absence of legislation providing clear VS organisation and defining roles. The lack of a direct and well understood chain of command compromised the ability of the VS to deliver effective animal health, veterinary public health and food safety, and animal welfare programmes. As would be expected, the chain of command issue was highlighted as a more major problem in larger and decentralised countries.

Some countries suggested that the weak chain of command issue was being partially addressed by the adoption of informal communication practices, and this without any supporting legislation or guidelines. One country had developed guidelines to provide detailed advice for their decentralised governments ‘to establish their veterinary authorities and clearly define the chain of command for animal disease surveillance, the prevention and control of animal diseases and other important areas of the veterinary domain as well as the lines of communication between the central DVS and the county governments’.

Competent Authorities

The OIE standards require that the broad reach of the veterinary domain is covered but make no requirement as to how this is achieved. It is expected that in coordination with the Veterinary Authority other Competent Authorities will take the lead in providing the necessary legislation and governance of defined areas and that this will vary between countries.

In many countries major concerns were expressed over the lack of identification of the Competent Authorities and/or an ambiguity with regard to the respective roles of the Veterinary Authority and other Competent Authorities. In some countries legislation covering aspects of the veterinary domain had been introduced by the Ministry of Health but the legislation had resulted in ‘conflicting authorities, different opinions on its interpretation and confusion in its implementation, notably in the area of animal diseases, slaughterhouses and veterinary drugs’. This was particularly common in the regulation of the food safety of animal products, the import and export of animal products, the control of food processing premises and the import, manufacture, distribution, sale and use of veterinary medicines. Legislation covering wildlife and animal welfare was also commonly under the remit of other ministries with similar issues being raised.

3.5.2.3 Coverage

In all countries the coverage of veterinary legislation was less than required under OIE and other international standards. More developed countries with stronger economies and export markets performed better with fewer gaps. In many countries legislation not only lacked coverage but was also outdated, particularly in some Anglophone countries where some of their common-law legislation dated back more than 50 years.

Commonly gaps or weaknesses were identified in many areas of the veterinary domain including the VS operational chain of command, authority for communication and awareness

campaigns, and the implementation and management of programmes for animal disease surveillance, animal disease control, animal identification, movement control and traceability, veterinary diagnostic laboratory services, animal disease information management, the control of veterinary medicines and biologicals, and the management of imports and exports. The management of the veterinary profession, as required through a VSB, was in place in most countries but the legislation was outdated and insufficient to meet OIE standards. Coordination and delegation of authority to other Competent Authorities was highly variable but often weak, this was particularly common in the management of the food safety of animal products. Critically for effective disease surveillance notifiable disease lists were not available or had not been updated recently.

Secondary legislation

A common problem with coverage was the provision of appropriate secondary regulations.

A frequent finding was that secondary legislation was being used inappropriately to make up for gaps and deficiencies in the primary legislation, that is in laws. In some other cases a misunderstanding of legal drafting had led to primary legislation being used to provide great detail on specific activities such as specific disease control plans or notifiable disease lists; although this approach may provide sufficient coverage it results in overly complex and detailed primary legislation which is less easy to update and modify than supporting secondary legislation. In one country good progress was recognised in developing animal welfare legislation but it was stated that more of its provisions should have been placed in regulations.

An additional problem faced with the coverage of secondary legislation was that sometimes though a new law had been passed no update had been undertaken of secondary legislation. To address this issue some countries merely transferred, sometimes by default, the existing secondary regulations from the old law which resulted in some ambiguity and uncertainty over the legal mandate and also failed to address the necessary updating of legislation coverage.

It was frequently noted that new legal instruments were in draft but had not yet been approved, and sometimes this draft legislation had been under development for many years. In one country it was noted that between 2008 and 2013, 14 new primary laws related to the veterinary domain had been enacted, though gaps and deficiencies remained.

Veterinary profession

Countries varied widely in their management of the veterinary profession with a few countries having no legislation and no VSB to most with a partly or more fully functional VSB with the legal mandate to register, set standards (technical and ethical) and to discipline members.

The commonest weakness identified was that the VSB only governed veterinarians and had no role in managing VPPs, with no reference to their training, responsibilities and supervision – though it was noted that many reports did not refer to the issue of VPP registration and management. A further common issue was the lack of requirement for continuing education as part of a re-registration process. In some countries the registration of veterinarians was not mandatory for those in government service, which was recognised as diminishing the veterinarian's role and professional standards.

In some countries it was recommended that the legislation needed to clearly define the powers, procedures and practices of veterinarians and the VS; in one country there was no distinction in law between the prerogatives of qualified veterinarians and VPPs.

Overall, it was considered that the VSBs that had been established generally provided the necessary requirements for proper regulation of the veterinary profession. Some countries were drafting or amending legislation to address the deficiency on VPPs.

Veterinary laboratories

There was almost no reference to veterinary laboratories in existing legislation.

Disease surveillance and disease control

Veterinary legislation covering disease surveillance and disease control was weak in most countries with serious gaps and limitations.

Disease surveillance was often limited by the lack of an up to date notifiable disease list and so a lack of mandatory reporting. This limitation was exacerbated in disease response situations by limited powers being provided to the VS to enter, examine and test animals. With outdated notifiable disease lists the VS were unable to report their animal health status accurately to the OIE, WTO or interested trading partners.

In response to emergency disease outbreaks few contingency plans existed, with the exception of HPAI, and only some countries had clearly defined mandated pathways for the release of emergency funds.

Some countries had provisions for movement control though these were often limited and there was a need to develop more detailed provisions, especially those setting out the procedure for declaring infected zones, control zones, surveillance zones, etc. Provisions were also required for dealing with the permitted movement of animals and animal products from such zones. As indicated above, veterinarians and designated officers often had no clear power to enter into premises, to carry out inspections, and to isolate, cull animals, seize products, dispose and decontaminate premises.

There was very limited legislation on animal identification and traceability in all countries except those with the most advanced livestock sectors, strong disease control/disease-free programmes and significant exports. Some countries had base level legislation, but this was sometimes assessed as being unrealistic and unenforceable with the expectation that identification and traceability was to be introduced to all species at the same time. In a number of countries, the main priority of animal identification was to reduce the risk of stock theft.

Animal welfare

A few countries had no legislation covering animal welfare. However, the majority had some legislation though it was almost always dated and/or had major deficiencies; for example, poor definitions of animal well-being or animal cruelty. Implementing regulations, guidelines and SOPs were often missing. Some countries had reasonable coverage of issues relating to animal welfare including areas such as the prohibition of over work of draught animals as well as ill treatment or abuse of animals in general.

Additional legislation was recommended in all countries to bring overall animal welfare coverage up to international standards. Communications on the needs of animal welfare and the establishment and enforcement of compliance programmes is required in all countries.

Veterinary medicines and biologicals

As for food safety the control of veterinary medicines and biologicals was often managed not directly by the Veterinary Authority but through a Competent Authority, commonly an agency of the Ministry of Health. This arrangement made communication and coordination between the authorities imperative and it should have been laid down in law – this was often not the case. In one country specific reference was made to the ‘principal stakeholders working at cross purposes’ and there being an urgent need to establish a ‘formal, constructive, ongoing dialogue among the key parties to effectively resolve the issue of proper regulation of veterinary products’.

In all countries insufficient provisions were identified to ensure the effective registration, manufacture, import, distribution, storage and prudent use of veterinary medicines and biologicals. In particular, there was a recognised need to ensure that withdrawal periods were correctly observed, and maximum residue levels set, and that there was then a need to implement a compliance programme which should also monitor residues in animal products. Legislation was often in place but was often dated and lacked quality and sufficient implementing details; there was a general need to develop comprehensive, coordinated implementing regulations.

It was noted that in some countries new draft laws covering veterinary medicines were of such poor quality that it was recommended that they be withdrawn and rewritten to ensure that sufficient provisions were in place.

Food safety

In all countries the legislation covering food safety was limited. This finding applied both to coordination with the Competent Authorities, who were commonly responsible for many aspects of food safety, particularly post-slaughter (see also above), and also to the lack of sufficient veterinary legislation empowering the VS.

The responsibility for food safety was often said to be uncertain and/or ambiguous and that formal agreements were required between the Veterinary Authority and the health/food safety and/or commercial authorities. It was also noted that definitions covering the full range of foods of animal origin including fish and products of animal origin both for human consumption and for non-human consumption were often missing; this included the absence or poor definition of animal by-products.

Countries with more developed food safety programmes had made provisions for the licensing of slaughterhouses and other premises where animal by-products were being processed. Legislation governing animal welfare at slaughter was commonly missing or in need of updating.

Quarantine, imports and exports

Legislation with guidelines and ‘operational rules’ for import and export were advanced and available in the major trading countries. In some countries detailed legislation with supporting legal instruments and guidelines covered a wide range of issues including: lists of products to be checked, documentation required, identity or physical checks, frequency of the checks, veterinary controls for specific customs regimes e.g. customs warehouses, airplane and ship stores, equipment required at Border Inspection Posts and also the facilities required for the control of live animals. Import/export legislation was applied at the national level – and this was recognised in the decentralised countries.

Countries with little or no trade in animals and animal products tended to have no or only minimal legislation that did not comply with OIE standards and this was recognised as a serious weakness in the face of ongoing epidemics of major TADs on the continent.

3.5.2.4 General recommendations made in the reports

It was commonly recommended that governments should undertake a process of review and reform of their legislative instruments to clarify for each aspect of the veterinary domain where the legal responsibility lay. Legislation should be provided to the VS empowering them with the authority to carry out disease surveillance, disease prevention and disease control programmes, deliver improved animal welfare and to effectively manage the veterinary profession (veterinarians and VPPs), and to mitigate risk factors for animal and human health such as the control of veterinary medicines, residues and animal feed safety. It was recommended that legislation should not be developed *ad hoc* but should take a longer term more holistic approach referencing national sectoral strategic plans. In developing legislation, the need for extensive consultations and impact assessments was recommended along with the need to develop veterinary legal specialists and to employ specialist legal drafting skills.

4. Discussion

This discussion section covers the limitations, the gaps and the progress made by countries as assessed by using the available PVS Pathway reports and considers the contribution made by the PVS Pathway missions. The discussion is the interpretation and opinion of the review team and is not necessarily endorsed by OIE.

4.1 Data availability and quality

This review of the improvement in Africa's national VS and the utilisation and effectiveness of the PVS Pathway in Africa was constrained by the availability and coverage, consistency, quality and the age of the reports.

4.1.1 Availability and coverage

Of the 53 Member Countries in Africa that have engaged in the PVS pathway process, the majority had undertaken PVS Evaluation (n = 52) and PVS Gap Analysis (n = 49) missions. Most of these reports were made available for review – 88% and 96% respectively. A great number of countries had also completed a VLSP (n = 36) with 69% of reports being made available.

However, only 22 PVS Evaluation Follow-Up missions had been undertaken at the time of the review, but only 18 (82%) of these reports were available for review; these reports are critical as they are required to assess the actual progress being made by African Veterinary Services, and assess the impact of the PVS Pathway, recognising that any assessment should also consider factors to the VS (politics, economy, socio-cultural, etc.) In the absence of more comprehensive coverage of Evaluation Follow-Up missions, the sensitivity of the review of overall progress across Africa was reduced. Further, the distribution of the 18 available PVS Evaluation Follow-Up reports is uneven, with limited representation from central and southern African countries and over representation of north African countries; this biases the review and limits interpretation.

4.1.2 Consistency and quality

PVS missions may be compared with other expert consultations in that despite standardisation of the evaluation protocol, the results are qualitative and to a degree subjective. In addition, there has been considerable evolution of the PVS Tool and its application over time.

In assessing the reports, the review used both the categorical scoring of the LoAs as well as the narrative report text. A number of LoAs needed to be recoded to adjust for changes in the number and definitions of the CCs and in the definitions of some LoAs. In addition, a number of inconsistencies and data entry errors were identified, such as the LoAs from a PVS Evaluation mission being wrongly transcribed into the subsequent PVS Gap Analysis report. Also, there was an inevitable variability of the quality of the report writing by the PVS experts, particularly earlier in the programme.

The PVS Pathway developed from the first PVS Evaluations from 2006, with the introduction of the PVS Gap Analysis in 2009 (first training in April 2009), and the VLSP in 2010. The quality and consistency of the PVS reports greatly improved as the PVS Pathway matured and it was much easier to access, to extract and correlate data and information from the more recent

reports. The earlier reports were much more variable in their style, the evidence provided and the integrity and consistency of the LoAs assigned. Consideration was given to developing supplementary categorical scoring based on the narrative text to capture additional nuances; however, this was rejected because there would have been considerable overlap with existing LoAs; in addition, any such assessment would have relied on interpretation of retrospective narrative text by the review team would have been subjective and likely to introduce further bias. Consideration was also given to dropping some of the earlier reports, but this would have reduced the quantity of the information available and decreased the value of the review. As an outlier, some reports were applied over multiple years as the original report was not approved by the country and so a partial additional review was undertaken, further complicating analysis.

A simple categorical scoring schema was developed for the narrative VLSP reports, covering quality of legislation and its coverage. This allowed presentation of the outputs from the VLSP missions as simple graphics. The VLSP report style and content also evolved considerably since its inception, which again complicated direct comparisons between countries. Such comparisons needed to be handled with care as the missions were responsive to national priorities and did not necessarily consider veterinary legislation over the whole veterinary domain. A further complication in the VLSP reports is the differences in the legal system used in the anglophone and francophone countries. The categorical assessment of the quality and coverage of veterinary legislation was developed by the review team without external validation, and assessment was purely made from the available VLSP reports.

The overall consequence is that the reliability of the PVS reports cannot be estimated or quantified with any degree of accuracy. Notwithstanding this variability and the inevitable variation in the degrees of participation, input and cooperation of Member Countries, the review team considered that the PVS evaluations were more reliably scored over time and that, taken as a whole, the body of PVS reports for Africa provided an accurate reflection of their VS at the time of the evaluations. It is noted that no comparable information source on VS quality exists that provides as comprehensive or provides the level of detail as the PVS Pathway reports. As a source of retrospective and current (when updated) data on the status and performance of the VS, the information contained in the reports is considered of inestimably high value.

4.1.3 Age and sequencing of missions

The dates and sequencing of the PVS missions also resulted in limitations in the ability to assess the baseline, progress made and current competence of the VS and their compliance with OIE standards. The large majority of the PVS Evaluation missions were carried out in the initial three-year period (2007 – 2009) with one earlier mission and a few later missions each year up to 2014. The resulting data was used as the baseline for the performance of the VS. However, these PVS missions were undertaken a considerable time ago, and given the dynamic changes in political, economic and societal contexts, as well as changes to the PVS methods, their validity can be questioned.

Subsequent PVS Pathway missions were undertaken with various intervals and in varying order, which complicates assessment of progress. Generally, PVS Gap Analysis missions were performed soon after the baseline PVS Evaluations, as intended. The PVS Evaluation Follow-Up missions were introduced in 2011, initially to address what was considered to be too long an interval between the baseline PVS Evaluation and the PVS Gap Analysis, but latterly to review the progress made by the VS considering the use of the PVS Pathway Tools and other

factors. The ideal flow of reports from an evaluation perspective (PVS Evaluation – PVS Gap Analysis – PVS Evaluation Follow-Up undertaken at comparable intervals) was not strictly adhered to; this non-linear sequencing complicated the assessment of progress. For instance, the variable periods between PVS Evaluations and PVS Evaluation Follow-Up missions meant that overall change could be investigated, but not the rate of change or the variability in change patterns.

VLSP missions had occurred at a more even annual rate from 2008 – 2017 with an average of 3.6 missions per year.

4.2 Methodology

The review used the categorical scoring as determined for the LoA of each CC as the basis for the development of the infographics and this allows the simple development of means, distributions, graphs and maps. It is noted that using essentially qualitative categorical data (rather than numeric or continuous data) has some limitations and so data manipulation and outputs must be handled with caution. Unlike such continuous data, distributional assumptions cannot be assumed or easily investigated; therefore, using summary measures such as means represents the best approach.

Furthermore, it has long been recognised by OIE in the development of the PVS Tool that aggregating CCs or FCs for direct comparison between timepoints or between countries has limitations. The CCs and FCs may have different levels of criticality or importance depending on the priorities of the country; accounting for this would require some form of weighting, which cannot be simply performed and was considered beyond the remit of the review. In addition, it was assumed that the CCs are independent, which is not the case. Further, when taken across the continent, no correction or differentiation was applied for the size or importance of individual country VS so that large, populous countries or regions were directly compared with smaller or less influential countries.

The issues above could be addressed in follow-up work with greater inputs and the development of additional methodologies in close coordination with OIE. Despite the noted issues of the uneven weight of the CCs and of the countries, aggregation taken across regions and populations reduced the impact of outliers. Likewise, there is some scope for more advanced statistical analysis (such as the application of multivariate techniques to investigate trends in the CC data), but this could not be performed within the scope of the review.

The PVS Pathway reports are rich in detail, mostly in the form of text in which findings, strengths, weaknesses and recommendations are provided (PVS Evaluation and PVS Evaluation Follow-Up), national priorities, strategies at the pillar level, strategies and costed activities also at the CC level (PVS Gap Analysis) and social and economic context, legal system and topic area reviews (VLSP). All PVS reports provide Executive Summaries together with background information on the country and some basic data on the economy, the livestock sector and the structure of the VS. All reports were reviewed but only highlighted, outlier situations and summary information were extracted. For further detailed information the reader should read the specific country reports of interest.

Under the resourcing CCs, the review considered the budget for capital investment, emergency response and operating budget. In many countries, particularly decentralised countries, the budget information was unavailable or at least incomplete. The review did not consider the

cost tables and budgets as provided in the PVS Gap Analysis reports, which are aspirational, not actual.

Maps have been widely used in this report as a simple and easy method of visually assessing the LoAs, expected progression, progress made, etc. It is acknowledged that there may be sensitivities about this as the maps cannot be anonymised, and there is a danger of overinterpreting the results. However, it was considered by the review team that geographical stratification added substantial interest and value, so these maps have been retained in this report; it is at the discretion of OIE to which extent they are used or made publicly available. In contrast the review of the text has been de-identified with comments and conclusions being made only at a regional or generic level.

4.3 Results

As indicated above, the PVS Evaluations took place over an extended period of time from the first mission in 2006 to the most recent in 2014, as made available for review. As only 22 PVS Evaluation Follow-Up missions had been completed, the PVS Evaluation is the most recent assessment of the country VS for 29 countries. In 17 of these, the evaluation was undertaken in 2009 or before. Consideration was given to developing an updated assessment using the PVS Evaluation Follow-Up reports for countries where it was available and keeping the PVS Evaluation reports for the other countries but as the time interval was so variable this approach was rejected as the biases and confounders would have been too great.

It is recognised that over the period of the available PVS Evaluation reports, Africa has faced a number of major TADs and the limitations of the VS in many countries have become apparent. Many international agencies and donor organisations have sought to support both governments and the private sector in combating major diseases and promoting animal health and production. For example, in recent years, one country acknowledged that it had faced incursions of major TADs such as FMD, HPAI and CSF, ongoing challenges from endemic diseases and significant zoonoses that continued to threaten human health. Such widespread disease incursions, ongoing threats and changes in policy and international support and with increasing international demand for animal products will all tend to have changed the profile and support of the VS.

In addition, many countries have faced serious economic pressures, particularly following the global financial crisis in 2008/09, and a number of countries have had to deal with increasing problems with civil unrest and changes in politics and governance. Such external factors must be considered in the interpretation of any evaluation. In addition, analysis of older PVS Evaluations must be interpreted with great caution, as the assessments represent the status at the 'point in time' when the evaluations were undertaken.

In the complex environment of different and changing national economics and priorities, complex and variable governance structures, the varying balance between the public and private sectors, the different livestock economies and disease profiles and the breadth of the veterinary domain, it is not possible to quantify the contribution of the PVS Pathway to changes in performance of national VS. No direct credit or reference to the benefits from participating in the PVS Pathway was provided in any PVS Evaluation Follow-Up report.

In reviewing progress as indicated by the PVS Evaluation Follow-Up reports, improvements were seen in staffing, resourcing, management and organisation of the VS in some countries

with increased numbers of veterinarians and VPPs, improved chain of command within the VS and better resourcing. These improvements did not occur everywhere with veterinary staffing sometimes being reduced, commonly due to government recruitment policies and the retirement of aging veterinarians, increased decentralisation and extended lines of authority, and reduced access to VS funding.

Despite the fact that some progress was made in staffing, these CCs were still mentioned as inadequate for the majority of countries and represent, along with the lack of operational funding, a major obstacle to the development of the VS. The lack of staff, both adequately trained and sufficiently funded, appeared to be a hindrance to the development of many cross-cutting services including laboratory services, border control, risk analysis, epidemiological surveillance, food safety, slaughterhouse inspections and animal welfare.

In more detail, considering the 18 available PVS Evaluation Follow-Up reports in comparison with the previous PVS Evaluation reports, it could be seen that four countries made significant progress (mean LoA >0.29) with strong improvements across many of the CCs, and eight countries made relative but encouraging progress (mean LoA >0.01). For the remaining six countries (which commonly had security issues), there appeared to be some weakening across the VS. However, it is difficult to assess if the apparent limited progress/deterioration in the mean LoAs of VS was real, as the PVS Tool definitions had become more specific and the PVS experts more rigorous in their assessments which had resulted in lower LoAs. Furthermore, there was considerable variability in the overall changes in CCs (see Table 6); CCs with marked improvement (mean LoA >0.20) and marked deterioration (mean LoA <-0.20), as summarised in the table below.

Considerable improvement was seen in many CCs particularly in the competencies of veterinarians and ongoing continuing education (though still at a very low level), disease control and emergency preparedness, communications, consultations and working with the private sector, and in developing international sanitary agreements. Conversely a marked deterioration was seen in coordination with other Competent Authorities, in surveillance and early detection, the management of animal products, the authority of the Veterinary Statutory Bodies, harmonisation of legislation with international standards and the development of disease-free compartments.

Marked improvement		Marked deterioration	
CC	Mean difference	CC	Mean difference
Professional competencies - veterinarians (I.2A)	0.29	External coordination (IV.6B)	-0.47
Continuing education (I.3)	0.22	Passive surveillance (II.5A)	-0.47
Physical resources (I.5)	0.20	Active surveillance (II.5B)	-0.83
Emergency preparedness and response (II.6)	0.33	Inspection of collection, processing and distribution of products of animal origin (II.8C)	-0.21
Disease prevention, control and eradication (II.7)	0.29	Veterinary Statutory Body (III.5A)	-0.52
Veterinary medicines and biologicals (II.9)	0.33	International harmonisation (IV.3)	-0.28
Communications (III.1)	0.38	Compartmentalisation (IV.8)	-0.44
Consultations with interested parties (III.2)	0.28		
Accreditation/authorisation/delegation (III.4)	0.28		
Equivalence and sanitary agreements (IV.4)	0.20		

When considered against the PVS Gap Analysis targets, most CCs were expected to improve by an average of 1.04 LoA (range 0.58 to 1.52). This optimistic outlook was aspirational but tended to be unrealistic. PVS Gap Analysis missions were highly dependent on the core VS, the Veterinary Authority senior managers and the participants in the strategic planning and costing approach. It is unsurprising that key veterinary activities such as veterinary training and continuing education, disease control and emergency preparedness and response, and communication, collaboration and coordination with the private sector were targeted to benefit from marked improvements. It is equally not surprising that some activities that were not always perceived as core veterinary activities received less attention and were to benefit less e.g. external coordination and the management of animal products.

It is of concern that surveillance, both active and passive, were assessed as having become weaker in the 18 countries between their PVS Evaluation and the PVS Evaluation Follow-Up. This may be explained as a combination of extrinsic effects (e.g. country investment in surveillance has been reduced, primarily due to funding constraints), and/or intrinsic effects (e.g. the PVS Evaluation Follow-Ups have been undertaken with greater rigour and the result is a less positive but truer picture).

Compartmentalisation is an outlier as several countries clearly indicated they had no interest in developing this CC.

A number of confounders were identified in assessing the PVS Pathway reports. For example, the assessment of lesser trained staff, such as community-based animal health workers, was highly variable with some being considered as a form of VPPs whilst others were variously referenced under surveillance, food safety, communications or animal welfare; it is noted that the 7th edition of the PVS Tool uses the recently developed OIE Terrestrial Animal Health Code definition for VPPs. In many reports it was recognised that this cadre of staff delivered much of the VS at field level with their limited training, weak coordination mechanisms and minimal supervision. Some PVS Evaluation Follow-Up reports noted that OIE had developed competency standards for VPPs and that these were being aspired to, though a high level of dependence remains on the community-based animal health workers in many countries.

VSBs were in place in most countries but their authority and capability to operate varied considerably. In the more developed economies, VSBs were operating effectively to cover most areas of the management of the veterinary profession, though very few PVS reports included any reference to the registration and management of VPPs. Legislation was often cited as being weak and few disciplinary mechanisms were being taken or reported. In many PVS reports the actual level of activity of the VSBs was unclear with the focus being on whether enabling legislation was in place and whether the VSB was fully independent and autonomous as required to comply with OIE standards.

All countries had access to some *ad hoc* training provided by international agencies and donors with a few countries having a more rigorous approach to staff development including undertaking a needs assessment and implementing a formal continuing education programme with follow up evaluations; reports of training being provided and impact assessments were not cited in the reports. It was noted in some reports that international support, though valuable, was provided primarily in support of donor programmes and was not necessarily well aligned with the ongoing needs and sustainability of the country VS. The lack of continuing education applied across all technical staff, that is veterinarians, VPPs and community-based animal health workers.

Staff management, job descriptions with performance reviews, and the need for a well-defined VS chain of command were reported in many PVS Pathway reports. The reports varied in their breadth and depth of assessment of VS organisational structures and their ability to deliver well-coordinated services. Many reports commented on the weak chain of command and made recommendations on the need for strengthening, along with better definition of staff roles and clearer lines of communication and delegation; weaknesses were identified even in the more developed, better resourced countries. However, the mean value for internal coordination in the 18 PVS Evaluation Follow-Up reports was just over LoA 3, indicating a good working chain of command.

Poor management of data with weak data capture, poor data consolidation and analysis, and inadequate reporting was identified with a common finding in the reports being the lack of effective information management systems which was resulting in insufficient quality data being made available for programme reviews and formal monitoring and evaluation, for competent risk analysis, reliable certification and transparency with reporting internationally; this limitation also compromised the reliability of the PVS evaluation process. Although some recommendations were made in the PVS Gap Analysis reports on improving data handling systems, there had been no demonstrated progress when assessed by the PVS Evaluation Follow-Up reports.

Technical independence was being compromised in many countries in part through the weak chain of command and so the lack of information, as indicated above, but also through poor remuneration packages for staff. Reports varied in their consideration of staff salaries probably owing to sensitivity in releasing such information to the PVS teams. In countries where low staff salaries were identified as an issue, some reports emphasised that this could lead to a conflict of interest as other income sources might be sought. In some country reports, comparisons were made with the remuneration packages of other government professional staff and found to be wanting.

External coordination with other Competent Authorities had generally deteriorated with limited communication in most countries and few formal mechanisms of coordination being established. This is somewhat surprising with the significant political focus on ‘One Health’ collaborative approaches in recent years. Reports were often unclear about whether systems had been established for internal and external coordination, and if so, whether these were actually in use and being monitored. A similar ambiguity existed when communication, consultation and the development of joint programmes was considered; most countries had some informal activities, some had established mechanisms but it was often unclear whether the mechanisms were merely in place or actually operational. Reports on border control were also a mix of assessment of resources (staffing, facilities) and their actual operation; in many cases little information was available in the PVS report and it was unclear how effective border control was, though typically a list of border inspection posts was provided.

Policies and programmes were assessed as being stable over time with few changes of personnel or organisation, though this could also be interpreted as a sign of inertia; it is noted that the latest edition of the PVS Tool significantly changes the CC on programme stability adding policy development to changing situations and programme management – only three countries were assessed using the new criteria. The earlier assessments make no mention of the need for a dynamic response to a changing environment and needs of the VS. Management of budgets and resources tended to be short term and passive with few countries able to plan and

budget for programmes more than one year ahead. Such short timelines make it very difficult to plan and deliver effective and sustainable programmes. As mentioned above there was very little review of the effectiveness of programmes or the use of resources.

Physical resources, operating and capital budgets and access to emergency funding were other areas that were critically weak in many countries. Some progress had been made with improved physical resources as assessed by the PVS Evaluation Follow-Up missions, although this was universally expected in the PVS Gap Analysis mission reports. No country reports had specific investments by donors so it was unclear how they had funded some of their new or upgraded facilities, such as laboratories and equipment. Information on capital investment was poor with no indication of any significant and sustainable changes in funding and access to additional resources. A key issue frequently raised in some reports was the need for a budget for repairs and maintenance. Though detailed information was commonly not available, it was apparent that most countries had no provision for the upkeep of their facilities, transport and equipment.

The threat of emerging infectious diseases, zoonoses and TADs was acknowledged in many reports and some improvement was observed in countries with PVS Evaluation Follow-Up missions in emergency preparedness and access to emergency funding, including the provision of compensation to animal owners. The HPAI threat was seen as a bias with high risk countries receiving significantly greater support from international donors. It was noted that very little training in emergency response was taking place and few simulation exercises were being held. The benefit of working with the national disaster agency was recognised in few PVS reports.

The PVS reports provided varying levels of information on specific disease control programmes with some merely citing the target disease whereas others provided considerable detail on strategy and the activities being undertaken. Many reports identified the limited staffing of the field VS along with insufficient resources, a weak chain of command and the poor management of data and information which was resulting in animal health programmes that lacked sensitivity of detection (passive surveillance), limited or no surveys being undertaken to assess progress in disease control or eradication (active surveillance), insufficient use of laboratory diagnostics, almost no use of risk analysis, and ineffective and unsustainable implementation of disease control programmes. Countries varied in their ability to deliver animal health programmes with some countries with higher income levels making good progress but most countries lacking the resources or technical planning and epidemiology skills to be able to implement more effective, risk-based programmes. Common problems cited were the inability to budget for disease control programmes over multiple years with resulting inefficient and sub-optimal programme delivery. In support of effective disease control programmes and particularly for disease-free zones some countries had introduced animal identification programmes with movement control; no references were made in the PVS reports to the actual traceability of animals following a disease outbreak or food safety incident.

The assessment of laboratory capacity and capability was made more complex by the significant changes in the PVS Tool. Initially there was only one CC, 'Laboratory disease diagnosis', but this quickly evolved with the addition of a CC focusing on 'Laboratory quality assurance' and then more recently with the addition of a third CC which considered 'Suitability of national laboratory infrastructures'. The PVS reports vary in their interpretation and assessment of laboratory infrastructure, with some reports assessing the laboratory facilities whereas others assessed the network of laboratories and their overall functioning and capability.

The food safety CCs were introduced as the PVS Tool evolved and as a result very few baseline assessments were available making direct assessment of progress impossible in many countries. In countries with PVS Evaluation and PVS Evaluation Follow-Up missions, evidence was provided that progress had been made with strengthened legislation, increased registration and inspection of slaughterhouses and the use of specialist trained VPPs for meat inspection. Ongoing concerns were the ambiguity in the division of authority between the Veterinary Authority and other Competent Authorities, particularly ministries of health but also with ministries of commerce. A number of reports identified the two-level approach to food safety and the need for this to change, that is best practices were in place for export slaughterhouses and processors but much less in those supplying the domestic markets and little or no control over local slaughter places.

The global concerns over AMR have been reflected in the most recent 7th edition of the PVS Tool. Prior to the introduction of a specific CC on AMR the registration, import/manufacture, distribution and use of veterinary medicines and biologicals was covered by a single CC; additional CCs covered the broader issues of residues and animal feed safety. In the available reports, very little progress was identified in strengthening the authority and capability of the VS to manage veterinary medicines and biologicals. Only in the most recent reports was reference made to the broad One Health concerns over the lack of prudent use of antimicrobials and the participation of the VS in the development of national action plans for the improved stewardship of antimicrobials.

Animal welfare was another area of the veterinary domain that was introduced to the PVS Tool more recently (5th edition, 2010) and many of the PVS Evaluations were completed prior to this date so assessing progress by the difference between PVS Evaluations and PVS Evaluation Follow-Up was rarely possible. The major limitation in developing conformity with OIE standards was identified as the lack of any effective public awareness and implementation programme, with few resources being provided and inadequate enforcement by officials. Legislation was considered weak with poor coverage and often few enabling regulations along with few sectoral guidelines and standards being developed.

Legislation assessment and its progress is more complex as multiple PVS Pathway mission types must be considered: PVS Evaluations and PVS Evaluation Follow-Up assess legislation as three CCs – preparation (in the 7th edition this becomes more focused on coverage), compliance and international harmonisation. This approach provides the structure of proposed strengthening of this CC in the PVS Gap Analysis missions. In contrast the VLSP takes a different approach with a focus on the structure and principles of legislation in the country, the social and economic context and then considers in detail the quality of existing and drafted legislation and the coverage by ‘veterinary legislation’ of the veterinary domain.

VLSP missions could have taken place before or after PVS Evaluation Follow-Up missions so these missions cannot simply assess any impact made; only six PVS Evaluation Follow-Up missions took place after the VLSP missions with an interval ranging from one year to eight years, with three occurring at less than three years – a short time for significant change in legislation to occur. Countries varied in the progress made with one being assessed as making significant progress but another seeing a significant deterioration, though it is possible that this was due to an unrealistic assessment in the earlier PVS Evaluation. In most countries little progress was acknowledged in any subsequent PVS mission. Few countries had effective compliance programmes and assessment was regarded as difficult as very few reports of non-compliance were available to the PVS missions.

In assessing ‘trade-related’ CCs the reports were consistent and generally of a high standard. One confounder was the assessment of the CCs for Zoning and Compartmentalisation – as mentioned previously, countries with no interest and no capability were variously assessed as these CCs being ‘Not assessed’ or at level 1, that is having no authority or capability. This discontinuity was addressed by recoding all the ‘not assessed’ as level 1 so that countries that progress against this CC could be better assessed/identified. However, it might be argued that this introduced bias with some countries having the authority but no intention or policy to develop disease-free zones or compartments and so being scored in this review only at level 1.

It was commonly recommended that governments should undertake a process of review and reform of their legislative instruments to clarify for each aspect of the veterinary domain where the legal responsibility lay. Legislation should be provided to the VS, empowering them with the authority to carry out disease surveillance, disease prevention and disease control programmes, deliver improved animal welfare and to effectively manage the veterinary profession (veterinarians and VPPs), and to mitigate risk factors for animal and human health such as the control of veterinary medicines, residues and animal feed safety. It was recommended that legislation should not be developed *ad hoc* but should take a longer term more holistic approach referencing national sectoral strategic plans. In developing legislation, the need for extensive consultations and impact assessments was recommended along with the need to employ specialist legal drafting skills.

As might be expected, the CCs that focused on trade, international relations and transparency, (mostly under FC4) varied considerably depending on whether the country was a significant exporter of animals and animal products – mostly these countries are in Southern and Eastern Africa. Other countries had much less robust systems.

The regional analysis that was undertaken used the regions as recognised by the AU. Regional comparisons (see Figures 14 - 20) provided a clear insight into the relative strengths and limitations of the different AU regions by CC with northern and southern African countries generally scoring better and central African countries being weaker. Some outliers and missing values are caused by the change in the PVS Tool and the lack of coverage in some regions.

To assess the relationship between countries and external factors the mean LoA was plotted against a number of numerical indicators and linear models were fitted. Associations were found to be positive for the HDI and GNI per capita, but negative for agricultural production as a percentage of GDP. None of the associations was strong, although those with HDI and agricultural production as a percentage of GDP were statistically significant. The differences in the distributions of LoAs for the countries categorised into the World Bank income groups were found to not be statistically significant. It might be argued that assessment of external factors by CC might have been more insightful with greater associations being seen for resource intensive CCs and those associated with trade, development and GDP. Conversely the testing of multiple output parameters, the CCs, will tend to produce significance merely by chance owing to the number tested; as the overall statistical testing was only just significant for HDI and agricultural production as a percentage of GDP this option was not pursued in this review. It is noted that if a greater number of recent PVS Evaluations were available that such analysis would be interesting. Considering progress against income, of the 18 countries with PVS Evaluation Follow-Up reports: six were categorised as ‘low-income countries’ of which four had a positive difference of their LoAs and two a negative difference; ten countries were categorised as ‘lower-middle income countries’ of which six had a positive overall difference

of their LoA and four a negative difference. The remaining country is classified as an ‘upper-middle income country’ and had a positive overall difference of its LoAs. The number of countries in each category is small and this finding cannot be generalised.

5. Conclusions

It is widely recognised that national VS are important in supporting animal health and production, veterinary public health and animal welfare with improved food security and food safety, reduced threat to human health from zoonoses, and increased economic development with more sustainable rural livelihoods.

African countries have demonstrated a very strong commitment to the OIE PVS Pathway and its various elements, as shown by the number of missions performed – of the 54 Member Countries, 53 had either requested at least a PVS Evaluation or benefited from one (n=51), 46 countries benefited from a PVS Gap Analysis, 36 countries had participated in a VLSP and 22 had had PVS Evaluation Follow-Up missions.

Overall the PVS reports were of a good standard and provided very extensive background information on the country, its VS and the assessment of their competencies against OIE standards as assessed using the PVS Tool, analysis and of their legislation as assessed by the VLSP. Notwithstanding the high standard of many reports, there was considerable variability over time, particularly in the use of the PVS Evaluations in the first few years and in the VLSP in its early years; more recent reports are much more consistent and of a higher standard. In addition to the variability in the reports, a further complication in the review was the evolving nature of the PVS Tool, this was particularly dynamic in the period 2006 - 2010. The variability in reports and the editions of the PVS Tool made direct comparisons problematic.

To assess progress, the PVS Evaluation Follow-Up provided the ‘gold standard’. As only 18 reports were available for this review and there were various time intervals between the baseline PVS Evaluation and PVS Evaluation Follow-Up missions, conclusions must be made with caution. Of the 18 countries, 11 (61%) were assessed as having made progress on their mean LoA across all CCs. Within this overall assessment some CCs improved markedly whereas others deteriorated. Some of the reduction in LoAs can be attributed to the change in definition of the CCs and the more rigorous and consistent assessment by the PVS teams.

In the complex environment of different and changing national economics and priorities, complex and variable governance structures, the varying balance between the public and private sectors, the different livestock economies and disease profiles and the breadth of the veterinary domain, it is not possible to quantify the contribution of the PVS Pathway to changes in performance of national VS. No direct credit or reference to the benefits from participating in the PVS Pathway was provided in any PVS Evaluation Follow-Up report.

Hence, although the PVS Pathway has undoubtedly contributed to the strengthening of VS, it is not possible to attribute a simple cause/effect relationship owing to many confounding factors; these include national priorities (especially in those countries that have a strong focus on export of animals and animal products), economic strength and development focus, political and social stability, international relationships and support and the level of perceived risk to global health, the livestock sector its importance and its stage of development. In such a complex environment of factors contributing to the development of the VS, it is not possible to directly quantify the contribution of the PVS Pathway through this broad Africa-wide analysis. It is also noted that in a few countries their VS had deteriorated, when assessed by the PVS Evaluation Follow-Up missions against OIE standards. Further in-depth review of individual countries could more directly assess the contribution of PVS reports recognising external factors such as their specific political, economic and social context and changes over

time. Recognising the low cost of PVS Pathway missions compared with the overall cost of VS delivery, the benefits and value for money from participating in the PVS Pathway can be emphasised.

It is recognised that governments face many competing priorities and budget limitations and that considerable investment over time is required to make a significant change in the VS. It is also noted that in the period since the inception of the PVS Pathway a number of countries have faced particularly difficult economic and/or political situations and this compromised their ability to invest broadly in their development and specifically in their VS. Despite this, significant improvements are being made in the VS across Africa, particularly in the technical competence of veterinarians, communication and coordination with the private sector and in emergency preparedness and disease control. However, major challenges remain especially in the areas of laboratory reliability and quality assurance, risk analysis and epidemiology, food safety, animal/animal product identification and traceability, the control of veterinary medicines and animal welfare.

To achieve further progress, a higher level or more effective use of public sector resources is required to be allocated to the VS. This may not realistically be expected or relied on, but the use of PVS reports has the potential to improve this and is worthy of further exploration through more detailed investigation at national level. The greater engagement of the private sector for service provision in areas where capacity is limited, as identified above, should be considered as it is likely to be the most viable and sustainable mechanism to increase VS capacity, effectiveness and impact. This approach requires established procedures with clear definitions of the tasks and official supervision, and may also require supplementary legislation. The recent development of OIE guidelines and frameworks for such Public-Private Partnerships (PPPs) is to be recommended as providing increasing scope for such initiatives.

Technical annexes

Annex A. Call for Expression of Interest

The text below is reproduced verbatim from the OIE's Call for Expression of Interest (EoI) for the work performed in this project.

Vacancy title	Desktop research consultant
Type of contract	Consultancy contract
Location	Home-based
Starting date	1 April 2019
Expected working days	50 to 60 days
Expected duration	From April 2019 to July 2019 (3-4 months)
Application deadline	28.02.2019

B.1 Context

B.1.1 Background

The World Organisation for Animal Health (OIE, Office International des Epizooties) is the intergovernmental organisation responsible for improving animal health worldwide. It is recognised as a reference organisation by the World Trade Organization (WTO) and in 2018 counted a total of 182 Member Countries.

The OIE maintains permanent relations with nearly 75 other international and regional organisations and has Regional and Sub-regional Representations on every continent, of which 4 in Africa: Bamako, Mali; Gaborone, Botswana; Tunis, Tunisia and Nairobi, Kenya.

B.1.2 Purpose

About the OIE Performance of Veterinary Services Pathway

The Performance of Veterinary Services (PVS) Pathway is the OIE's global flagship programme for the sustainable improvement of national Veterinary Services' compliance with OIE standards on the quality of Veterinary Services. To help ensure the effective performance of the Veterinary Services of its Members, the OIE has dedicated two Chapters of the OIE Terrestrial Animal Health Code (TAHC, or the Terrestrial Code) to the Quality of Veterinary Services. These OIE international standards constitute the basis for independent external country evaluations on the quality of Veterinary Services and have been adopted by all OIE Members.

A specific methodology has been developed and the OIE has published the "OIE Tool for the Evaluation of Performance of Veterinary Services" (the OIE PVS Tool) as the basis for evaluating performance against the international standards published in the Terrestrial Code. A similar tool is available for the evaluation of Aquatic Animal Health Services.

Only OIE-certified PVS experts can carry out independent external PVS Evaluations of country Veterinary Services and/or implement PVS Gap Analysis (planning and costing element) missions. These experts have undergone training sessions organised by the OIE.

All PVS Pathway experts use standardised tools, indicators and Experts' Manuals, prepared and published by the OIE Headquarters, which also include template reports. Generally, PVS Pathway missions comprise 2 – 4 PVS Experts which undertake in-country visits for 2 – 4 weeks depending on the size and complexity of the country. A peer-reviewed report is approved by the country before finalisation.

About the SVSDC Project

The Strengthening Veterinary Services in Developing Countries (SVSDC) Project is a 4-year project funded by the European Union, through the European Parliament and the European Commission, aimed at building better African Veterinary Services that deliver effective governance, health safety, food security and food safety for their citizens.

This Project specifically addresses the compliance of African Veterinary Services with the standards on the quality of Veterinary Services of the OIE.

The project consists of two components and aims to achieve 5 outcomes, one of which is:

Output 1.2: National Veterinary Services have been gradually brought up to the standards of the OIE (World Organisation for Animal Health), through the implementation of OIE PVS Pathway missions and of their recommendations.

This is to be demonstrated (objectively verifiable indicators) through the: “Improvement in the levels of advancement (LoA) of the 47 critical competencies (CC) of the PVS matrix, over time”, whereby the target result is that: “at least 40 African countries improve the 47 critical competencies of the PVS matrix”.

Background

There are currently 51 countries in Africa that have engaged in the PVS Pathway, out of 54 OIE Member States in Africa. The three countries that have yet to engage in the PVS Pathway are Somalia (PVS Evaluation requested in 2008, mission pending given the security situation in the country which prevents OIE from envisaging a field mission, covering most federal states), South Sudan (became an OIE Member after its independence and has not yet applied for a PVS mission due to the ongoing civil war) and the Republic of Congo (Brazzaville). The latter applied for a PVS Evaluation in 2011 and it is expected that the mission will have been conducted by the time this work is undertaken (2019).

Once the mission has been conducted and the report written, peer-reviewed and accepted by the country, the OIE Delegate of that country can decide to keep the report confidential, allow OIE to share it with development partners only (technical agencies and donors) or to share it in the public domain. In the latter case, these reports can be downloaded from any OIE website (international, Africa), otherwise from a dedicated password-protected database to which only official development partners have access. These would typically include e.g. African Union, World Bank, FAO, WHO, Economic Community of West African States, etc.

Hence out of the 51 available (initial) PVS Evaluation reports, only 40 are available for scrutiny under the proposed scope of work (at the time of drafting of these ToRs).

OIE Member Countries	54
Reports available	51
Reports labelled “confidential”	4
Reports labelled N/D *	7
Reports labelled P&D **	29
Reports in the public domain	11

(*) “No Decision”, decision on clearance pending

(**) “Partners and donors” (development partners)

In general, each report contains an assessment of 47 Critical Competencies (CC), grouped under 4 Fundamental Components (FC). These are:

1. HUMAN, PHYSICAL AND FINANCIAL RESOURCES
2. TECHNICAL AUTHORITY AND CAPABILITY
3. INTERACTION WITH INTERESTED PARTIES
4. ACCESS TO MARKETS

Every CC is awarded a level of advancement (LoA) from 1 (no compliance with the international standard) to 5 (going beyond compliance with the international standard).

Note that 47 CCs are currently used in the 6th Edition of the OIE PVS Tool, published in 2013,5 but that earlier versions, since its commencement in 2006, featured less CCs. Over time, CCs have been added, deleted and their definitions and level of advancement (LoA), changed.

For instance, the (updated) 1st Edition of the Tool, published in 2006, only featured 30 CCs, whereas the 2nd Edition of the Tool, published in 2007, already featured 40 CCs.

Over and above the mere numerical score awarded for any given CC, the reports contain narrative, qualitative information on the findings which led to the choice of a LoA, with in addition strengths, weaknesses and recommendations, along with a list of “evidence” (usually documents and pictures which support the claims made under “findings”).

Once a country has undergone an initial PVS Evaluation mission (a qualitative analysis), it may apply for a PVS Gap-Analysis Mission, which will enable the country to assess the cost to bridge the gap with what is achievable through a 5-year action plan (a quantitative analysis). E.g. a country having been assessed at Level of Advancement 2 in 2007 (as part of an initial PVS Evaluation mission) may regard it as feasible to reach Level of Advancement 3 in the next 5 years, i.e. by 2012, provided a strategy can be implemented, possibly, but not necessarily, requiring investments (both recurrent and capital investments), to be made available either by the Government or by a donor or both.

Depending on the willingness of the country to enter the PVS Pathway and the time at which it entered this Pathway, there may be up to 6 PVS reports available for any given country:

- (initial) Evaluation report,
- Gap-Analysis report
- Evaluation follow-up report
- Gap-Analysis update report
- Veterinary Legislation Identification mission report
- Veterinary Laboratory mission report

The PVS Evaluation reports of Aquatic Animal Health Services (AAHS) are outside the scope of work, which focuses on the project's main aim, i.e. strengthening of Veterinary Services in developing countries (SVSDC).

Overall, there are currently (October 2018) 160 PVS Pathway reports available from the African continent, the majority of which are available for the proposed analysis.

B.2 Duties and Responsibilities

B.2.1 Objectives of the Assignment and Scope of Work

The consultant will be expected to make use of the available information, not only PVS (initial) Evaluation reports, but also PVS Gap Analysis reports, PVS Evaluation Follow-up reports, Veterinary Legislation Identification mission reports and Veterinary Laboratory mission reports, to present an overview of progress made by countries in moving towards compliance with the OIE international standards.

E.g. a country having been assessed at Level of Advancement 2 in 2007 (as part of an initial PVS Evaluation mission) and having been assessed at Level of Advancement 3 in 2016 (as part of a PVS Evaluation Follow-Up mission) would be regarded as having made progress in moving towards compliance with OIE standards. However, in many cases progress may be described in the narrative text without necessarily meeting the requirements to move to a higher Level of Advancement. The processing of the text sections which justify the Levels of Advancement is therefore critical (qualitative analysis).

Ideally, this information should be presented for all 47 currently used Critical Competencies (CC) though this may not always be possible (refer to comments above on the changes in the number of CCs over time).

The methodology used by the consultant will enable the aggregation of information:

- Per country, for all critical competencies;
- Per region, for all critical competencies;
- Per critical competency, for all countries;
- Per fundamental component, for all countries.

Several such analyses have been conducted in the past, but always for a limited number of criteria, either geographical (West Africa) or topical (veterinary medicinal products, animal welfare, risk analysis, veterinary staffing and training, etc). An example for the continental analysis of one only one such CC (risk analysis) was published at the beginning of the year.

It is reiterated that the changes of CCs in number and scope, as well as the three confidentiality statuses of reports, render the presentation of results inherently complex and this will have to be catered for by a scientifically robust and – where possible- statistically sound methodology.

Furthermore, the output of this consultancy will have to clearly differentiate parts that are for internal use (mentioning names of countries, even when clearance is limited) and for public consumption, where no countries should be identifiable, not through lists, tables and/or maps.

In some cases, it may be relevant to provide additional insights, e.g. where certain subjects (CC) may not be handled by the Veterinary Services (or Authority), but by another Competent

Authority (e.g. public health services, wildlife services, municipal services, etc...), where decentralisation or devolution of powers (federalised countries) has taken a number of powers away from the national Veterinary Authority, or where issues are handled through a multi-sectoral approach, including a One Health approach.

Likewise, any statistically relevant correlations, within regions, or between inter-related CCs are to be computed and highlighted. The consultant is equally encouraged to investigate any statistically relevant correlations with macro-economic parameters, such as Livestock to GDP, Livestock to Agricultural GDP, GDP, HDI, etc...

Reports are currently available as pdf (Acrobat Reader portable document file format) files only, nonetheless allowing for word search operations. Note that reports may be available in English, French or Spanish/Portuguese.

B.2.2 Expected Outputs and Deliverables

The study should be concluded and deliverables surrendered latest by 15 July 2019.

The consultant should ensure the delivery of the following outputs:

- A mid-study progress report, approximately mid-way into the assignment, including a detailed methodology and draft Technical report;
- Technical report (maximum of 100 pages), illustrated (tables, maps, graphs, pictures);
- Executive summary (1,000 to 1,500 words, text only);
- Article for a broader non-technical audience (for web publication purposes) 600 – 800 words;
- Power-point presentation (20 – 30 slides), using the OIE template.

The language and spelling/grammar of all output materials is UK/English.

All documents are to be submitted electronically, in Word format, Power-Point format and/or Acrobat Reader format (.pdf) as appropriate. Excel spreadsheets having contributed to the statistical analysis and/or production of tables and graphs are to be added. Maps are submitted in high resolution format as separate .jp(e)g or .png files.

None of the reports, documents and related supports may be used in other publications, whether paper-based or electronic, without the prior and written approval of the OIE Director General.

B.3 Qualifications and Experience

Eligibility criteria (either united in one candidate or provided by several proposed team members, as applicable) are as follows:

- Degree(s) in agricultural economics, agricultural sciences, veterinary sciences or related fields;
- (main) Consultant (team leader) should possess at least 15 years of demonstrated experience;
- (secondary) Consultant (ancillary) should possess at least 10 years of demonstrated experience, where applicable;
- Demonstrated (cumulative) experience of at least 8 years working in Africa or dealing with African portfolios;

- Demonstrated familiarity with the subject of (public) Veterinary Services delivery and knowledge of the OIE and its international standards;
- Proficiency with word processing and advanced spreadsheet applications/software;
- Thorough understanding of statistical methods and interpretation of results;
- Proficiency in English (oral and written English).

Additionally,

- Prior exposure to the PVS Pathway methodology is regarded as a strength, but is not essential;
- Command of French and Spanish/Portuguese (by one or more of the proposed candidates) is regarded as a strength but is not essential.

B.4 Work Arrangements

B.4.1 Organisation of the Work

This is a home-based assignment expected to require a total of 3 working-months, whereby there is freedom to conduct this study as an individual, or as a team. The study is entirely desktop-based, based on analysis of electronic documents. All necessary support and documentation will be provided to the Consultant(s) by Patrick Bastiaensen, with relevant support from the World Fund and Regional Activities Departments.

The Consultant(s) is/are not authorised to contact OIE Delegates or any other Member Country representatives in order to obtain clarification or additional information. This will only be allowed in exceptional circumstances and with the explicit prior authorisation of the Head of the Regional Activities Department (RAD).

B.4.2 Payment Schedule

- Thirty percent (30%) of the total price will be paid upon the signature of the contract;
- Thirty percent (30%) of the total price will be paid after receipt of a mid-study progress report;
- The balance payment will be issued upon reception and validation of the final deliverables (Technical report, executive summary, article, and presentation) by the OIE.

B.5 Structure of the Response

Interested applicant(s) are invited to submit an Expression of Interest (EOI) including the following:

- Maximum 4-page 'Expression of Interest' that provides information on the proposed methodology for carrying out the study, including the following sections:
 - Understanding of the project;
 - General methodology (including analytical approach, major constraints and prerequisites such as data requirements, risk factors, quality assurance methods, etc.);
 - Professional profiles (expertise, past similar experience, rationale for team-set up if more than one, language skills etc.);
 - Cost;
 - Timeline;

- Any additional information.
- Maximum 4-page CV with information on related experience (for each of the candidates, if joint submission);
- Two (2) work samples of peer reviewed related work;
- Contact details of 3 academic/professional referees.

B.6 Response Procedure

The OIE places high value on a multicultural and positive work environment and seeks gender and geographical balance in its international consultants.

The OIE welcomes applications of all qualified candidates, irrespective of their ethnic origin, gender, opinions or beliefs.

If you are interested in the position, please complete your application online by 28 February 2019 at the latest by clicking on the link below.

Should you have any questions, please contact Patrick Bastiaensen at p.bastiaensen@oie.int. In the first phase, short listed candidates/teams will be invited to make a (video-link) presentation on their EOI's after which a final screening will be conducted.

Annex B. PVS Evaluation Critical Competencies by edition, plus codes and specifications used in this project

The wording of the CCs is shown in this table. Blank cells represent CCs that were not in use in that specific edition. The same colour coding of the four FCs has been used as applied elsewhere in this document.

The specifications of the CCs used in this project are included in the final two columns. The wording is based as much as possible on the current edition (2019). Non-current, older or obsolete CCs have been retained for completeness; the wording of these older CCs is consistent with the edition of the Tool in which they were used.

Fundamental Component	Critical Competency (Wording by edition of the PVS Tool)							Wording used in this project	
	2006	2007	2008	2009	2010	2013	2019	Code	Specification
HUMAN, PHYSICAL AND FINANCIAL RESOURCES	I-1: Professional and technical competence of the Veterinary Services	I-1: Professional and technical staffing of the Veterinary Services	I-1: Professional and technical staffing of the Veterinary Services	I-1: Professional and technical staffing of the Veterinary Services	I-1: Professional and technical staffing of the Veterinary Services	I-1: Professional and technical staffing of the Veterinary Services	I-1: Professional and technical staffing of the Veterinary Services		
	I-1.A: Veterinary and other professionals (university qualification)	I-1.A: Veterinary and other professionals (university qualification)	I-1.A: Veterinary and other professionals (university qualification)	I-1.A: Veterinary and other professionals (university qualification)	I-1.A: Veterinary and other professionals (university qualification)	I-1.A: Veterinary and other professionals (university qualification)	I-1.A: Veterinary and other professionals (university qualification)	1.01	Staffing (veterinary and other professionals with university qualifications)
	I-1.B: Veterinary para-professionals and other technical personnel	I-1.B: Veterinary para-professionals and other technical personnel	I-1.B: Veterinary para-professionals and other technical personnel	I-1.B: Veterinary para-professionals and other technical personnel	I-1.B: Veterinary para-professionals and other technical personnel	I-1.B: Veterinary para-professionals and other technical personnel	I-1.B: Veterinary para-professionals	1.02	Staffing (veterinary para-professionals and other technical personnel)
		I-2: Competencies of veterinarians and veterinary para-professionals	I-2: Competencies of veterinarians and veterinary para-professionals	I-2: Competencies of veterinarians and veterinary para-professionals	I-2: Competencies of veterinarians and veterinary para-professionals	I-2: Competencies of veterinarians and veterinary para-professionals	I-2: Competency and education of veterinarians and veterinary para-professionals		
		I-2.A: Professional competencies of veterinarians	I-2.A: Professional competencies of veterinarians	I-2.A: Professional competencies of veterinarians	I-2.A: Professional competencies of veterinarians	I-2.A: Professional competencies of veterinarians including the OIE Day 1 competencies	I-2.A: Veterinarians	1.03	Professional competencies of veterinarians including the OIE Day 1 competencies
		I-2.B: Competencies of veterinary para-professionals	I-2.B: Competencies of veterinary para-professionals	I-2.B: Competencies of veterinary para-professionals	I-2.B: Competencies of veterinary para-professionals	I-2.B: Competencies of veterinary para-professionals	I-2.B: Veterinary para-professionals	1.04	Competencies of veterinary para-professionals
	I-2: Continuing education	I-3: Continuing education	I-3: Continuing education	I-3: Continuing education	I-3: Continuing education	I-3: Continuing education	I-3: Continuing education (CE)	1.05	Continuing education
	I-3: Technical independence	I-4: Technical independence	I-4: Technical independence	I-4: Technical independence	I-4: Technical independence	I-4: Technical independence	I-4: Technical independence	1.06	Technical independence
	I-4: Stability of policies and programmes	I-5: Stability of structures and sustainability of policies	I-5: Stability of structures and sustainability of policies	I-5: Stability of structures and sustainability of policies	I-5: Stability of structures and sustainability of policies	I-5: Stability of structures and sustainability of policies	I-5: Planning, sustainability and management of policies and programmes	1.07	Stability of structures and sustainability of policies
	I-5: Coordination capability of the sectors and institutions of the Veterinary Services	I-6: Coordination capability of the sectors and institutions of the Veterinary Services	I-6: Coordination capability of the sectors and institutions of the Veterinary Services	I-6: Coordination capability of the sectors and institutions of the Veterinary Services	I-6: Coordination capability of the Veterinary Services	I-6: Coordination capability of the Veterinary Services	I-6: Coordination capability of the Veterinary Services		
					I-6.A: Internal coordination (chain of command)	I-6.A: Internal coordination (chain of command)	I-6.A: Internal coordination (chain of command)	1.08	Internal coordination (chain of command)

					I-6.B: External coordination	I-6.B: External coordination	I-6.B: External coordination (including the One Health approach)	1.09	External coordination
		I-7: Physical resources	I-7: Physical resources	I-7: Physical resources	I-7: Physical resources	I-7: Physical resources	I-7: Physical resources and capital investment	1.10	Physical resources
	I-6: Funding	I-8: Funding	I-8: Funding	I-8: Funding	I-8: Operational funding	I-8: Operational funding	I-8: Operational funding	1.11	Operational funding
	I-7: Contingency funding	I-9: Contingency and compensatory funding	I-9: Contingency and compensatory funding	I-9: Contingency and compensatory funding	I-9: Emergency funding	I-9: Emergency funding	I-9: Emergency funding	1.12	Emergency funding
	I-8: Capability to invest and develop	I-10: Capability to invest and develop	I-10: Capability to invest and develop	I-10: Capability to invest and develop	I-10: Capital investment	I-10: Capital investment		1.13	Capital investment
					I-11: Management of resources and operations	I-11: Management of resources and operations		1.14	Management of resources and operations
TECHNICAL AUTHORITY AND CAPABILITY	II-1: Laboratory disease diagnosis	II-1: Veterinary laboratory diagnosis	II-1: Veterinary laboratory diagnosis	II-1: Veterinary laboratory diagnosis	II-1: Veterinary laboratory diagnosis	II-1: Veterinary laboratory diagnosis	II-1: Veterinary laboratory diagnosis		
						II-1.A: Access to veterinary laboratory diagnosis	II-1.A: Access to veterinary laboratory diagnosis	2.01	Access to veterinary laboratory diagnosis
						II-1.B: Suitability of national laboratory infrastructures	II-1.B: Suitability of the national laboratory system	2.02	Suitability of national laboratory infrastructures
		II-2: Laboratory quality assurance	II-2: Laboratory quality assurance	II-2: Laboratory quality assurance	II-2: Laboratory quality assurance	II-2: Laboratory quality assurance	II-1.C: Laboratory quality management systems (QMS)	2.03	Laboratory quality assurance
	II-2: Risk analysis	II-3: Risk analysis	II-3: Risk analysis	II-3: Risk analysis	II-3: Risk analysis	II-3: Risk analysis	II-2: Risk analysis and epidemiology	2.04	Risk analysis
	II-3: Quarantine and border security	II-4: Quarantine and border security	II-4: Quarantine and border security	II-4: Quarantine and border security	II-4: Quarantine and border security	II-4: Quarantine and border security	II-3: Quarantine and border security	2.05	Quarantine and border security
	II-4: Epidemiological surveillance	II-5: Epidemiological surveillance	II-5: Epidemiological surveillance	II-5: Epidemiological surveillance	II-5: Epidemiological surveillance	II-5: Epidemiological surveillance and early detection	II-4: Surveillance and early detection		
		II-5.A: Passive epidemiological surveillance	II-5.A: Passive epidemiological surveillance	II-5.A: Passive epidemiological surveillance	II-5.A: Passive epidemiological surveillance	II-5.A: Passive epidemiological surveillance	II-4.A: Passive surveillance , early detection and epidemiological outbreak investigation	2.06	Passive epidemiological surveillance
		II-5.B: Active epidemiological surveillance	II-5.B: Active epidemiological surveillance	II-5.B: Active epidemiological surveillance	II-5.B: Active epidemiological surveillance	II-5.B: Active epidemiological surveillance	II-4.B: Active surveillance and monitoring	2.07	Active epidemiological surveillance
	II-5: Early detection and emergency response	II-6: Early detection and emergency response	II-6: Early detection and emergency response	II-6: Early detection and emergency response	II-6: Early detection and emergency response	II-6: Emergency response	II-5: Emergency preparedness and response	2.08	Emergency preparedness and response
		II-7: Disease prevention, control and eradication	II-7: Disease prevention, control and eradication	II-7: Disease prevention, control and eradication	II-7: Disease prevention, control and eradication	II-7: Disease prevention, control and eradication	II-6: Disease prevention, control and eradication	2.09	Disease prevention, control and eradication
		II-8: Veterinary public health and food safety	II-8: Veterinary public health and food safety	II-8: Veterinary public health and food safety	II-8: Food safety	II-8: Food safety	II-7: Animal production food safety		
						II-8.A: Regulation, authorisation and inspection of establishments for production, processing and distribution of food of animal origin	II-7.A: Regulation, inspection (including audits), authorisation and supervision of establishments for production and processing of food of animal origin	2.10	Regulation, authorisation and inspection of establishments for production, processing and distribution of food of animal origin

					II-8.A: Ante- and post mortem inspection at abattoirs and associated premises (e.g. meat boning/cutting establishments and rendering plants)	II-8.B: Ante- and post mortem inspection at abattoirs and associated premises (e.g. meat boning/cutting establishments and rendering plants)	II-7.B: Ante- and post mortem inspection at slaughter facilities and associated premises	2.11	Ante- and post mortem inspection at abattoirs and associated premises
					II-8.B: Inspection of collection, processing and distribution of products of animal origin	II-8.C: Inspection of collection, processing and distribution of products of animal origin		2.12	Inspection of collection, processing and distribution of products of animal origin
		II-9: Veterinary medicines and veterinarybiologicals	II-9: Veterinary medicines and veterinarybiologicals	II-9: Veterinary medicines and veterinarybiologicals	II-9: Veterinary medicines and biologicals	II-9: Veterinary medicines and biologicals	II-8: Veterinary medicines and biologicals	2.13	Veterinary medicines and biologicals
							II-9: Antimicrobial Resistance (AMR) and Antimicrobial Use (AMU)		
		II-10: Residue testing	II-10: Residue testing	II-10: Residue testing	II-10: Residue testing	II-10: Residue testing	II-10: Residue testing, monitoring and management	2.14	Residue testing
	II-6: Emerging issues	II-11: Emerging issues	II-11: Emerging issues	II-11: Emerging issues	II-11: Emerging issues	II-11: Animal feed safety	II-11: Animal feed safety	2.15	Animal feed safety
	II-7: Technical innovation	II-12: Technical innovation	II-12: Technical innovation	II-12: Technical innovation	II-12: Technical innovation			2.16	Technical innovation
	II-8: Veterinary medicines and veterinarybiologicals				II-13: Identification and traceability	II-12: Identification and traceability	II-12: Identification, traceability and movement control		
					II-13.A: Animal identification and movement control	II-12.A: Animal identification and movement control	II-12.A: Premises, herd, batch and animal identification, tracing and movement control	2.18	Animal identification and movement control
					II-13.B: Identification and traceability of products of animal origin	II-12.B: Identification and traceability of products of animal origin	II-12.B: Identification, traceability and control of products of animal origin	2.19	Identification and traceability of products of animal origin
					II-14: Animal welfare	II-13: Animal welfare	II-13: Animal welfare	2.20	Animal welfare
INTERACTION WITH INTERESTED PARTIES	III-1: Communications	III-1: Communications	III-1: Communications	III-1: Communications	III-1: Communications	III-1: Communication	III-1: Communication	3.01	Communication
	III-2: Consultation with stakeholders	III-2: Consultation with stakeholders	III-2: Consultation with stakeholders	III-2: Consultation with stakeholders	III-2: Consultation with stakeholders	III-2: Consultation with interested parties	III-2: Consultation with stakeholders	3.02	Consultation with interested parties
	III-3: Official representation	III-3: Official representation	III-3: Official representation	III-3: Official representation	III-3: Official representation	III-3: Official representation	III-3: Official representation and international collaboration	3.03	Official representation
	III-4: Accreditation / autorisation / delegation	III-4: Accreditation / autorisation / delegation	III-4: Accreditation / autorisation / delegation	III-4: Accreditation / autorisation / delegation	III-4: Accreditation / autorisation / delegation	III-4: Accreditation / autorisation / delegation	III-4: Accreditation/authorisation/delegation	3.04	Accreditation/authorisation/delegation
	III-5: Veterinary Statutory Body	III-5: Veterinary Statutory Body	III-5: Veterinary Statutory Body	III-5: Veterinary Statutory Body	III-5: Veterinary Statutory Body	III-5: Veterinary Statutory Body	III-5: Regulation of the profession by the Veterinary Statutory Body (VSB)		

					III-5.A: VSB authority	III-5.A: VSB authority		3.05	Veterinary Statutory Body: authority
					III-5.B: VSB capacity	III-5.B: VSB capacity		3.06	Veterinary Statutory Body: capacity
	III-6: Implementation of joint programmes	III-6: Participation of producers and other stakeholders in joint programmes	III-6: Participation of producers and other stakeholders in joint programmes	III-6: Participation of producers and other stakeholders in joint programmes	III-6: Participation of producers and other stakeholders in joint programmes	III-6: Participation of producers and other interested parties in joint programmes	III-6: Participation of producers and other stakeholders in joint programmes	3.07	Participation of producers and other interested parties in joint programmes
							III-7: Veterinary clinical services		
ACCESS TO MARKETS	IV-1: Preparation of legislation and regulations, and implementation of regulations	IV-1: Preparation of legislation and regulations, and implementation of regulations	IV-1: Preparation of legislation and regulations, and implementation of regulations	IV-1: Preparation of legislation and regulations, and implementation of regulations	IV-1: Preparation of legislation and regulations	IV-1: Preparation of legislation and regulations	IV-1: Legislation and regulations	4.01	Preparation of legislation and regulations
							IV-1.A: Integrity and coverage of legislation and regulations		
	IV-2: Stakeholders compliance with legislation and regulations	IV-2: Stakeholders compliance with legislation and regulations	IV-2: Stakeholders compliance with legislation and regulations	IV-2: Stakeholders compliance with legislation and regulations	IV-2: Implementation of legislation and regulations and stakeholders compliance	IV-2: Implementation of legislation and regulations and compliance thereof	IV-1.B: Implementation of and compliance with legislation and regulations	4.02	Implementation of legislation and regulations and compliance thereof
	IV-3: International harmonisation	IV-3: International harmonisation	IV-3: International harmonisation	IV-3: International harmonisation	IV-3: International harmonisation	IV-3: International harmonisation	IV-2: International harmonisation	4.03	International harmonisation
	IV-4: International certification	IV-4: International certification	IV-4: International certification	IV-4: International certification	IV-4: International certification	IV-4: International certification	IV-3: International certification	4.04	International certification
	IV-5: Equivalence and other types of sanitary agreements	IV-5: Equivalence and other types of sanitary agreements	IV-5: Equivalence and other types of sanitary agreements	IV-5: Equivalence and other types of sanitary agreements	IV-5: Equivalence and other types of sanitary agreements	IV-5: Equivalence and other types of sanitary agreements	IV-4: Equivalence and other types of sanitary agreements	4.05	Equivalence and other types of sanitary agreements
	IV-6: Traceability	IV-6: Traceability	IV-6: Traceability	IV-6: Traceability				2.19	(moved to 2.19)
	IV-7: Transparency	IV-7: Transparency	IV-7: Transparency	IV-7: Transparency	IV-6: Transparency	IV-6: Transparency	IV-5: Transparency	4.06	Transparency
	IV-8: Zoning	IV-8: Zoning	IV-8: Zoning	IV-8: Zoning	IV-7: Zoning	IV-7: Zoning	IV-6: Zoning	4.07	Zoning
	IV-9: Compartmentalisation	IV-9: Compartmentalisation	IV-9: Compartmentalisation	IV-9: Compartmentalisation	IV-8: Compartmentalisation	IV-8: Compartmentalisation	IV-7: Compartmentalisation	4.08	Compartmentalisation

Annex C. Country-level status of PVS Tool reports

Note that shaded cells signify reports made available for analysis by OIE.

Country	PVS Evaluation report		PVS Gap Analysis report		PVS Evaluation Follow-Up report		VLSP report	
	Year	Status	Year	Status	Year	Status	Year	Status
Algeria	2007	Partners & donors	2013	ND	2012	ND		Not listed
Angola	2012	Partners & donors	2014	Partners & donors		Not listed	2016	Partners & donors
Benin	2007	Confidential	2014	Public	2013	Public	2008	ND
Botswana	2010	Public	2011	Public		Mission requested	2015	Confidential
Burkina Faso	2008	Partners & donors	2009	Partners & donors		Not listed	2010	Confidential
Burundi	2007	Partners & donors	2012	Public	2019	Confidential	2012	Public
Cameroon	2006	Partners & donors	2011	Partners & donors	2011	ND	2011	ND
Cape Verde	2014	ND		Not listed		Not listed		Not listed
Central African Republic	2010	Public		Mission requested		Not listed		Mission requested
Chad	2008	Confidential	2014, 2017	Public	2013	Confidential	2016	Public
Comoros	2011	Partners & donors	2016	Partners & donors		Not listed	2014	Confidential
Cote d'Ivoire	2007	Partners & donors	2012	Partners & donors	2011	ND	2013	Confidential
Dem. Rep. Of The Congo	2007	Partners & donors	2011	Partners & donors		Mission requested		Mission requested
Djibouti	2007	Confidential	2009	ND		Not listed	2016	ND
Egypt	2007, 2009	Partners & donors	2010	Partners & donors		Not listed		Not listed
Equatorial Guinea	2010	ND		Mission requested		Mission requested		Mission requested
Eritrea	2009	Not public	2011	ND		Not listed		Mission requested
Ethiopia	2011	Partners & donors	2012	Partners & donors		Not listed	2015	Confidential
Gabon	2007	Partners & donors	2011	Partners & donors		Mission requested	2010	ND
Gambia	2009	Confidential	2012	ND		Not listed	2016	Confidential
Ghana	2008	Partners & donors	2011	Public	2016	ND	2017	Public
Guinea	2007	Public	2009, 2012	Public		Not listed	2011	ND
Guinea-Bissau	2008	Public	2009	Public	2015	Public	2008	Confidential
Kenya	2007	Public	2011	Public	2011	Public	2015	Public
Lesotho	2007	Partners & donors	2011	Partners & donors		Not listed	2013	ND
Liberia	2013	Partners & donors	2016	Partners & donors		Not listed		Mission requested
Libya	2009	Partners & donors	2013	Partners & donors	2013	Confidential		Mission requested
Madagascar	2007	Partners & donors	2013	Partners & donors		Not listed	2008	ND
Malawi	2007	Partners & donors		No mission	2014	ND	2016	ND
Mali	2007	Partners & donors	2009	Partners & donors	2017	Public	2011	ND
Mauritania	2008	Partners & donors	2010	Partners & donors		Not listed	2011	ND

Mauritius	2009	Partners & donors	2011	ND		Not listed	2011	ND
Morocco	2007	Confidential	2013	Partners & donors	2013	Partners & donors		Not listed
Mozambique	2008	Partners & donors	2009	Partners & donors		Not listed	2015	Public
Namibia	2008	Public	2010	Confidential		Not listed		Not listed
Niger	2008	Partners & donors	2012	Public		Mission requested	2014	ND
Nigeria	2007	Public	2010	Public	2019	ND	2011	ND
Rwanda	2008	Public	2010	Public		Mission requested	2014	Public
Sao Tome and Principe	2013	Partners & donors		No mission		Not listed		Not listed
Senegal	2008	Partners & donors	2010, 2018	Partners & donors	2016	Public	2014	Confidential
Seychelles	2011	Public	2014	ND		Not listed	2016	Confidential
Sierra Leone	2010	Partners & donors	2012	Confidential		Not listed		Not listed
South Africa	2012	Public	2014	Public		Not listed		Not listed
Sudan	2009	Partners & donors	2014	ND	2013	Partners & donors	2016	Confidential
Swaziland	2007	Public	2015	Public	2015	Public		Not listed
Tanzania	2008	Partners & donors	2009	Partners & donors	2016	Public	2015	Confidential
Togo	2007	Partners & donors	2010	Public	2019	ND	2010	ND
Tunisia	2007	Partners & donors	2013	ND	2013	ND	2013	ND
Uganda	2007	Partners & donors	2011	Partners & donors	2018	Confidential	2010	ND
Zambia	2008	Partners & donors	2009	Partners & donors		Not listed	2011	ND
Zimbabwe	2009	ND	2014	Partners & donors	2018	ND	2016	Partners & donors
Total count available	46		49		18		25	

Annex D. Country-level differences between expected and assessed LoA scores from Gap Analysis reports

Country	Year of mission	Difference between mean LoA score				
		FC1	FC2	FC3	FC4	Overall
Algeria	2013	0.42	1.22	1.38	1	0.97
Angola	2014	1.71	1.75	1.86	1.38	1.7
Benin	2014	0.51	1.58	1.57	1.38	1.13
Botswana	2011	0.71	1.06	1	1.13	0.96
Burkina Faso	2009	1.08	1.07	0.83	1.13	1.04
Burundi	2012	1.65	1.18	1.48	0.75	1.26
Cameroon	2011	1.41	1.09	1.37	1.25	1.26
Chad	2014, 2017	0.71	1	0.71	0.88	0.85
Comoros	2016	1.29	1	0.71	0.88	1.01
Cote d'Ivoire	2011	1.21	1.47	1.14	0.29	1.17
DRC	2011	1.3	0.92	1.21	0.88	1.09
Djibouti	2009	1.33	1.29	1.17	1.46	1.32
Egypt	2010	0.89	1.08	0.67	1.08	0.98
Eritrea	2011	0.83	0.86	0.67	0.88	0.83
Ethiopia	2012	0.43	1	1.29	0.63	0.79
Gabon	2011	0.75	0.79	0.93	0.52	0.75
Gambia	2012	1.22	1.43	1.33	1.58	1.38
Ghana	2011	0.8	1.06	1.1	0.63	0.91
Guinea	2009, 2012	0.98	0.43	0.19	0.75	0.61
Guinea Bissau	2009	1.42	1.07	1	0.5	1.05
Kenya	2011	1.07	0.68	1.29	1.13	0.96
Lesotho	2011	1.69	1.8	1.83	0.63	1.52
Liberia	2016	1.23	1.11	0.67	0.88	0.98
Libya	2013	1.08	0.72	0.74	0.63	0.81
Madagascar	2013	1.62	1.28	0.95	1.13	1.26
Mali	2009	0.56	0.82	0.5	0.38	0.59
Mauritania	2010	1.17	1.53	1.83	1.33	1.42
Morocco	2013	1.19	1.11	1.45	1.13	1.22
Mozambique	2009	1.5	1.29	1.83	1	1.38
Niger	2012	0.77	1.12	1.26	0.88	1
Nigeria	2010	0.65	0.72	1.36	1.75	0.99
Rwanda	2010	0.11	0.83	0.93	0.45	0.55
Senegal	2010	0.75	1.07	1.33	0.86	0.97
South Africa	2014	0.79	0.61	0.57	0.5	0.64
Sudan	2014	0.1	0.02	1.07	0	0.19
Swaziland	2015	0.61	0.67	0.45	0.13	0.53
Tanzania	2009	1.42	1.64	2	1	1.5
Togo	2010	0.97	1.16	0.67	0.5	0.84
Tunisia	2013	1.4	1.28	1.33	0.88	1.23
Uganda	2011	1.9	1.38	1.57	1.16	1.5
Zambia	2009	1.25	1.36	1.5	1.13	1.3
Zimbabwe	2014	1.17	1.4	1.33	1.13	1.26
Mauritius	2011	1.42	1.16	1.29	0.88	1.21
Seychelles	2014	0.5	1.29	0.57	0.69	0.79
Mean		1.04	1.10	1.13	0.89	1.04



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Final report - August 2019



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