Improving the delivery of veterinary services in Africa: insights from the empirical application of transaction costs theory in Uganda and Kenya

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Summary
This paper presents a summary of findings from a research project that examined institutional arrangements for providing animal health services in Uganda and Kenya. Given the need to find solutions to the pervasive governance challenges encountered in the delivery of veterinary services in Africa, the study applied transaction economics theory to generate recommendations on how to improve the delivery of these services and minimise livestock production risks, including those that pose a risk to human health, e.g. zoonoses.

The most notable recommendations are as follows: i) lower- and middle-income countries should invest in creating an enabling environment that supports the relationship between professional veterinarians and para-professionals, to ensure the timely reporting, treatment and control of animal diseases; ii) the provision of veterinary extension services should not focus solely on household ‘heads’, but also on other household members, such as wives and children, and on herdsmen; iii) strong government engagement is required in the provision of veterinary services for pastoral or extensive livestock production systems, because normal market forces have failed to attract professional veterinarians and trained para-professionals from the private sector to work in these sectors; iv) farmers must be empowered to hold service providers accountable, by the development and trialling of tools that would enable them to measure the quality of services that they receive and to verify the qualifications of different service providers; v) investment in veterinary education is vital, to ensure that enough qualified veterinary staff are available to offer veterinary services to farmers.

Keywords

Introduction

Livestock production is a very important activity in the livelihoods of many rural households in developing countries. It often contributes to multiple livelihood objectives and is an important source of nutritious food, income and draught power (1, 2). Livestock are also a major store of wealth and investment and play a role as a social asset. For example, livestock are used for paying a dowry on marriage; as compensation for injured parties in tribal or clan feuds; and as an indicator of social status in the community (2, 3). Livestock production also offers employment opportunities, especially to those involved in adding value to livestock products (4).

However, animal diseases continue to be a threat to livestock production and to the realisation of such benefits in most developing countries, particularly in sub-Saharan Africa (5, 6, 7). An outbreak of disease can mean the difference between sufficient food and food insecurity; having a secure income and losing key household assets; and even between eating healthy food and food that is contaminated (5, 6).
In developing countries, epidemic diseases such as peste des petits ruminants (PPR), contagious bovine pleuropneumonia (CBPP) and caprine pleuropneumonia (CCPP) have led to the deaths of many animals, while other diseases, including foot and mouth disease (FMD) and brucellosis, affect animal growth and milk production (8, 9, 10, 11). Zoonotic and foodborne diseases, such as gastro-intestinal diseases, also lead to deaths and increased treatment costs, which are passed on to the consumers of livestock products (12, 13).

A report by the International Federation of Animal Health estimates that about one million cattle die of rabies in Central and South America each year, while 55,000 humans die of rabies annually in the world, with 99% of these deaths occurring in developing countries (14). Knight-Jones and Rushton (10) estimate losses due to FMD in the endemic regions of Africa and Asia to be in the range of US $5 to $21 billion annually, in terms of production losses and vaccine costs alone. In South Sudan, Barasa et al. (15) estimate a loss of $25 per cow per year from FMD, and, in Nigeria, Fadiga et al. estimate the economic burden of PPR, CBPP, trypanosomiasis, Newcastle disease and African swine fever at $179 million (29.2 billion naira) (16).

A recent study by the International Livestock Research Institute reveals that many of the major geographical hotspots for zoonotic diseases are in East Africa, with all four main countries in the region, namely Ethiopia, Kenya, Uganda and Tanzania, appearing among the top 20 countries most burdened by zoonotic disease (13). The report estimates that about 13 zoonotic diseases are responsible for 2.4 billion human cases of illness and 2.2 million deaths every year in developing countries. The risk of zoonotic disease emergence is expected to increase with increased intensification of livestock production to meet the ever-increasing demand for animal protein, especially in developing countries (10, 13). Therefore, there is a dire need for cost-effective approaches or mechanisms for managing veterinary services so that they can minimise risks to livestock production and risks to animal and human health.

Managing veterinary services: from private and public analysis of veterinary service delivery to process-based analysis

Before the 1980s, the delivery of veterinary services in Africa, including in Uganda and Kenya, was entirely the responsibility of the government. However, in the late 1980s, the role of government in providing public services, including veterinary services, was being questioned in favour of the market forces of supply and demand, as a consequence of prolonged fiscal challenges (17). As a result, the World Bank pressured African governments to adopt structural adjustment programmes (SAPs) as a condition for receiving loans (financial or budgetary support). The expectation was that the SAPs would lessen the fiscal and governance challenges confronting African governments by promoting the private sector (the ‘market approach’) as the preferred means of providing services, including veterinary services (18).

However, the ‘miracle of the market’ did not happen (17) and, as a result, the World Bank supported analytical works on what governments should and should not provide, such as those of Umali et al. (19) and Ahuja (20). Those veterinary services for which no market failure was assumed to exist were categorised as private services and those where the market approach was not succeeding in ensuring that demand for those services was met were categorised as public goods (17, 21). As a result, a number of institutional arrangements emerged, including: decentralisation, cost recovery, sub-contracting, the provision of subsidies to animal health service providers and the Community Animal Health Worker (CAHW) system, particularly in pastoral areas. Nonetheless, in most cases, expectations have not been met (22) and this is largely attributed to institutional and governance challenges (23, 24, 25).

To address these institutional and governance challenges, Riviere-Cinnamond (21) recommends that economic analyses of animal health service delivery should move towards a process-based approach, which provides a broader perspective and understanding of transaction costs. Process-based analysis provides insights into transaction costs that arise from political interference, behavioural attributes and other economic attributes, including market failure (21). Indeed, a number of studies that examine behavioural attributes and incentives in these areas, as well as strategic interactions between public- and private-sector actors, have since emerged (26, 27, 28). Nevertheless, these studies pay less attention to governance problems, such as community capacity and state capacity. Nor do they deal adequately with veterinary service delivery attributes, such as care intensity (a measure of the resources required to adequately care for an animal) and the intensity of transactions that tend to affect the day-to-day provision of veterinary services (29, 30). This paper presents a summary of PhD work, originally entitled: ‘An analysis of institutional arrangements for providing animal health services: a theoretical framework and empirical evidence from Kenya and Uganda’ (31). The study applied transaction cost economics (TCE) to the management of veterinary services in developing countries, given pervasive governance and market failures. This approach is based on the so-called ‘discriminating alignment hypothesis’.
developed by Williamson (32). The thesis developed and applied innovative tools, such as role-play experiments and Net Map process tools.

In applying the TCE approach, three steps are required.

i) The process of providing different types of veterinary services (such as clinical and preventative veterinary services) should be examined, to identify the actors, their roles, possible challenges and potential remedies to address the challenges faced in the provision of effective veterinary services.

ii) The effectiveness of institutional arrangements should be examined.

iii) Veterinary services that differ in their characteristics should be aligned with a system or an institutional arrangement or governance structure that best fits those characteristics (in terms of costs and competencies) so as to determine a cost-effective management approach (32).

Although the literature on veterinary services delivery identifies many institutional arrangements, such as decentralisation, government structures, CAHWs, para-veterinarians (para-professionals), and cost-sharing, this study considered three main service delivery systems, for analytical purposes:

- para-professionals
- professionals (qualified veterinarians)
- a referral system of veterinarians and para-professionals.

According to the World Organisation for Animal Health (OIE), a veterinary para-professional is a person authorised by the Veterinary Statutory Body to carry out certain designated tasks in a given territory, delegated to them under the responsibility and direction of a veterinarian (33). In reality, most para-professionals in African countries are not mandated by the Veterinary Statutory Body and are not under the direction or supervision of veterinarians (34). Therefore, for the purposes of this paper, the author considered all service providers who lacked a degree in veterinary science as para-professionals, including those who had not been formally trained but who operated a drug store.

The results from the process analysis revealed that para-professionals in Kenya and Uganda are more influential than veterinarians in the provision of clinical services in intensive livestock production. However, poor relations between veterinarians and para-professionals in the provision of clinical veterinary services have greatly affected the provision of preventative services, such as vaccination and disease surveillance. This is worsened by the fact that most para-professionals, in the case of Uganda, are trained in general agriculture, rather than in animal health. Nevertheless, their services are still in greater demand than those of private veterinarians, because para-professionals charge lower fees, are closer to farmers and farmers cannot measure the quality of services they receive (34, 35). In Uganda, there were no private veterinarians in either the pastoral or intensive livestock production system districts examined in the study. Moreover, out of 11 government veterinarians, only one was actively involved in providing veterinary services on a private basis. Most veterinary services delivery was left to the para-professionals. These para-professionals have various qualifications. Some have no education and are trained on the job, while others have formal education in the social sciences, general agriculture or accounting, but not in veterinary medicine, and have received only minimal formal veterinary training. The quality of services that they provide (measured by their ability to clinically diagnose a given cattle disease and prescribe the correct drug and dosage) is generally low (35).

In the case of qualified veterinarians, in both pastoral and intensive livestock production systems, the quality of their services is very high. However, absenteeism by government veterinarians, limited opportunities for career progress, weak veterinary structures, and inadequate and unpredictable budgetary allocations were found to affect their ability to deliver veterinary services.

In the context of clinical services, the results show that the ability of qualified veterinarians to identify the signs of different diseases does not significantly differ from that of para-professionals trained in veterinary science, and there is little difference in the accuracy of their prescriptions. However, the ability of service providers who are not formally trained in veterinary science to perform these tasks is significantly lower than that of service providers who are trained. Yet, the non-trained para-professionals are more dominant in the animal health market (34, 36, 37).

Nonetheless, as shown by the results of a role-play experiment, presented in Figure 1, the ability of para-professionals to prescribe drugs correctly improves with experience and as they interact with qualified veterinarians. The experiment took place over four ‘rounds’. In each round, farmers were given an ‘animal medical card’, similar to those used for people, with the name of a disease written in both English and the local language. Service providers were asked to write down the clinical signs for this disease and to prescribe drug treatment. After each round, veterinarians and para-professionals had the chance to discuss their answers, so with each round, the para-professionals gained experience and the quality of their response improved (for further details, see [35]). Thus, building working relationships between para-professionals
and veterinarians may be the key to improving the quality of services offered by para-professionals.

Unfortunately, legislation to support the strengthening of relationships between veterinarians and para-professionals is not easily enforceable in the pastoral areas of either Kenya or Uganda, because there are no or very few qualified veterinarians and veterinary-trained para-professionals (34). In Uganda, such legislation is also outdated and ineffective (36). The most recent revision of legislation in Uganda occurred in 2003, mainly in order to address the problems of poor or ineffectual relationships among the relevant government authorities and a general lack of capacity of both the Directorate of Animal Resources and Veterinary Board professionals to navigate the policy process.

Indeed, the Ugandan Ministry of Agriculture and Veterinary Board have singularly failed to obtain support for legislative change from the Ministry of Finance Planning and Economic Development. Nor have they managed to build a coalition with local government and farmers’ organisations to support veterinary-related legislation in general. Given these governance challenges, which are inherent in the provision of veterinary services in many countries, and the inefficiencies highlighted in the specific cases of Kenya and Uganda, the question that must be asked is: how can governments better manage and deliver veterinary services?

**The management of veterinary services: insights from transaction cost economics**

Insights from the TCE analysis show that it is not enough to categorise veterinary services into public and private goods. Doing so ignores governance attributes that ensure continuity and sustained service delivery, as well as variations in the technical competence of service providers and in the quality of veterinary services offered to livestock farmers (38). Such division of services into public and private assumes that the private sector can attract skilled service providers and that users are able to measure the quality of the services provided. As experience has shown, in some areas – especially in extensive livestock production systems in sub-Saharan Africa – the government sector does provide qualified veterinarians. However, even in the public sector, only a limited number of trained veterinarians are willing to work in pastoral livestock production systems with high livestock populations, given their remoteness (39). Worse still, corruption and the misuse of public funds have completely undermined government capacity to provide veterinary services (40, 41). Therefore, any policy option intended to enhance the performance of a national veterinary system in sub-Saharan Africa should address the following issues:

- improving the relationship between para-professionals and professional veterinarians

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**Fig. 1**

An assessment of the ability of para-professionals to prescribe appropriate drugs: improvements in the scores of service providers:

- **a)** with different educational backgrounds
- **b)** working in different types of livestock production

In a role-play exercise, service providers were asked what drugs they would prescribe for a given disease. The exercise was repeated for four different diseases. Between each round, para-professionals discussed their answers with professional veterinarians to learn more about clinical signs and appropriate drug treatment.
- ensuring that women and herdsmen have access to livestock extension services
- supporting public veterinary systems in pastoral areas
- investing in para-professional education
- empowering farmers to measure the quality of services.

**Improving the relationship between para-professionals and professional veterinarians**

The results from the TCE analysis of veterinary services delivery in Kenya and Uganda show that para-professional services are needed because they offer the care and attention clients require and because they are located closer to clients compared to veterinarians, which minimises travel costs and transaction costs. Veterinarians, on the other hand, are valued for their technical expertise (29). These results suggest that, if a service is characterised by a high level of repeat transactions (transaction intensity) and a high degree of care intensity, the para-professional system has a comparative advantage over the veterinary system. However, if a service requires technical skills, professional veterinarians have the advantage. In the case of clinical services with mixed attributes, para-professionals alone cannot be relied upon to provide these services (29). But neither can farmers rely only upon veterinarians, because there are not enough veterinarians to provide the veterinary services needed (42). A referral system or an integrated veterinary system, in which para-professionals and professional veterinarians work together, is the most effective, since most of these services have mixed attributes. Indeed, results from the TCE analysis show that the use of para-professional services by livestock farmers is positively related to the availability of veterinarians, and the use of professional veterinary services is positively related to the availability of para-professionals (29). In addition, as shown in Figure 1, positive interactions between para-professionals and qualified veterinarians lead to improvements in the quality of veterinary services provided by para-professionals (35). Therefore, any intervention aimed at improving the management of veterinary services needs to consider the relationship between professional veterinarians and para-professionals.

One example of making use of this relationship would be to strengthen referral arrangements. Referrals between veterinarians and para-professionals can be improved by placing para-professionals under the supervision of veterinarians, expanding mobile phone ownership among para-professionals, supporting the formation of para-professional associations, and investing in short-term training (34). The establishment of veterinary and para-professional associations is useful in forging a sense of unity, professionalism, and pride in one’s local reputation, as well as in creating links between para-professionals and veterinarians (43, 44, 45).

**Ensuring that women and herdsmen have access to livestock extension services**

Although women, children and young people the world over are known to play a key role in livestock production, including animal healthcare, they have limited access to extension services (46, 47, 48). Most extension programmes, especially in pastoral livestock production systems, mainly reach out to men or ‘household heads’, leaving out herdsmen, women and children, despite the fact that they play an influential role in the provision of veterinary services (36). Ilukor et al. (29) demonstrated that women and herdsmen, in particular, play a crucial role in the detection and treatment of livestock diseases. Therefore, veterinary extension services should focus not only on household heads, but must also take into account all those involved in livestock management, nutrition and animal healthcare (in the Kenyan and Ugandan situation, this includes female household members and herdsmen). This will help to ensure the timely detection, reporting, treatment and control of disease.

In other situations, the focus could be different. The message emerging from process-based analysis is that it is important to understand who is involved in livestock care, what role they play and their level of decision-making in the health and welfare of the animals in question.

**Supporting public veterinary systems in pastoral areas**

Private-sector veterinarians and para-professionals trained in veterinary science have come to play an important role in intensive livestock production systems since the withdrawal of the government (34, 35). However, this is not the case in pastoral livestock production systems (18). Experience in Kenya and Uganda has shown that the market failures there could not be overcome. The author’s findings also indicate that the effort to close this gap by promoting CAHWs, most of whom have no formal training and limited informal training, has proven to be a rather problematic response to this issue. This is especially the case when these service providers are expected to fulfil a major role in providing curative services, as this may lead to inefficient use or potentially dangerous misuse of veterinary drugs (35). As shown in Figure 1, para-professionals without formal training performed below required standards when it came to prescribing drugs. Although those who had undertaken some formal veterinary training as part of their social sciences or agricultural training performed better than informally trained para-professionals, their performance was below that of those trained in veterinary medicine. In addition, the quality of veterinary services provided to pastoralists was of low quality, in comparison to those provided to intensive livestock production systems (Fig 1). This is attributed to the fact that most para-professionals in pastoral systems (CAHWs) have no formal education.
These results suggest that stronger government involvement is required in the provision of veterinary services to pastoral or extensive livestock systems. The study indicates that there are more government veterinarians in the intensive livestock system than in pastoral systems because of the difficulty in attracting and retaining veterinary staff in remote pastoral areas. Leonard et al. (42) show that veterinarians are difficult to keep and to motivate, and they require higher wages than para-professionals who hold diplomas in veterinary medicine. The results of the present study, shown in Table I, indicate that such para-professionals are a viable alternative to veterinarians with university degrees, because they provide a quality of service very similar to that of veterinarians who hold a degree in veterinary medicine. Thus, considering the fact that veterinarians with degrees are not easily attracted to work in remote pastoral areas (36), governments should consider recruiting para-professionals who hold diplomas in veterinary science (veterinary nurses and technicians), to work in pastoral areas.

Investing in para-professional education

Para-professionals play a significant role in providing veterinary services to livestock communities, both in intensive and extensive livestock systems. However, in the extensive systems of many developing countries, the quality of the service provided by many para-professionals is low, because they have not received sufficient training and do not have the requisite skills (34, 35). The shortage of skilled providers has adversely affected the market demand for veterinary services because farmers tend to treat the animals by themselves instead of seeking the services of the service providers. Indeed, 52% of the farmers interviewed in both Kenya and Uganda said they would treat a sick animal on their farm by themselves because they believe they can perform the task just as well as the untrained para-professionals and are unwilling to pay a premium to service providers (29, 36). This results in the market for trained para-professionals and veterinarians becoming too small and fragile to sustain their incomes (29, 30).

The shortage of skilled veterinary service providers in countries such as Uganda and Kenya can be linked to a structural adjustment programme that led to a cut in the number of para-professionals and the ceasing of automatic recruitment of veterinarians (18). As a result, enrolment in veterinary training programmes declined and some para-professional veterinary training institutions were forced to close. The veterinary training institute at Entebbe in Uganda, for instance, closed down and, even today, there is no institution training para-professionals in veterinary medicine in Uganda. Even in countries such as Kenya, which do still train para-professionals in veterinary medicine, a majority of the students intend to work in intensive livestock production systems. Part of the problem is that most training institutions are situated in geographical regions where intensive livestock production is practised.

The number of veterinary para-professionals and veterinary nurses/technicians in areas of extensive livestock production could be increased by encouraging veterinary colleges to establish training centres in these areas. This approach could have considerable potential to increase enrolment rates because the costs of access would be significantly reduced (49). In addition, development partners and governments could establish scholarship programmes targeting students from marginal livestock-producing areas who wish to train as para-professionals. A similar scholarship programme is being implemented in Uganda by the Ministry of Health to support human resource development in the provision of human healthcare services in hard-to-reach and marginal areas (50). Such an intervention for animal health would ensure that marginal areas had sufficient qualified veterinary staff to offer quality veterinary services. If this does not happen, the livestock sectors in those areas will continue to be disadvantaged by unqualified service providers who tend to misuse animal drugs; moreover, disease outbreaks, delays in disease reporting and surveillance challenges will persist. This will inflict significant losses on farmers, on human healthcare systems and on the economy.

Empowering farmers to measure the quality of services

Much of the attention given to improving the delivery and governance of veterinary services has focused on good veterinary legislation, and on getting the ‘right’ veterinary system, to ensure a strong chain of command in veterinary services delivery (6, 51). The role of farmers and livestock producers has either been ignored or received little attention. Yet their role is of particular importance, as a result of the paradigm shift in veterinary services delivery from the public to the private sector, or to private–public partnerships (52). Van Veen and de Haan (53) argue that farmers and farmer associations should play a much greater role in initiating and maintaining veterinary legislation, as well as in demanding quality veterinary services. Having strong veterinary legislation with good enforcement and

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<th>Type of service</th>
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<tr>
<td></td>
<td>Veterinarians</td>
<td>Para-professionals</td>
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<tr>
<td>Clinical diagnosis</td>
<td>53%</td>
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<td>Drug prescription</td>
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effective veterinary systems is necessary to improve the delivery of veterinary services, but it is not enough. It is also necessary that farmers be able to participate in the animal health market to ensure the sustainability of the veterinary system.

One of the main challenges for farmers is that they are not easily able to measure the quality of services that they receive from veterinary service providers (54). It is important, therefore, to develop and test tools, such as the animal medical cards referred to previously, that will enable them to improve their own knowledge and skills and thereby equip them to assess the work of these service providers.

A study by Ilukor and Birner (35) showed that using an animal medical card enables farmers to assess the quality of service they receive from veterinary service providers and to make those who provide poor-quality services accountable. This tool can also help in keeping records of the treatment history of the animal and monitoring antimicrobial agents. In France, the French Veterinary Association has developed the VETELEVAGE software package to monitor the prescription and use of medicines at the farm level. The computerised register is shared by the farmer and the veterinarian. Veterinary interventions and prescriptions, as well as the farmer’s interventions and treatments administered, are captured. The application makes it easy to monitor herd performance, treatment protocols and antibiotic prescriptions (55).

In developing countries, if farmers do not have computers, the use of exercise books could be promoted. Farmers would ask the service providers to write their diagnosis and prescription in these books. This tool could help farmers to distinguish between the qualifications of different service providers and the quality of services they offer. The tool could also help to exclude non-educated para-professionals from the marketplace, or at least reduce their numbers, and thereby reduce competition.

**Conclusion**

Transaction cost analysis of veterinary services delivery in Kenya and Uganda demonstrates that any given intervention aimed at improving veterinary services delivery should support:

i) a synergistic relationship between para-professionals and professional veterinarians, through mutually beneficial referral arrangements

ii) the establishment of public veterinary systems for pastoral areas

iii) investment in the education of para-professionals

iv) the empowerment of farmers to be able to measure the quality of services offered to them

v) access for women and herdsmen to livestock extension services.

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**Améliorer la prestation de services vétérinaires en Afrique : éclairage à partir d’une étude empirique basée sur les coûts de transaction en Ouganda et au Kenya**

J. Ilukor

**Résumé**

L’auteur propose une synthèse des principales conclusions d’un projet de recherche consacré aux dispositifs institutionnels élaborés en Ouganda et au Kenya pour encadrer la prestation des services de santé animale. Face à la nécessité de trouver des solutions aux graves difficultés de gouvernance qui entraînent la prestation de services vétérinaires en Afrique, cette étude s’est fondée sur la théorie des transactions économiques pour formuler quelques recommandations sur les moyens d’améliorer la prestation de ces services et de
Mejora de la prestación de servicios veterinarios en África: ideas resultantes de la aplicación empírica de los costos de transacción en Uganda y Kenia

J. Ilukor

Resumen
El autor resume las conclusiones de un proyecto de investigación en el que se estudiaron los dispositivos institucionales destinados a prestar servicios zoosanitarios en Uganda y Kenia. Dada la necesidad de encontrar soluciones para los omnipresentes problemas de buen gobierno que lastran la prestación de servicios veterinarios en África, en el estudio se aplicó la teoría de la economía de transacción para formular una serie de recomendaciones sobre la manera de mejorar la prestación de dichos servicios y reducir al mínimo los riesgos para la producción ganadera, en particular aquellos que entrañen una amenaza para la salud humana, como las zoonosis.

Las recomendaciones más destacadas son las siguientes: i) los países de nivel bajo o medio de renta deben invertir en la creación de condiciones que favorezcan la relación entre los veterinarios profesionales y los paraprofesionales, con objeto de lograr una mayor puntualidad en la notificación, el tratamiento y el control de las enfermedades animales; ii) la prestación de servicios de divulgación veterinaria no debe ir dirigida únicamente a los «cabezas de familia», sino también a los demás miembros de la unidad familiar (esposa e hijos, por ejemplo) y a los encargados de cuidar de los rebaños; iii) en sistemas de producción ganadera pastoral o extensiva la prestación de servicios veterinarios exige una...
References


