

An Analysis of Animal Healthcare Service Delivery in Kenya

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One important objective of agricultural policies and interventions in developing countries is to commercialize and intensify agricultural production. As argued in Chapter 5, to intensify their agricultural production, smallholder households may require access to a range of support services, including improved seeds, inorganic fertilizers, credit, technical advice, market information, and linkages to output markets. In this case study one of the critical inputs for animal production—animal healthcare services—is analyzed. The control of animal diseases and the promotion and protection of animal health through efficient and reliable animal healthcare services are essential components of any effective animal breeding and production program and constitute an essential prerequisite to livestock development. Despite remarkable technical advances in the diagnosis, prevention, and control of animal diseases, the condition of animal health throughout the developing world remains generally poor, causing substantial economic losses and hindering any improvement in livestock productivity.

In many developing countries, animal healthcare services were established with the main objective of controlling major contagious and infectious diseases, such as foot-and-mouth disease, rinderpest, and contagious bovine and caprine pleuropneumonia, as well as parasitic diseases (such as trypanosomiasis and tick-borne diseases). This goal was obviously the first priority, because the control of these diseases is a prerequisite for any successful livestock development program. The successful control of disease depends initially on its timely and accurate recognition and on the presence of sound diagnostic capabilities based on effective working links between

laboratories and field services. Emergencies created by outbreaks of major infectious diseases demonstrate the need for establishing and improving such diagnostic services. Particular attention should also be given to the development of an efficient animal disease information system.

In the immediate postcolonial period of the 1960s, the public-sector veterinary services of most developing countries were engaged in delivery of the full range of veterinary activities and services, with little or no participation by the private sector. By the mid-1980s, many of these countries were experiencing serious economic difficulties and were left with little choice but to accept structural adjustment policies (SAPs), linked to International Monetary Fund and World Bank loans. These SAPs sought to increase the role of the private sector in providing commercially based services that had previously been provided by the public sector. The rationale behind this policy was that market-oriented economies and any form of private enterprise would be likely to outperform the public sector. In the agricultural and especially the livestock sectors, SAPs have resulted in reduced investment in capital and recurrent expenditures. This outcome in turn led to a drive for the privatization of veterinary services, with the aim of diminishing the role of the state in these activities. Animal health was seen as a private good, and veterinary services were seen essentially as providing an animal healthcare delivery system. The sale of veterinary medicines and vaccines and the provision of clinical services or vaccinations were thus at the forefront of privatization programs. Surveillance, early warning, laboratory diagnostic services, planning, regulation, management of disease-control programs, and assurance of the quality and safety of animal products became secondary considerations (FAO 2002).

Thus an institutional vacuum developed in the supply of animal healthcare services and veterinary inputs in the rural and more remote areas of most developing countries, where the majority of livestock is to be found. The casual stance adopted by many governments, allowing the privatization process to evolve passively, has resulted in this vacuum being filled by informal delivery systems (or by donors and nongovernmental organizations). These informal systems give livestock keepers ready access to prescription-only medicines, often of questionable quality, which they administer to their animals themselves with insufficient regard for informed diagnosis or correct treatment regimens.

It is against this general background that this case study presents an analysis of the emerging pattern of animal healthcare services delivery after liberalization in Kenya. Largely following from the neoliberal market thinking of the 1980s, service delivery through the private sector was considered more or less a panacea for redressing government failure in delivering animal healthcare services. The case study illustrates how the process of reform in this crucial input market was informed by a good understanding of the economic characteristics of animal healthcare services.

The reforms focused on defining clear roles for both the public and private sectors in the delivery of these services: the public sector would be responsible for provision of services with public goods characteristics, leaving those with private goods characteristics to the private sector. This case study illustrates how the framework for the analysis of institutions developed in Chapter 3 can also be used in analyzing the market for inputs and service delivery to farmers.

11.1 Characteristics and Attributes of Animal Health Services

It is useful to discuss the economic characteristics and attributes of animal healthcare services to help define the distribution of responsibilities between the public and private sectors, because these services can be delivered both by government veterinary staff (completely or partly free of charge) or by private veterinarians (usually at cost). Broadly speaking, the spectrum of animal healthcare services includes preventive and control and/or inspection programs and the treatment of sick animals. The most important tier of the animal healthcare service structure is the field animal healthcare service, which is in direct contact with producers, animals, and their products. The work done at the village, farm, herd or flock, and individual animal levels is decisive for any animal healthcare program.

Animal healthcare services can typically be classified as private or public goods, depending on who receives the benefits (Leonard 1993). At one extreme are purely private goods, which (1) only benefit the animal owner receiving the service; (2) can be enjoyed exclusively by that owner (the exclusion principle); and (3) when provided, exclude somebody else from that service at that particular time (the rival principle). For example, clinical treatment for a wound or worms would qualify as a pure private good, because the treatment benefits only the owner of that animal, and it excludes other farmers from the services of the veterinarian at that time. In contrast, such services as quarantine and meat inspection are pure public goods, as they do not directly benefit the owner of the animal and do not exclude other producers from that service.

As a rule, the higher the private benefit, the more justified it is to have the beneficiary pay for the service directly and to transfer the service to the private sector. Public-sector management of private-good services is justified if economies of scale are an important consideration or if sophisticated expertise or equipment is needed. In such cases, the services should be financed through direct payment from the beneficiaries and not from general revenue.

Pure public good services typically involve market failures, externalities, or moral hazards and should be managed by the public sector (although subcontracting to

private operators is always possible) and financed by the general public revenue. Such activities as meat inspection approximate a purely public service and should therefore be financed and managed by public resources. Other examples of pure public goods include veterinary public health care and prevention, control, or eradication of major epidemic livestock diseases that have the potential to affect the national economy through high production losses, losses in export trade, or food insecurity at a national level. Individual farmers (particularly poor and marginalized farmers) and private providers of animal health care are relatively powerless to protect themselves from these diseases, which require a national or even international approach for their control. This approach should also include the prevention and control of zoonotic diseases and other food-safety issues that could cause substantial public health concerns in communities. The control of the tsetse fly, which transmits cattle trypanosomiasis, is one important example.

Between these extremes, there is a continuum of diseases and animal health concerns with varying public and private attributes. Brucellosis, for example, is a classic zoonotic disease with high infection rates in rural populations. It frequently affects whole families in a short time, causing severe disability and family crisis, because most of the wage earners will be sick simultaneously. If medical treatment is not sought or available, the disease results in significant economic loss to individuals and countries. There is a clearly recognized public good in controlling this disease in livestock, the only source of infection for humans. Brucellosis species cause abortion and decreased lactation in female cattle or small ruminants, so prevention is clearly a private good for livestock owners. Both individual owners and the public sector could have obligations to pay the costs of controlling this disease.

One important aspect of animal healthcare service delivery that complicates the decision on who should provide or pay for the service relates to the externalities produced by these services. Externalities are spillover effects from production or consumption of a given service. Markets may be ill equipped to allocate resources optimally when externalities exist. Typically, therefore, either too little (in the case of a positive externality) or too much (in the case of a negative one) is produced or consumed in the absence of a price mechanism to determine the value of these externalities. A vaccination for control of epidemics is an example of a service with a positive externality. Controlling the spread of foot-and-mouth disease or rinderpest in a given region checks the spread to other regions. As another example, cattle dips designed for the treatment of ticks and tick-borne diseases (especially East Coast fever in East Africa) produce predominantly private benefits. However, if participation is low, the population of ticks resistant to the acaricide may increase and pose a threat to all farmers, including those participating in the program. Because of these externalities, there is a public element in a dipping program, suggesting the need for some state involvement.

An additional attribute of animal healthcare services is the existence of economies of scale, which relate to the research and production of vaccines, veterinary drugs, and supplies and to individual veterinary practices. All entail significant indivisible fixed costs that are diminished with increasing scale of operation and sales. The cost of input delivery is at times increased substantially as a result of widely dispersed farmers. Under such circumstances, natural monopolies enjoying economies of scale deliver the inputs at a comparatively lower cost. However, net welfare losses arise from monopolistic market structures, leading to a suboptimal allocation of resources.

Furthermore, the limited skills and knowledge of farmers about animal diseases and their diagnoses confirm a typical situation of information asymmetry, in which one party is better informed about the details of a given transaction than the other, providing scope for opportunistic behavior. An animal healthcare service provider is capable of administering expired vaccines or drugs to an animal without detection, because the farmer is not able to evaluate the quality of the drugs. Likewise, a service provider can recommend a more costly course of therapy to reap higher returns from a transaction.

Thus the roles of the private and public sectors in the delivery of animal healthcare services are not so clear-cut. Although recognizing the broad spectrum of animal healthcare services and the varied economic characteristics of different animal healthcare services, Gros (1994) points to the possible complementarities of the public and private sectors in the provision of animal healthcare services. In addition, Gros (1994) observes that although most services can be classified as private goods, public goods, or services that confer externalities, the original design of the animal healthcare services delivery system and the nature of most animal diseases in Africa mar this distinction. Most contagious diseases in Africa, such as foot-and-mouth disease or rinderpest, cannot be cured. However, vaccinations exist, and in some countries it is mandatory that the animal health authorities and farmers are alerted in the case of an outbreak. Whereas the diagnosis of such a disease by an animal healthcare specialist exhibits the rivalry principle, the control measures instituted, including vaccinations, confer positive externalities on neighboring farmers. According to Gros (1994), therefore, some curative services in Africa assume the character of a public good rather than a pure private one. Nevertheless, some curatives (such as treating a case of trypanosomiasis or a surgical intervention for delivering a calf by caesarean section) exhibit pure private good characteristics, because only the herd owner benefits and there are no externalities. Thus there is a need to take the characteristics of the disease, the intervention technology needed for prevention and cure, and the economic benefits flowing from the delivery of the service (all collectively referred to as the techno-economic characteristics of the activity or good) into account to determine the optimal delivery mode of animal healthcare services.

11.2 Case Study Method

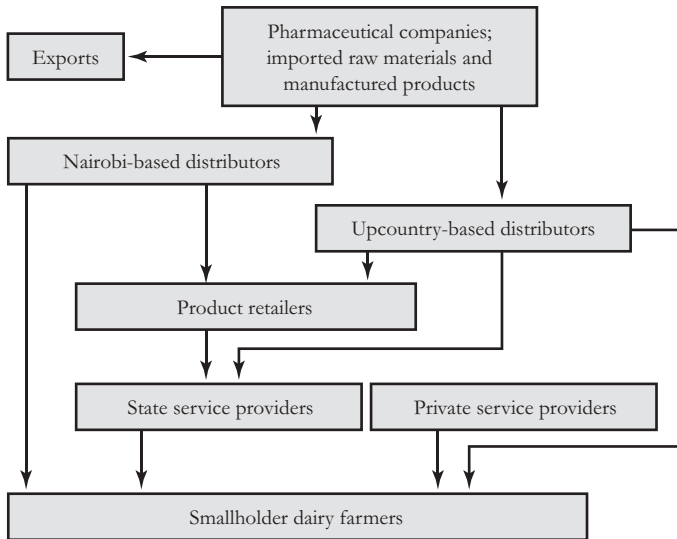
Using the framework presented in Chapter 3, this case study examines the effects of changes in the policy and economic environment (the environment) on the delivery of animal healthcare services to two smallholder dairy production regions in Kenya, namely, Kilifi in the coastal lowland zone and Meru in the upper midland zone (the action domain). Data were obtained through a survey of 320 farm households selected through a random sampling technique. In addition, information was obtained from the population of animal healthcare service providers in the survey area and a review of secondary data.

Ndung'u (2002) followed a similar approach in analyzing the structure of the animal healthcare delivery market in the Kiambu, Nakuru, and Nyandarua districts of Kenya, and the results are also reported here. Both studies recognize the imperfect market structure as a key characteristic of the animal healthcare delivery market.

11.3 Structure of the Market for Animal Healthcare Services in Kenya

Although both the public and private sectors are involved in the delivery of animal healthcare and artificial insemination services in Kenya, there has been an increase in the number of private-sector players, especially in the importation and distribution of pharmaceutical products, in the postliberalization period (Ndung'u 2002). Most of these pharmaceutical companies import semifinished products for reconstitution or finished products for repackaging. In addition, most have specialized in the distribution of human medicine as a product line, although some also have distributed agrochemicals used in crop protection. Save for semen for artificial insemination services, where the government-owned Central Artificial Insemination Services remains a key player, most of the pharmaceutical and veterinary vector-control products are imported or manufactured and distributed by private companies. Likewise, at the lower channel levels, upcountry distributors and private retailers are the main source of these products (Figure 11.1).

The state regulatory authorities (the Pharmacy and Poisons Board or the Pest Control Products Board) should register all pharmaceutical products. At this level of the delivery chain, the role of the state is largely regulatory. The pharmaceutical companies use a network of distributors and retailers for their line products. More often than not, a single upcountry-based distributor serves several pharmaceutical companies, implying some degree of coordination. Likewise, a single retailer serves as a retail outlet for a variety of products from different pharmaceutical companies. The distributors and retailers are the main source of veterinary inputs to service providers and farmers.

Figure 11.1 Market intermediaries and delivery channels for veterinary products

Source: Adapted from Ndung'u (2002).

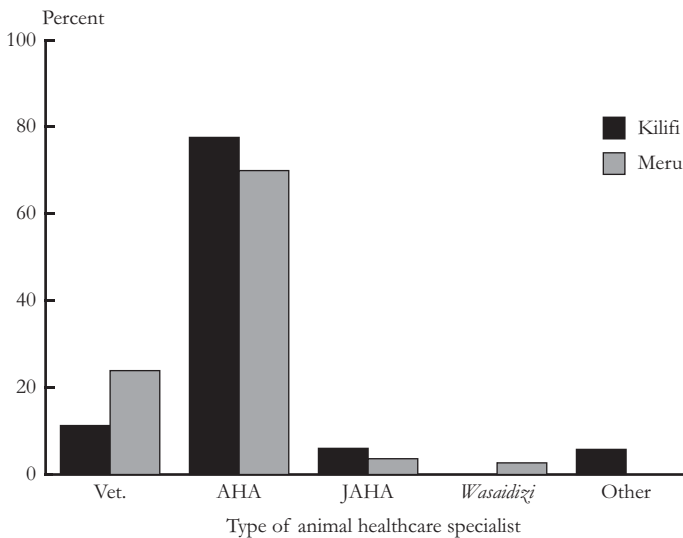
At the point of delivery, both the private and public sectors are involved in the delivery of a variety of animal healthcare services. Although both sectors provide clinical services, advice on vector control is mainly provided by the government. The level of formal training of service providers varies from professional veterinarians to animal healthcare technicians. Animal healthcare specialists in the public sector are posted according to geographical region, following a clear hierarchical structure based on level of professional qualification. Professional veterinarians supervise a number of paraprofessionals or veterinary technicians, thereby complementing one another in delivering services to livestock producers. Although some services remain the responsibility of professional veterinarians—including complicated clinical diagnosis, cases requiring major surgery, and prescription of veterinary drugs (classified as “ethicals”)—minor clinical cases, collection of samples, and routine herd health management are handled by paraprofessionals. Government records indicate that the ratio of professionals to paraprofessionals is 1:10 in Meru and 1:7 in Kilifi. Likewise Ndung'u (2002) indicates a ratio of veterinarians to paraveterinarians of 1:4, 1:2, and 2:3 for Nyandarua, Nakuru, and Kiambu, respectively. Undeniably, therefore, the paraprofessionals are the predominant service provider at the farm level.

Figure 11.2 indicates the main sources of animal healthcare services by service provider type and level of formal qualifications in Meru and Kilifi. These include

professional veterinarians, who are trained to degree level; paraveterinarians, who usually hold a certificate of training ranging from a few months to 2 years from animal healthcare training institutes and may be animal healthcare assistants (AHA) or junior animal healthcare assistants (JAHA); and village animal health scouts with no formal training, but who have acquired their skills through years of experience, otherwise known as *wasaidizi* (Kiswahili for “helper”). Other sources of animal healthcare services include fellow farmers and relatives.

The two studies reveal that there are very few private veterinary practices operating in the smallholder dairy production systems of Kenya. However, some paraprofessionals are increasingly setting up unlicensed practices with the minimum equipment required for the delivery of clinical services. Veterinary professionals in the public sector have traditionally engaged in private clinical work since the pre-independence period. Even with the advent of subsidized government clinical services, budgetary constraints limited the capacity of the government clinics. Therefore, most of the public-sector service providers have gradually expanded routine moonlighting¹ into fully-fledged private activities. Consequently, routine government work turned into private activity during office hours. The survey work in Kilifi and Meru revealed that animal healthcare practitioners in the government service spend a significant proportion of their time on private clinical practice using government facilities.

Figure 11.2 Sources of animal healthcare services



Notes: AHA, animal healthcare assistant; JAHA, junior animal healthcare assistant; *wasaidizi*, helper; vet., veterinarian.

Access to government-owned equipment and facilities by public-sector service providers operating in their private capacity causes a distortion in the animal health-care delivery market. Table 11.1 indicates that even in those cases when service providers in the public sector own some equipment, their levels of investment are far lower than that of their counterparts in private practice. Arguably, the public sector may be obliged to provide a form of production subsidy to animal healthcare service providers, especially where markets are too thin to support fully fledged private practices. In the present case, however, this policy is not that of the government, because private veterinary practices are not subsidized. Instead, the practice is a typical agency problem, in which service providers engage in hidden action, because the government does not condone their extraction of economic rent from their privileged positions. Besides their salaries and allowances, the public-sector service providers have access to government facilities and equipment that could create barriers to entry for private practitioners (Table 11.2).

Table 11.1 Average levels of investment by professional veterinarians (U.S. dollars)

Asset	Private sector		Public sector	
	Meru	Kilifi	Meru	Kilifi
Motor vehicle	3,000	2,667	0	0
Surgical kit	500	750	83	50
Refrigerator	1,167	250	0	0
Furniture	833	333	0	0
Other items	333	333	100	0
Total	5,833	4,333	183	50

Source: Oruko (1999).

Table 11.2 Items provided by the public sector

Item	Nature of unintended subsidy
Office rent and furniture	Public-sector practitioners operate from a government office
Telephone	Clients mostly call; specialists just receive
License fees	Public-sector practitioners do not need a license
Vehicle purchase and maintenance	Where available, the government meets the cost of purchase and maintenance
Fuel	Farmers often meet the fuel cost when specialists attend a case
Laboratory and refrigeration facilities	Practitioners based at Veterinary Investigation Laboratories or at the district headquarters with a functional laboratory
Surgical equipment	Usually provided by the government
Client base	Public-sector practitioners are posted in a geographical area with a ready client base (no monetary value attached)

11.4 Market Imperfections and Asymmetric Information in the Animal Healthcare Market

The effects of asymmetric information on prices has been extensively analyzed in the human healthcare economics literature. A large number of studies in the United States have documented wide dispersions in physicians' fees in seemingly competitive markets (Feldstain 1970; McCarthy 1985; Rizzo and Zeckhauser 1992). These large dispersions have been interpreted as indicative of incomplete market information. Chawla (2002) indicates that for a variety of reasons, including information asymmetries and the urgent nature of consumption, patients in the market for human healthcare services face high search costs and therefore balance the prospect of finding a physician willing to accept lower fees against the cost of gathering the information and searching for the physician. The physician may also balance between charging a lower fee against losing the patient. In such a market, stable market equilibria may exist, with different physicians charging different prices for the same product (Chawla 2002). In New Institutional Economics (NIE) terms, both patients and doctors face transaction costs. The magnitude of costs may, however, not be sufficiently high to result in market failure in the developed world.

The framework of incomplete market information can be applied to the animal healthcare sector to analyze the service-seeking behavior of livestock farmers. In a full-information market, dairy farmers seeking healthcare services of a given quality should obtain them at the lowest cost possible. Likewise, income-maximizing animal healthcare service providers should be able to assess the farmers' willingness to pay and charge the maximum fees possible. However, in a market with information imperfections, dairy farmers may have a general knowledge of the price spread but not of the actual fees charged by each service provider. Consequently, they choose an optimal amount of search, balancing the cost of search with the amount of savings from finding a lower price. This strategy is especially common when there is a wide spectrum of service providers to choose from.

The animal healthcare service providers interviewed indicated that the cost of clinical and prophylactic services depended on a number of factors, including the nature of the disease, qualification of the healthcare practitioner, means of transportation, and perceived wealth of the client. A client's ability to pay—assessed by such criteria as type of housing, breed of animals, and farm layout—influences the fees for clinical services. Accordingly, the fees charged for a given service vary a great deal both within and across different service providers. This observation appears to be consistent with the behavior of physicians reported in Chwala (2000).

Most livestock farmers are either unable (or do not bother) to assess the professional qualification of animal healthcare service providers. The title "doctor," meant for a qualified professional veterinarian, is therefore used for all service providers,

irrespective of their qualifications. The paraprofessionals working with the professionals often observe the rates charged by their supervisors for given cases and subsequently use these as guidelines for their own fee structures. Given the farmers' inability to differentiate between a professional veterinarian and a paraprofessional, uniform charges are often levied to specific clients. By the same token, most animal healthcare practitioners do not clearly itemize their charges into transportation costs, professional fees, and margins on drugs. In fact, few professional veterinarians and paraprofessionals fix their professional fees for cases, even though guidelines are provided by the Kenya Veterinary Association (KVA). The general trend is to consolidate the charges into a single fixed fee, and farmers are often made to believe they are paying for the drugs rather than for a professional service.

As a result, dairy farmers face *ex ante* search and information costs in the animal healthcare delivery market. It is hypothesised that transaction cost is one of the key factors influencing the choice of animal healthcare service provider. Several studies have analyzed the effect of transaction costs on market participation and choice of market outlet in the product markets (Goetz 1995; Hobbs 1997). Most of these studies employ binary choice econometric models using indicator variables to capture the elements of transaction cost. Oruko (2001) employed a probit model to examine the probability that a farmer will consult a veterinarian. Distance to the nearest alternative clinic run by a paraprofessional and frequency of use of animal healthcare services positively influenced the probability of consulting a veterinarian (Table 11.3). Similar results were obtained with paraveterinarian specified as the dependent variable. These results suggest that professional qualification is not critical in the choice of service provider.

Likewise, Ndung'u (2002) employed a probit model, specifying both the frequency of previous contact and ethnicity—key information-indicator variables—as explanatory variables to predict a farmer's probability of using a veterinarian. Density of veterinarians in a particular zone, ethnicity of a service provider, and frequency of previous contact all positively influenced the probability of consulting a professional veterinarian. By the same token, ethnicity and density positively influenced the probability of farmers consulting paraveterinarians (Table 11.4). Irrespective of the level of professional qualification, service providers of similar ethnic background to their clients commanded a higher degree of trust from the farmers. The above results appear to be consistent with the findings by Ahuja et al. (2000), who examined the quality of veterinary services from three categories of service providers in three provinces of India using two indicators: degree of accuracy in diagnosis and prescription, and the success rate of the services (measured by the proportion of total service provider visits that result in the animal's recovery). Results showed no significant differences among government, private, and cooperative services, and the study concluded

Table 11.3 Significant variables influencing the probability of using a veterinarian

Significant variable	Coefficient (β)	Standard error	z-Score
Region (Kilifi)	-0.261***	0.008	-2.541
Distance to alternative source of animal healthcare services	0.051**	0.030	4.215
Frequency of use of animal healthcare services in the past 12 months	0.122**	0.201	2.838
Household head educated to tertiary level	-0.318*	0.524	3.568
Least likelihood = -237.711			
Pseudo R^2 = .1220			
Model c^2 = 26.28			

Notes: * indicates significance at the 10 percent level, ** at the 5 percent level, and *** at the 1 percent level.

that characteristics of the service provider do not explain variations in the quality of services.

As indicated earlier, the scope for opportunistic behavior does exist in the presence of information asymmetries. The Oruko (2001) and Ndung'u (2002) studies reveal that frequency of transactions and ethnicity are key factors determining the choice of service provider. Following repeated transactions, farmers are better able to assess the quality of services provided by a given provider. Trust based on reputation is thus built among the transacting parties. Likewise, members of a similar ethnic group belong to the same social networks. Accordingly, trust is viewed as a source of social capital. According to Dyer (1997), noncontractual trust, such as goodwill, eliminates the need for formal contracts, which are costly to write, monitor, and enforce. When trust exists, transacting parties spend less time and resources on ex ante contracting and monitoring to see whether the other party is shirking, because they trust that pay-off will be divided fairly.

Table 11.4 Transaction-cost variables and use of a vet (Kiambu, Nyandarua, Nakuru)

Significant variable	Coefficient (β)	Standard error	z-Score
Farmer perception of service quality	0.207*	0.108	1.907
Density of veterinarians in the area	0.117**	0.030	3.950
Travel time to the nearest veterinarian	-0.004**	0.001	-3.330
Veterinarian belongs to the same ethnic group as client	0.604**	0.218	2.766
Least likelihood = -199.288			
Pseudo R^2 = .1124			
Model c^2 = 50.49			

Source: Ndung'u (2002).

Notes: * indicates significance at the 10 percent level and ** at the 5 percent level.

11.5 Challenges of Regulation

The responsibility for regulation and quality control is vested in the public sector and the Kenya Veterinary Board. Only qualified veterinary surgeons with a degree in veterinary medicine are allowed to practice by law. Private veterinary practices are registered only after meeting the recommended standards in terms of equipment and location of clinic. Based on these recommendations, KVA provides investment guidelines for start-up clinics. In addition, KVA provides periodic fee guidelines for private practitioners. Table 11.5 shows the recommended minimum level of investment by KVA. The majority of the start-up clinics operated by professional veterinarians barely meet the minimum registration requirements. Even the highly capitalized clinics (Table 11.1) do not meet the recommended levels of investment. Clearly there is a need to review these requirements, because some of the equipment, especially diagnostic facilities, could be provided by government laboratories at a fee.

The greater regulatory challenge is posed by the paraprofessionals in private practice. Traditionally, paraprofessionals provided services under the supervision of a professional veterinarian and, as indicated earlier, they are limited to handling less complicated cases. However, the case study reveals that, except for cases requiring surgical procedure, the paraprofessionals do indeed attend to more complex cases, and farmers are largely satisfied with their performance. This development has caused concern at the policy level and among professionals. Given their level of training, paraprofessionals might not appreciate the possible impact of externalities generated by their activities, especially those associated with drug resistance. And in a bid to undercut the professional veterinarians, the paraprofessionals could adopt a price-competition strategy that is harmful to the industry. Evidence from the present

Table 11.5 Estimates by the Kenya Veterinary Association of the minimum recommended costs for establishing a clinic (U.S. dollars)

Item	Estimated cost
Motorcycle	4,167
Laboratory equipment	1,667
Drugs and vaccines	10,000
Salaries	3,000
Clinic rent	600
Telephone, electricity, and water	600
Fuel and repairs	1,000
Stationery	1,000
Sundries	1,000
Total	23,034

study indicates that these fears are largely unfounded. The paraprofessionals provide a much-needed service to smallholder farmers. Furthermore, there is more complementarity than competition between private- and public-sector paraprofessionals. However, the existing harmony tends to be based on goodwill rather than a clear institutional framework and could provide scope for opportunistic behavior.

Undeniably, the distribution of paraprofessionals exceeds that of professional veterinarians among smallholder farmers. However, although paraprofessionals live closer to farming communities and are therefore more accessible to farmers than professional veterinarians, they are only allowed to deliver a limited range of services, and legislation presently creates entry barriers to their participation in private practice. One way to use their service potential more effectively is to better develop their interface with veterinarians as a way of increasing penetration into rural communities and improving service quality. Veterinarians would have their clinics in their preferred locations and would support paraprofessionals in the more rural areas that the former would visit routinely to supply with drugs and attend to any cases that require their expertise. This coordination would also minimize transaction costs associated with service quality through the supervisory role of professionals. In addition, there is need for the formation of a regulatory professional body that includes the paraprofessionals in the animal healthcare market to address the potential of exploitation of paraprofessionals by professional veterinarians.

11.6 Methodological Note

This case study employed the NIE framework to analyze markets for animal healthcare services in Kenya. The study hypothesizes the existence of thin markets, widely distributed cattle keepers each with a small number of animals, poor infrastructure, and information asymmetry in the market. Accordingly, market reforms in the animal healthcare sector that presume the existence of competitive market structure are unlikely to generate the desired outcomes—effective and efficient mechanisms for coordinated exchange. Standard neoclassical economic analysis of input markets is therefore not suitable for this case study.

The case study uses cross-sectional data from a survey of farm households and animal healthcare service providers to analyze the market structure and delineate the significant transaction-cost elements in the exchange process. A binary choice model is estimated with proxies for transaction costs. Undeniably, the probit model is not robust enough to delineate the transaction costs faced by dairy farmers in Kenya. In addition, the proxy variables for transaction costs could be improved, given the current status of knowledge.

We therefore recommend that future empirical research in this area should employ more recent models, such as the linear selectivity model, to capture the sequential nature of farmer decisionmaking in the choice of animal healthcare service provider. We also recognize the limitations of cross-sectional data from a relatively small sample of households and market intermediaries. We recommend a study design that uses panel data from repeated transactions that distinguish transaction costs from variables for general marketing costs. Despite these areas for improvement, the case study provides an informative analysis based on the NIE principles of the animal healthcare market in Kenya.

Note

1. *Moonlighting* refers to working outside office hours for additional income.

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