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DEMAND OF FULANI PASTORALISTS FOR VETERINARY SERVICES IN NORTH-WESTERN NIGERIA

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Target audience: Veterinary/livestock economists, agricultural economists, veterinarians, policy makers, researchers.

Abstract

The demand of Fulani pastoralists for veterinary services was determined using data collected from 300 respondents in Sokoto and Zamfanra States in north–western Nigeria. The interviewed pastoralists were selected using cluster sampling technique and data collected on herders' annual total expenditure on veterinary service, cost of veterinary service per animal herders' total annual expenditure, herd size, herd's distance from veterinary post, number of sick animals and others were analysed using descriptive statistics and multiple regression analysis. The latter was used to estimate herders' demand functions for veterinary services. The elasticities obtained from the estimated demand functions showed that herders' response to veterinary service cost was relatively inelastic, although the small-scale herders responded slightly more than the large-scale herders. The inelastic response to service cost is an indication of willingness to pay by the herders. This was further confirmed by the fact that majority (75%) of them considered that it is proper for them to pay for veterinary services. In fact, 73% of them indicated that they could even pay more than the market value of an animal to save its life.

Key words: Demand for veterinary services, Fulani pastoralists, structural reform, demand elasticity.

DESCRIPTION OF PROBLEM

The Nigeria economy witnessed a phenomenal expansion in the 1970s following the discovery of oil and its commercial exploration. During this period of oil boom, government was able to provide most public services fairly well. By the early 1980s, however, the economy began to experience severe fiscal crisis due to a sudden decline in the international prices of crude oil. The economy was further weakened during this period by the faltering

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world economy, the reverberating effects of which were felt most severely in African economics.

Some of the first casualties of the economic crisis were public services while government could no longer support with the level of funds required for effective performance. Consequently, some public services (including livestock support services) nearly collapsed (1). In apparent response to the deteriorating economic situation and prodded by creditors, the country, in 1986, began the Structural Adjustment Programme (SAP). The components of SAP included privatization, cost recovery, currency exchange and interest rates deregulation, trade liberalization, promotion of non-oil exports and debt conversion. In the livestock support services sub-sector, government has introduced projects based on cost-recovery and has encouraged more private sector participation in the delivery of veterinary goods and services, with the apparent aim of partially withdrawing from the provision of these services.

In northwestern Nigeria, donor-assisted projects such as the Zamfara Environmental Protection Agency in Zamfara State, and the Second State Pilot Livestock Development Project in Sokoto State, have introduced cost-recovery in the provision of veterinary services. The latter has also established a credit programme in collaboration with the Nigeria Agricultural and Cooperative Bank (NACB) for the benefit of veterinarians wishing to establish private practices in the State.

While these moves towards the market are being made, there is no evidence to suggest that the willingness and ability of the Fulani pastoralist herders who control more than 80% of the livestock in the area (2) has been empirically assessed. But the willingness and ability of livestock owners to pay for veterinary services is crucial in structural reform because private practice could be sustained only if veterinary services are paid for. The determination of willingness and ability to pay becomes even more essential considering the fact that the production systems of the Fulani pastoralists are not commercialized and that they have been used to receiving the services free-of-change or at least at subsidized rates.

This study, therefore, examined the attitude of Fulani pastoralists towards payment for veterinary services, the nature of their demand for veterinary services and their degree of responsiveness to veterinary service cost (demand elasticity).

MATERIALS AND METHODS

The Study Area

Northwestern Nigeria as used in this study refers to the erstwhile Sokoto State consisting of the present Sokoto, Kebbi ankd Zamfara States. The area is located within latitudes 10^0 and 14^0N, and longitudes 3^0 and 7^0E (3). It covers a total land area of 102.535km^2 (4). The area shares international boundaries with the Republic of Niger in the north, and Benni Republic in the west. It is bounded by the Nigerian states of Kwara and Niger in the south and Katsina in the east.

The vegetation of the area is savanna, with the boundary between Northern Guinea Savanna and Sudan Savanna cutting across the center. Given this vegetation, the area is free of tse-tse flies, which makes it an important livestock-producing zone in Nigeria.

The area is ethnically diverse, although the Hausa and Fulani people occupy most of its territory and minority groups such as the Tuareg, Zarma, Bariba, Kambari, Kabawa, Dakarkari, and others are restricted to relatively small areas (5). The major occupation of the people is arable crop and livestock farming. Livestock production is undertaken by both settled and semi-settled farmers, and by pastoralists, but the pastoralists predominate. The pastoral peoples include the Fulani and the Tuareg.

Sampling procedure

The data for this study were obtained as part of a larger survey covering 300 Fulani pastoral cattle herders as well as 15 veterinary professionals and paraprofessionals in northwestern Nigeria. The results presented here are from the data obtained from the herders. Cluster sampling technique was used in the selection of the herders based on the major provider of veterinary services. There local governmnent areas (LGAs) – Wurno, Rabah and Goronyo Local Government Areas -located in the present Sokoto State, were sampled in the first cluster (zone 1) where only the state government services were available. Kaura Namoda, Birnin Magaji and Zurmi LGAs were sampled from the second cluster (zone 2) in the Zamfara Grazing Reserve in Zamfara State, where Zamfara Environmental Protection Agency (ZEPA) was the major service provider.

From each of the selected LGAs, 50 herders were randomly sampled, bringing the sample size to 150 herdersa per cluster (zone) or 300 herders in all. In zone 1, the respondents were sampled at the outskirts of Wurno, Lugu, Rabah Dimbiso, Goronyo and Dejibe settlements. In zone 2, they were sampled at the outskirts of Kaura Namoda, Gidan Jaja, Sabon Birni Dan Ali, Kokiya, Gusami, Tsabre and Shamushalle settlements.

Data Requirement and Collection

Data collection from the pastoralists include information on the medical and reproductive history of their herds, such as disease prevention measures taken, number of cattle that fell sick within the past one year, what disease affected them, who treated them, how were they treated, at what cost, what was the repayment arrangement, how was the provider contacted, how many cattle had given birth, how were alive and so on. Information was also collected on membership and benefits of cooperative societies, sources of information, willingness to pay, other work apart from livestock production, total annual expenditures, knowledge, availability and cost of traditional means of treatment, herd sizes and others. These information were obtained, by the researcher and two trained enumerators, through interviews using questionnaire in 1996

Data Analysis

Descriptive statistics and multiple regression were used in analyzing the data collected from pastoralists. Regression technique was used in estimating the demand functions specified.

In specifying the demand function, it was assumed that the herder's willingness and ability to pay for veterinary services would be reflected in his actual expenditure on veterinary care. The function estimated was of the for:

$$E_v = f(X_1, X_2, X_3, X_4, X_5, e) \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$$

Where:

E_v = herder's total expenditure on veterinary services (naira/annum)

X_1 = price (cost) of veterinary service (naira/annum)
X_2 = herder's total annual expenditure (naira/annum) which was used as a proxy for income and consisted of household expenditure on food, medical care, ceremonies, clothing, livestock production and others.
X_3 = herd size
X_4 = herd's distance from veterinary post (km)
X_5 = number of sick animals
e = error term.

The demand function was initially estimated across all categories of herders. Thereafter, model estimation was done separately for 50 herders with the largest herd sizes and likewise for 50 with the smallest herd sizes, but without variable X_3 (herd size). In each of the three cases, the above function was estimated in the linear, Cobb-Douglas (double-log), and quadratic functional forms.

RESULTS AND DISCUSSION

Herders' attitude towards payment for veterinary services

To determine their willingness to pay, herders were asked if they considered it proper for them to pay for veterinary services. Their responses summarized in Table 1 shows that 62.67% of herders in zone 1 and 87.33% of those in zone 2 (which together constitute 75% of all respondent) considered it proper to pay. In fact, 73.33% of herders in zone 1 and 72.67% of those in zone 2 (or 73% of all herders) indicated that they were willing to pay more than the market value of an animal to save kits life (Table 1). This suggests that herders attach both monetary and sentimental values to their animals. Discussion with the herders suggest that their production goal is maximization of the number of animals and they could go to great extent to save the life of a sick animal.

Table1. Some indicators of herders' attitude towards payment for veterinary services

	Zone 1		Zone 2		
Indicator	Freq.	%	Freq.	%	z-value
Paying is proper	94	62.67	131	87.33	4.932***
Can pay more than market value	110	73.33	109	72.67	0.129ns
Paid for vaccination*	54	36.00	51	34.00	0.365***

*Fee paid per animal ranged from N2.50-N180 with a mean of N32.72 in zone 1, and from N1-N20 with a zone
+ Test statistic = z test for differences between two proportions: ***=Significant at P<0.01; ns = not significant.

The results further revealed that some of the herders in the area paid even for vaccination. As presented in Table 1, 36% of the respondents in zone 1 (who constitute 42.86% of those who vaccinated) and 34% of herders in zone 2 (or 61.45% of those who vaccinated) paid for vaccination. The fact that herders were willing to pay even for vaccination, whose provision would have been thought to be subject to market failure due to the externalities involved, is a favourable condition for the financial survival of private providers. Some studies elsewhere in Africa have equally shown that herders are willing to pay for veterinary services (6,7).

Demand functions

The double-log function gave the best fit for the three categories of herders and was chosen for further analysis. Variable X_2 (herder's total annual expenditure) was not significant in all cases and was eventually dropped from the model.

The demand functions were estimated to quantify the degree of responsiveness of herd owners to the price (or cost) of veterinary care. In Table 2, the results for the estimated double-log function parameters for the herders are presented. The coefficient of determination, (R^2) presented in Table 2 shows that 53.86% of the variation in the expenditure on veterinary services (demand) was jointly explained by service cost, herd size, herd's distance and number of sick animals. The joint explanatory power of these variables was further confirmed by the F-value which was highly significant ($P<0.01$). The parameter estimate with respect to the cost (price) of veterinary service was negative and significant, which is in agreement with the law of demand which states an inverse relationship between demand and price. Koma (8), in Uganda, also reported that the expected financial

Table 2: Demand function for all herders

Variable	Parameter estimate	t-value
Intercept	3.335	4.949***
Service cost (price)	-0.566	-3.718***
Herd size	0.331	4.131***
Distance	-0.419	-4.201***
No. of sick animals	0.326	3.225***

R^2 = 53.86%; Adjust. R^2 = 50.28%; F-value = 32.40***; *** = significant at P<0.01

cost of service was a major factor determining the likelihood of herders calling a veterinary personnel when such need arose.

The regression coefficient with respect to herd size was positive and significant. The positive sign is expected, considering the fact that herders with large herd sizes are likely to encounter more sick animals, everything equal, than those with small herds. Furthermore, large-scale herders could share the cost of veterinary services on many animals (economies of scale), thus reducing the unit cost. The reduced cost would then allow the herders to demand for more. This is quite in agreement with Umali *et al.* (6) who observed that farmers with large herds can take greater advantage of veterinary services than small herders since their cost per unit is smaller and thus makes the services more affordable.

Distance from the veterinary post had a negative and significant effect on demand (P<0.01). The negative relationship was expected because distance is a transaction cost (dead wait loss) to both the herder and the provider. From the provider's perspective, he has to travel to meet the herders most of whom are unable to bring their large animals to the veterinary post or clinic. The provider will normally shift this cost to the herder. In a sense, the cost of distance incurred by the provider is already captured in the cost of veterinary services. But the effect of distance arising from the actions of the herder is different. Distance captures not only the monetary expenses the herder must incur in traveling to inform the provider about his sick animal,but also the cost, in labour time, of doing so. The negative effect of distance on demand has been underscored by Koma (8) and Woods (9) in Uganda and Zimbabwe.

respectively, both of whom identified distance as a major transaction cost limiting demand for veterinary services.

The number of animals falling sick in the herd within the year had a positive and significant effect no demand (P<0.01). This is to be expected since a herder with a higher number of sick animals will normally have more need to seek veterinary intervention.

The results of the estimate double-log function for the large-scale herders are presented in Table 3. The coefficient of determination (R^2) was 40.48% while the F-value of 9.294 was highly significant (P<0.01). The coefficient with respect to cost of veterinary service was again negative as expected and significant (P<0.05). The absolute value of the coefficient (0.407) was, however, lower than that for all herders which was 0.566, suggesting that the large-scale herders responded less to price than the average herder. It indicated that one percent change in the cost of veterinary service would reduce demand by 0.407 [percent for large-scale herders as against a reduction of 0.566 percent for the average herder.

Table 3. Demand function for large-scale herders

Variable	Parameter estimate	t-value
Intercept	4.078	10.172***
Service cost (price)	-0.407	-2.806***
Distance	-0.460	-2.517***
No. of sick animals	0.682	4.313***

R^2 = 40.48%; Adjust. R^2 = 38.68%; F-value = 9.294***: *** = significant at P<0.05 and P<0.01, respectively.

The regression coefficient for distance was negative as expected and significant (P<0.05). The value of the coefficient (-0.460) was almost at par with that of all herders (-0.419). The coefficient for number of sick animals was positive as expected and highly significant. It was higher than that of all herders.

Table 4 presents the result of the estimated demand function for the small-scale herders. The R^2 and F-value were 46.24% and 10.895, respectively. The latter was highly significant (P<0.01). The coefficient of the cost of service was negative as expected and significant (P<0.01). It was the highest amongst the herd categories considered, showing that the small-scale herders responded most to cost in the area. This is so because of the small number of their animals.

Table 4: Demand function for small-scale herders

Variable	Parameter estimate	t-value
Intercept	4.234	7.094***
Service cost (price)	-0.766	-2.759***
Distance	-0.564	-4.143***
No. of sick animals	0.401	2.390**

R^2 = 46.24%; Adjust. R^2 = 44.15%; F-value = 10.895***: **, *** = significant at P<0.05 and P<0.01, respectively.

Distance to the veterinary post or clinic had a significant (negative) effect on demand by small herders. Small-scale herders responded more to distance than the large-scale herders. The coefficient with respect to the number of sick animals was positive and significant ($P<0.05$) but lower than that for large-scale herders.

Demand elasticities

Demand elasticity is a pure number which measures the degree of responsiveness of demand to change in the price of a commodity. It is the proportionate change in quantity divided by the proportionate change in price. In this study, demand elasticity was given directly as the regression parameter with respect to price or cost of veterinary care in the double-log function. From Tables 2-4, it can be seen that the price elasticities of demand were –0.566, -0.407 and –0.766 for all herders, large scale herders, respectively. This shows that in all cases, the demand for veterinary services was inelastic since the absolute values of the elasticity coefficients were below unity.

The relatively low response of herders generally to the cost of veterinary service has an important implication for the financial survival of private providers for it demonstrates that herders are generally willing to pay for veterinary services. With widespread privatization of veterinary services the cost of the services may increase and herders may reduce their demand. If demand were elastic, the reduction in demand would exceed the increase in cost, leading to a loss of revenue to the provider. In the case of this study, however, demand was inelastic suggesting that and increase in cost will cause a decrease in demand, but the decrease will be proportionately less than the increase in cost. Hence, the total revenue of the provider will likely increase with increase in price.

The results also show that the small-scale herders had a higher elasticity of demand than the large-scale herders. According to economic theory, one of the most important factors determining demand elasticity is the proportion of consumer's income or wealth endowment that is expanded on the commodity. The higher the proportion of income or wealth devoted to the commodity, the higher the elasticity of demand for that commodity (10). It is expected that expenditure on veterinary services is likely to constitute relatively small proportions of the total wealth of the large-scale herders. As a result of this, large-scale herders are expected to have lower elasticity of demand than the small-scale herders. Another closely related factor accounting for the relatively low response of large-scale herders is the economies of scale they enjoy, as mentioned earlier.

CONCLUSIONS AND APPLICATIONS

The results of the study suggest that herders have a positive attitude towards payment for veterinary services as long as such services are perceived to be effective. This positive attitude was further confirmed by their low response to service cost. This condition appears to be favourable for private practice. It must be added quickly, however, that willingness to pay is a necessary, but not sufficient, condition for the financial survival of providers. Also crucial are the costs of establishing and operating a private practice *vis-à-vis* returns, as well as the number of animals required to break-even and weather such number is available in the area. A

recent study in the area (¥1) suggests that this latter condition may be fulfilled in the study area.

Since distance was identified in the study as a major transaction cost limiting the consumption of veterinary services, it appears that private provision of veterinary services in the area could be facilitated if veterinary service posts are located as close to the herders as possible. There is already a network of empty veterinary clinic buildings belonging to local governments across the area. Some of these could be rented out to private providers. Where there are no properly positioned buildings, government may have to put the structures for renting out to providers.

The cost of private delivery could also be reduced if adequate livestock routes are demarcated and equipped with watering points and livestock dip/spray centers. The provider can then travel along such routes following an itinerary well known to the herders and attend to the animals at the watering or dipping/spraying points. The provider would then enjoy some travel economy which would reduce the overall cost of providing veterinary care.

The study also has some bearing on the pricing strategy that may be adopted by a private provider. In particular, large-scale herders who have been shown to be less responsive to service cost could be changed more than the small-scale herders. One of the major problems with price discrimination is how to separate the markets. But since it may not be easy for a herder receiving veterinary services to resell same to another herder, market separation should not pose too much problem.

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