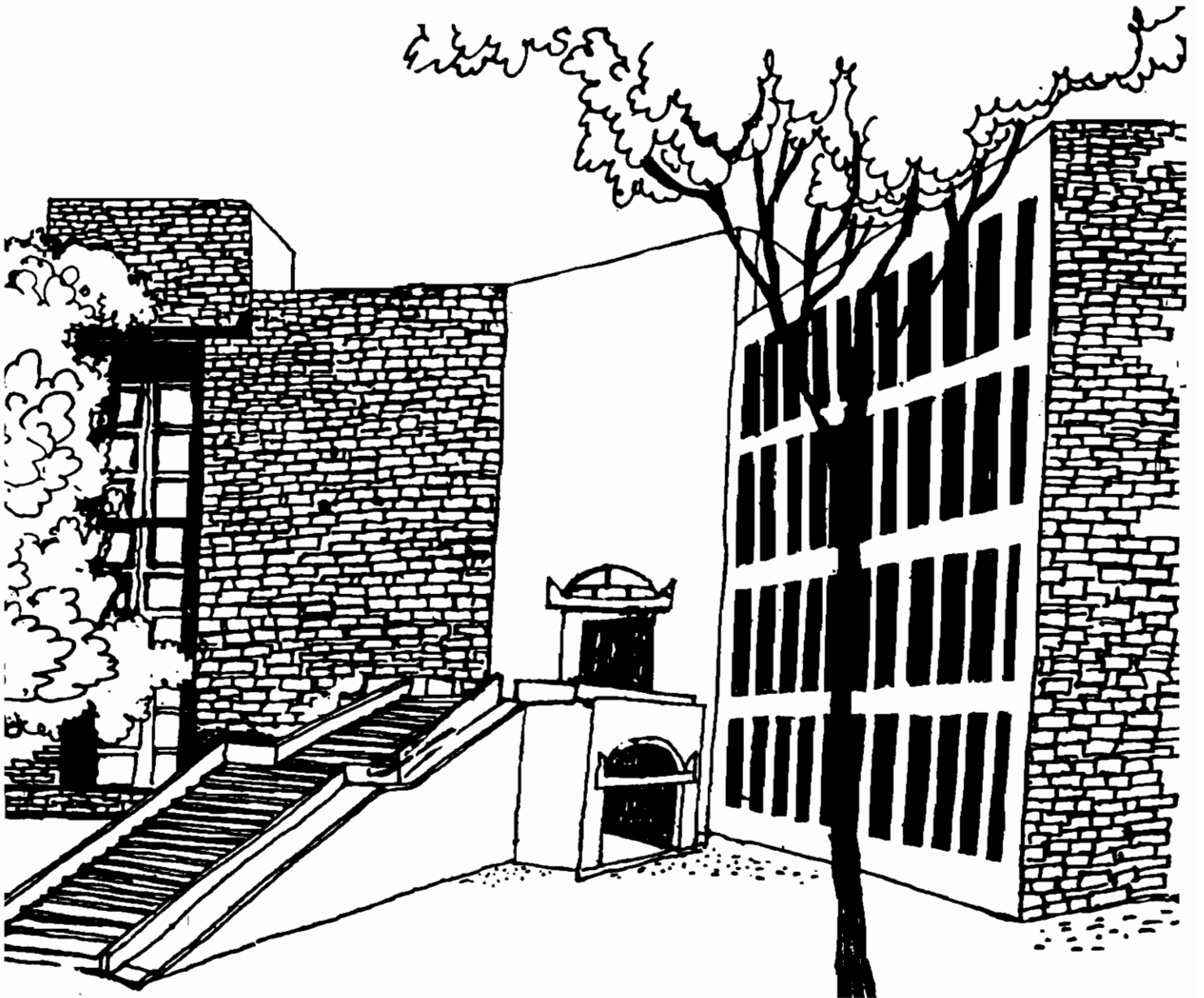




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Working Paper



**Market Structure and the Demand for
Veterinary Services in India**

by

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W.P.No.2001-06-02

June 2001

1658

WP1658

2001-06-02
(1658)

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Market Structure and the Demand for Veterinary Services in India

Vinod Ahuja
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June 2001

Market Structure and the Demand for Veterinary Services in India

Public provision of subsidized or free animal health services has been a major component of livestock development strategy in India. Overtime, the governments (both state and central) have built-up vast networks of physical and human infrastructure to provide these services to millions of farmers across the country. The number of state-run veterinary institutions had grown from about 2,000 in 1951 to over 50,000 at the end 1997-98. These institutions employed some 100,000 professionals and para-professionals. But, the quality of service provided by these institutions continues to be poor. Very few of these are equipped with clinical diagnosis facilities. Even those that have some facilities are very old. Lack of facilities for clinical diagnosis is at least in part responsible for indiscriminate use of antibiotics and anti-infectives, leading to high costs of drugs and medicines, and presenting a threat to human health because of the risk of inducing drug resistance

Significant market led opportunities are opening up for the livestock sector. The value of livestock output has grown by over 4.5 percent per year during 1990-91 to 1997-98, and there are expectations of even faster growth in demand for livestock products due to expected increases in incomes combined with the high income elasticity of demand for livestock products¹. At the global level as well, livestock production is growing faster than any other agricultural sub-sector and, by 2020, this sub-sector is predicted to produce more than half of the total agricultural output in value terms. Growth in demand for livestock products is primarily expected to emanate from the developing countries due to human population growth, increasing urbanization and rising incomes. These developments are likely to have significant influence on global economy in general and the economy of developing countries in particular. In view of these developments, the process has been described as the 'livestock revolution' (Delgado *et al.* 1999).

¹ According to one estimate the expenditure elasticity for milk is about 1.5 in rural and 1.0 in urban areas. Comparable estimates for meat and eggs group was 1.04 and 0.75 (Bhalla and Hazell, 1997).

Given that India's animal wealth is large and equitably distributed, these developments present enormous opportunity for India to boost rural incomes and accelerate the pace of poverty reduction. But, successful capitalization of these opportunities requires a policy regime that facilitates growth in productivity at the farm as well as processing sectors. The productive potential of animals depends crucially on the quality of nutrition, genetic material and the animal health system, and, on all these counts, India has a poor record. Despite a number of initiatives since the early 1960s to increase milk production and improve the quality and supply of draught animals, the quality of services remains poor. On the health side, the focus all throughout the planning period has been on enhancing the supply of veterinary services by expanding the capabilities and coverage of the State Departments of Animal Husbandry. Over 75 percent of the staff are, however, committed to delivery of curative veterinary care and AI services. The professional staff responsible for disease investigation and control, is a meagre 3.5 percent of the total, supplemented by limited vaccination input by the para-veterinary staff. As a result, transboundary animal diseases such as FMD are still prevalent in India and undercut India's ability to compete in the global market place.

It is clear that the future growth of livestock sector will depend crucially on the availability of good quality health services – both preventive and curative. At the same time, deteriorating fiscal situation of many states combined with low cost recovery is likely to make it extremely difficult to find funds for either expanding the reach of these services or improving the quality of delivery from the existing network. Currently, over 85 percent of the annual budget of animal husbandry departments is spent on salaries and establishment costs, leaving little funds for essential supplies and medicines.

All curative and some preventive veterinary services fall into the category of private goods. On efficiency grounds, therefore, there is a good rationale for private sector provision of these services and full cost recovery within the government system². Commercialized delivery of these services has the potential of easing the budgetary constraints as well as improving the service quality. But, there are serious concerns in India about the equity implications of private sector delivery or full cost recovery. More specifically, there are concerns that commercialization could adversely affect the access to these services by poor

² See Umali-Deininger, Feder, and de Haan (1992, 1994), Ahuja and Redmond (2001), FAO 1998, Holden, Ashley Bazeley (1996) for a for a conceptual discussion on the economic framework for livestock service delivery.

farmers. Given that over 60 percent of total livestock in India, is owned by small and marginal farms and landless households, it is important that these concerns be adequately examined before initiating changes towards commercialization of these services.

Evaluation of the desirability of user fees or private delivery of livestock services requires an understanding of the factors influencing the demand for these services, especially the price elasticities, i.e., how the changes in the price of these services are likely to affect the use of the service. To be able to say something about how the changes will affect service users in different income groups, one needs to also ascertain whether the price elasticity of demand for these services varies with income. In other words, is the demand by the poor relatively more sensitive to the changes in prices than the non-poor. For, if that is true, the price change may have a larger impact on the use of these services by the poor compared with the non-poor. In the light of that background, this paper examines the nature of demand for veterinary services in three states of India and presents first estimates of demand elasticities for veterinary services.

The organization of this paper is as follows. The data used for the study and the econometric specification of the demand model are given in the next section. Section 2 presents a descriptive analysis of the institutional and the market structure for veterinary services to facilitate the understanding of demand analysis. The results of econometric analysis and estimates of demand elasticities are presented in section 3. Section 4 offers concluding remarks and some policy implications of the results.

1. Data and Methodology

This study is based on primary data collected in three states of India—Gujarat, Rajasthan and Kerala, during April-June 1999. The survey covered 1185 livestock owning households and collected information on the number and nature of veterinary visits during the 12 months period immediately preceding the survey. This included the expenditure on each visit, travel and waiting time, place of service, type of service provider, and so on. In addition, data were also collected on a number of household specific characteristics such as education, farm characteristics, ownership of consumer durables, etc.

The sample for the survey was drawn from 24 villages located across six districts in Gujarat and Rajasthan each, and 28 villages located in seven districts in Kerala. The districts

were selected so as to ensure adequate representation of areas with low, medium and high livestock density, as well as agriculturally prosperous and backward regions. Within the districts, the villages were selected randomly using the 1991 population census as the sampling frame.

Demand for veterinary services: The empirical model

Assuming that (i) the households seek to maximize profits from livestock raising, (ii) the production function is separable between veterinary care and other inputs, and (iii) there are no credit markets for financing the expenditure on veterinary services, the economic theory would suggest the demand for veterinary visits to depend on the price of milk, the price of veterinary care, household income, and the herd size. That is,

$$N_i = f(v, P, Y_i, B_i) \quad \dots(1)$$

where

- N_i = Number of veterinary visits by i^{th} household
- v = Price of veterinary care
- P = Price of milk
- Y_i = Household income,
- B_i = Number of bovine animals owned by the i^{th} household.

In addition to these variables, a number of other household and area specific factors are also likely to affect the decision to seek veterinary care. That is

$$N_i = f(v, P, Y_i, B_i, Z_i, D) \quad \dots(2)$$

where Z_i and D are the vectors of household and location specific characteristics. Further, by simply including an interaction term between price and income, one can obtain the elasticities for different income levels. With this background, the final estimating model for this study was specified as

$$N_{ijk} = \alpha_0 + \alpha_1 v_{jk} + \alpha_2 P_{jk} + \alpha_3 Y_{ijk} + \alpha_4 v_{jk} Y_{ijk} + \sum_l \eta_l Z_{ijk} + \lambda_k D_k + \varepsilon_{ijk} \quad \dots(3)$$

where subscripts j and k refer to the village and districts, respectively. That is, N_{ijk} represents the number of veterinary visits for i^{th} household in j^{th} village in k^{th} district. Other variables are

similarly defined. ε_{ijk} is the stochastic error assumed to be distributed normally with zero mean and finite variance.

The two most important variables in equation (3) are household income and the price of veterinary care. Both these variables deserve further comment in the context of the problem in hand. We take up each of these in turn

Household income

Household income comprises of earnings from sale of milk and crop output, as well as non-farm income. Since profits from milk production depend on whether the household seeks veterinary care in the event of an animal getting sick, the current household income is clearly determined within the model and is therefore endogenous. To avoid the simultaneity bias, therefore, we used an index of assets as an instrument for current household income. Details about the index including the summary statistics by groups are presented in Annex 1.

Price of veterinary services

The household survey data used for this study provided information on the amount spent on each visit. These represent unit values of the veterinary services, and not necessarily the true exogenous prices faced by service users. Unit values are different from the prices in that they reflect the choice of quality as well as the actual prices the household faces in the market. For estimating the true effect of price on demand, it is necessary that the quality effects be netted out of the unit values to obtain true prices. Consider the following regression

$$v_{ijk} = \beta' Z_{ijk} + \sum_j \theta_{jk} d_{jk} + \zeta_{ijk} \quad \dots (4)$$

where v_{ijk} are the unit values reported by the households, Z_{ijk} is a vector of service quality indicators and other household and visit specific characteristics, and d_{jk} are the village dummies. θ_{jk} in this equation represent the unit values net of the quality and other effects, or the true 'prices'. Note also the absence of intra-village variation in θ_{jk} indicating that every household within a village faces the same price, something that is more consistent with the exogenous price assumption of economic theory. Before running the demand regressions, the true village level prices were obtained from the above regression and used in the demand

model to estimate price elasticities. The service quality and other household and visit specific characteristics included in the regression are given below³

1. Service time
2. Travel and waiting time
3. Whether the veterinarian supplied medicines as part of the service
4. Number of visits it took to cure the animal
5. Provider type
6. Sickness type
7. Whether home service
8. Whether the household belonged to the bottom 40 percent households based on ranking of asset index.

2. Institutional and market structure for veterinary services in the study states

Livestock health provision in India is primarily in public domain. In all three states, the veterinarians employed by the State Animal Husbandry Departments (SAHDs) are the primary service providers. They provide these services through the network of veterinary dispensaries, veterinary hospitals and polyclinics and First Aid Veterinary Centres (FAVCs)⁴. Except in the case of emergencies, all government services are available at the centres. In the case of emergencies, the government veterinarians are allowed to make home visits and charge a nominal fee to cover the transportation cost. After office hours, however, they are allowed to engage in private practice.

Alternative sources of livestock services include co-operative unions, private veterinarians and some NGOs. Co-operatives are active only in some districts of Gujarat. The co-operative service is mostly delivered at home. They utilize the network of primary co-operative milk societies (PCS) at the village level to receive information about sick animals

³ Measurement of these variables is explained in the results section.

⁴ Veterinary polyclinics are the veterinary hospitals with multiple specialities and specialists such as surgery, gynecology, radiology, etc. These employ several postgraduate veterinarians and are located mostly in state headquarters and sometime in some important district headquarters.

Veterinary hospitals are institutions with inpatient facilities and with usually one or two qualified veterinarians. These are located mostly in district headquarters.

Veterinary dispensaries are same as hospitals but without inpatient facilities and with only one qualified veterinarian.

Veterinary first aid centres are minor dispensaries in panchayats manned by paraprofessionals. A number of these centres also have trained technicians who provide AI service.

and then dispatch veterinarians from their central facility⁵. Private veterinarians are far and few and generally operate in selected areas where the government and co-operative providers are not able to meet the demand.

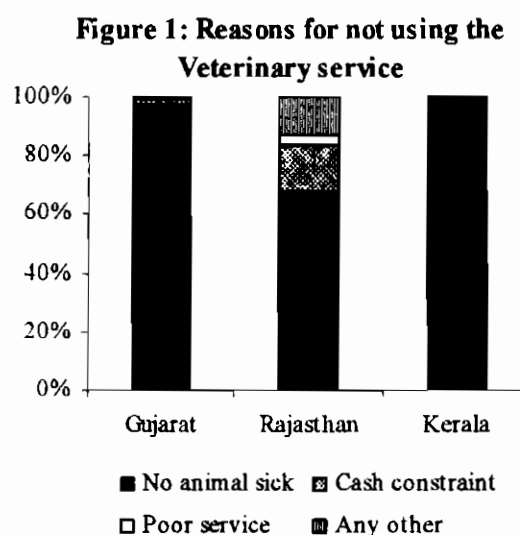
Access to veterinary services

Access to veterinary services can be examined in two different ways. First, by specifically asking the non-users why they did not use the service during the reference period of the survey, and second, by directly asking all the respondents whether they would be able to obtain the service as and when they needed it.

In Gujarat, of the 405 households included in the survey, nearly 50 percent had not used any veterinary service during the 12 months period immediately preceding the survey. Of these over 95 percent cited 'no animal sick' as the reason for not using the service. Similarly, in Rajasthan, the proportion of non-users was about 50 percent of which approximately 68 percent cited the same reason. Comparable figures for Kerala were 30 percent and 92 percent. In Rajasthan, approximately 16 percent of the non-users also cited 'cash constraints' as the reason for not using the service (Figure 1).

The proportion responding 'yes' to the second question—whether they would be able to obtain the service as and when they needed it—is given in Table 1. Approximately 93 percent of the respondents in Gujarat and 99 percent in Kerala said they would be able to obtain the service when needed. In Rajasthan, the comparable figure was 63 percent. The proportion of those having access to co-operative veterinary service was 47 percent in Gujarat and about 15-17 percent in Rajasthan and Kerala.

Another important question in this context pertains to the choice. That is, do the users have a choice of providers when it comes to using the service. In Gujarat approximately 40



⁵ Most of the PCSs are located within the villages and are easily accessible to all households in the village.

percent of the respondents reported having a choice of either the government or the cooperative union doctor. Overall, nearly half of the sample households had access to more than one provider. In Kerala and Rajasthan the comparable figures were 30 and 11 percent (Table 2).

Table 1: Access to livestock health Services

Do you have access to	Percent responding yes		
	Gujarat	Rajasthan	Kerala
Ethnic/traditional healer	58.8	85.8	5.2
Private veterinarian*	10.7	13.4	19.5
Co-operative veterinary service	46.6	14.2	17.4
Government veterinary centre	93.7	63.2	99.3
Home service by a government veterinarian	93.0	57.7	99.0

* The figure with respect to private veterinarians needs to be interpreted with caution. It was observed during the survey that in some, though not a very significant number of cases, the farmers did not make a distinction between the government and the private veterinarian. That was because the government veterinarian for that area had always provided service in his/her private capacity, and for all practical purposes was regarded as a private veterinarian by the farmers. Although the investigators were instructed to distinguish between different provider types, the possibility of some measurement error in this regard can not be ruled out.

Table 2: Choice of modern veterinary service providers

Provider type	(Percent)		
	Gujarat	Rajasthan	Kerala
Government only	46.6	63.6	69.8
Cooperatives only	2.9	0.5	0.2
Private only	0.0	3.0	0.0
Government and cooperatives	38.7	8.8	10.2
Government and private	6.0	5.5	12.6
Cooperative and private	0.5	2.2	0.0
All three	4.1	2.5	6.9
None	1.2	21.6	0.0
Total	100.0	100.0	100.0

Use Pattern

Tables 3 presents the number of veterinary visits made by different providers during the 12 month period immediately preceding the survey, as reported by the sample farmers. Even though, except in emergencies, the government services are only available at centers, a larger number of these cases were attended at home. In Gujarat, for example, the in-centre veterinary service was practically nil. Of a total of 140 sample visits by government veterinarians in Gujarat, only 7 percent were attended at the centers. Comparable figures for

Rajasthan and Kerala were 30 and 43 percent. It was quite common for the government veterinarians to attend even ordinary sickness cases at farmers' homes and the majority of such visits were undertaken in a private capacity.

Table 3: Number of sample veterinary visits disaggregated by provider type

District	Number of visits by				Total
	Government veterinarian		Home service by private veterinarian	Home service by cooperative veterinarian	
	At home	At the centre			
Gujarat	130	10	98	69	327
Rajasthan	178	79	55	9	321
Kerala	304	230	22	2	538

Since the focus of the study is on the poor, it is natural to ask whether there are any significant differences in the use pattern of these services across income groups. More specifically, (i) is it that the rate of utilization of these services is lower among the poor households?, (ii) do the poor rely more on the government system compared to the rich?, and (iii) do the rich opt for home service more often than the poor? Tables 4, 5, and 6 present the use pattern for veterinary services in the bottom, middle and top 20 percent households (as ranked by the asset index). It can be seen from Table 4 that, on per adult bovine basis, the number of visits in Rajasthan & Kerala increased with income whereas the trend was not so sharp in Gujarat. Similarly, the proportion of home visits showed an increasing trend in these two states. Given that a large proportion of home visits were either by private veterinarians, or by government veterinarians in private capacity, the fees for home visits were significantly higher. Again, in Gujarat, there was no significant difference in the proportion of home versus in-centre services across income groups. Both these trends were, at least partly, explained by the availability of relatively inexpensive home service from the co-operative unions in Gujarat. It is clear from Table 5 that in Gujarat a significantly larger proportion in the bottom 20 percent relied on the co-operative system. In all the three states, the proportion of those opting for the services of private veterinarians increased with income (Table 6). This was specially evident in Rajasthan and Kerala where private usage of the top 20 percent was more than double the rate of lowest 20 percent. At least part of this tendency could be explained by the fact that private veterinarians established themselves in relatively higher income areas.

Table 4: Number of veterinary visits per year

	Gujarat		Rajasthan		Kerala	
	Visits per household	Visits per adult bovine	Visits per household	Visits per adult bovine	Visits per household	Visits per adult bovine
Bottom 20 percent	0.65	0.31	0.46	0.15	1.67	1.41
Middle 20 percent	1.21	0.49	1.35	0.41	2.32	1.76
Top 20 percent	1.07	0.40	1.87	0.60	2.16	1.81

Table 5: Home versus in-centre service disaggregated by wealth categories (Percent)

	Gujarat		Rajasthan		Kerala	
	Home	Centre	Home	Centre	Home	Centre
Bottom 20 percent	96.6	3.5	69.7	30.3	45.3	54.7
Middle 20 percent	93.4	6.6	72.6	27.4	68.8	31.2
Top 20 percent	97.5	2.5	86.4	13.6	58.8	41.2

Table 6: Use of different providers disaggregated by wealth categories (Percent)

	Gujarat				Rajasthan			Kerala		
	Govt	Coop	Priv	Oth	Govt	Priv	Oth	Govt	Priv	Oth
Bottom 20 percent	27.6	43.1	13.8	15.5	87.9	9.1	7.0	97.2	2.8	0.00
Middle 20 percent	42.0	21.0	28.4	8.60	82.1	15.1	2.4	97.5	2.5	0.00
Top 20 percent	43.8	26.3	27.6	2.50	71.8	25.2	3.0	91.6	7.4	0.00

Price

For veterinary services at the centre, the prices prescribed by the government are either zero or very nominal. For example, in Gujarat, the prescribed fee per veterinary visit was Rs.5.00 (Rs.2.00 for small ruminants) inclusive of drugs and medicines. In Rajasthan and Kerala, the veterinary services at the centre were supposed to be free.

However, the service users often paid much higher prices. To understand the structure of the price paid by the users, data were collected on three components—fee paid to the veterinarian (comprising of service charge, transportation charge in case of home service and any drugs and medicines supplied by the veterinarian); price of additional medicines purchased from the medical store; and additional transportation and communication expenditures incurred by the user.

The average fee paid to the veterinarian for in-centre service was about Rs.40.00 in Rajasthan and Rs.18.00 in Kerala (Table 7).

The average price paid per visit including the price of drugs and medicines was Rs. 128 in Rajasthan and Rs. 50 in Kerala. Recall that in both these states no fee was to be charged for the service when treatment was received at the centre⁶.

This is not to say, however, that no one received free services at the veterinary centres. Indeed, over 60 percent of the cases attended at the veterinary centres in Rajasthan and about 58 percent in Kerala were provided free service⁷. Recall, however, that only about 30 percent of total cases attended by government veterinarians in Rajasthan were at the veterinary centres. As a share of total cases attended by government veterinarians, therefore, only about 18 percent received the service for free in Rajasthan and 25 percent in Kerala.

The prescribed fee for emergency home visits was equivalent to that for in-centre service except that the government veterinarians were allowed to charge a nominal amount to cover transportation cost. In reality, however, the charges were significantly higher than what could be justified as the transportation cost. Estimated average price for a home visit (excluding the cost of medicines purchased at the stores) by a government veterinarian was Rs.94.0 in Kerala, Rs. 110.0 in Gujarat and Rs.227.0 in Rajasthan (Table 8). In all three states, less than 5 percent of the cases attended at home were reported to be treated for free.

What matters to the user, however, is the total charge for the service including the expenditure on drugs and medicines. Table 9 presents the total visit cost (including additional expenditures on medicines for home visits in addition to what the veterinarians supplied). A comparison of Tables 8 and 9 suggests that, in Gujarat and Rajasthan, the additional medicine expenditures per visit for government veterinarians was significantly higher than for private veterinarians. The difference in the Government and private veterinarian which was about Rs.75 per visit in Table 8 narrowed down to Rs. 41 in Table 9. In case of Rajasthan, on the

Table 7: Average expenditure for veterinary service at the government veterinary centre

(Rupees per visit)		
State	Doctor's fee	Total Charges *
Rajasthan	41.3	128.1
Kerala	18.4	54.9

* including the cost of additional medicines

⁶ Due to the limited extent of in-centre service in Gujarat, the statistics for in-centre service in Gujarat, are excluded.

⁷ Excluding the cost of medicines purchased at the stores.

other hand, where the charge per visit was higher for government veterinarians the difference further widened. Both these comparisons indicate that private veterinarians were providing more medicines during the visit, whose costs were incorporated in the fees charged for the visit. Only in Kerala, the medicine component in the case of private veterinarians was higher than in the case of government veterinarians but the difference was small.

Table 8: Average fee per home visit*

Disease	(Rupees)						
	Gujarat			Rajasthan		Kerala	
	Govt	Coop	Private	Govt.	Private	Govt	Private
General sickness	100	44	157	225	147	107	112
Gynecological problem	175	59	284	300	278	96	..
FMD	..	..	..	177	..	65	..
Mastitis	..	..	..	..	..	85	94
Pneumonia	..	..	..	237	..	..	..
Diarrhea	80	..	..	214	..	..	..
Others	106	38	138	225	208	105	..
Overall average	110.5	44.5	184.5	227.2	206.0	94.3	98.0

* Including the cost of any drugs and medicines supplied by the veterinarian.

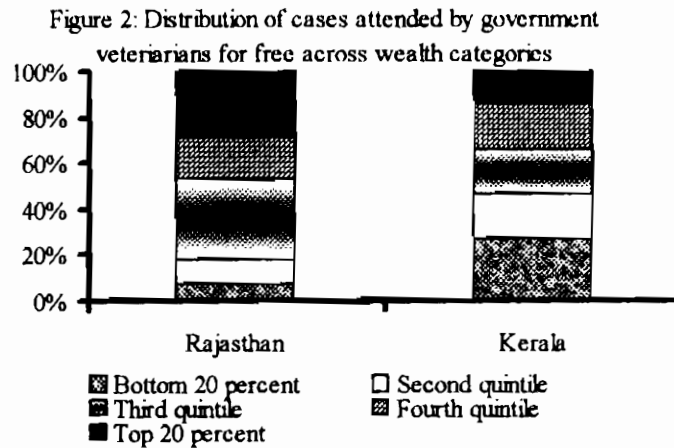
".." Not calculated due to insufficient observations.

Table 9: Total Charges per home visit

Disease	(Rupees)						
	Gujarat			Rajasthan		Kerala	
	Govt	Coop	Private	Govt.	Private	Govt	Private
General sickness	153	49	173	275	214	175	140
Gynecological problem	248	59	284	306	316	180	..
FMD	..	..	..	292	..	134	..
Mastitis	..	..	..	..	..	235	..
Pneumonia	..	..	..	258	..	..	..
Others	146	50	157	314	..	120	..
Overall average	161.2	51.5	202.2	332.8	286.4	178	204.2

It is clear from the preceding discussion that a large proportion of *veterinary service users paid prices for government service that were several times higher than what was officially prescribed*. Indeed, for home visits, the average price paid for treatment received from a government veterinarian was only slightly lower than those charged by private veterinarians. Only a small fraction – approximately 15 percent in Rajasthan, 25 percent in Kerala, and less than 1 percent in Gujarat – received services for free, and not all of those receiving free service actually belonged to the ‘poor’ category. In Rajasthan, only about 10

percent of those receiving free service belonged to bottom quintile. In Kerala, the comparable figure was about 30 percent. In both the states, about 40 percent of those receiving free service belonged to top two quintiles (Figure 2).



3. Demand function and elasticities

The descriptive statistics presented in the preceding section showed that a large proportion of service users are already paying significantly higher prices than prescribed. Thus, raising the prescribed fees to recover the costs may not have any adverse impact. On the other hand, it is conceivable that raising the official prescribed prices leads to a rise in the price currently paid by the users to government veterinarians operating in their private capacity. At the same time, however, due to the potential threat of entry, the price must remain below that charged by the private providers. That means, at the most, cost recovery/privatization could lead to a price rise equivalent to the difference between the prices charged by private and government veterinarians.

The descriptive analysis also showed that, in Gujarat, the average difference between government veterinarians' price and private price was approximately Rs.75 per visit. In Kerala, the price difference was less than Rs. 5 per visit. In Rajasthan, on the other hand, the price charged by government veterinarians turned out to be marginally higher than that of private veterinarians. But, these are simple descriptive statistics. These do not control for variations in service quality, sickness type, location, etc. Since these variables also cause variation in prices, it is important to examine the price differences between different providers by netting out the effect of other variables. Thus, before investigating the demand pattern, it is necessary to examine if there are significant differences in the quality and price of service across different provider types – government, cooperative, and private. If there are no significant price and quality differences, then it can be reasonably concluded that full cost

recovery/formal privatization of these services will not affect the service users, for they are paying private prices anyway. If the price charged by the government providers is lower than that charged by private providers, that implies that at least part of the subsidy is actually reaching the livestock owners. In such a scenario it makes sense to ask the question – what will be the impact of withdrawal of this subsidy on different groups.

However, to be able to establish, relatively rigorously, the quality and price differences across different providers, it is essential to have critical number of data points for each of these provider types. But, given the limited private veterinary practice in India, one inevitably runs into small sample problem with respect to private practitioners. Anticipating this problem, the sample in Gujarat was extended as to purposely include three additional villages where there was prior information on private activity. Thus, in Gujarat this analysis could be done with reasonable degree of confidence. In Kerala and Rajasthan, on the other hand, the sample for private veterinarians is quite small. The findings in these two states are therefore subject to this caveat.

Even if the price and quality differences can not be established with good confidence, the demand analysis can still provide important insights. At the very least, one can speculate on the likely effect on service utilization, *if* the subsidy withdrawal leads to a rise in the prices now paid by the users of veterinary services. In the light of that motivation, we now present the analysis to examine the price and quality differences across government, private veterinarians and cooperative unions, and (ii) the estimated price elasticity of demand for veterinary services for different income groups.

Quality differences across provider types.

Quality is a multidimensional concept and its measurement raises several difficulties. For veterinary service, a reasonable measure of quality would be the degree of accuracy in diagnosis and prescription. For this study we used the ‘number of visits to completely cure the animal’ as a measure of service quality. The results are presented in Table 10.

The results are strikingly similar across states – controlling for type of sickness and some other provider characteristics, there is no difference in service quality across different categories of providers. Among the provider types, the regression omits the ‘private’ veterinarian category. Thus, the coefficients on ‘Government provider’ and ‘Cooperative

provider' variables need to be interpreted relative to 'private provider'. None of these coefficients is statistically insignificant in any of the three states. Indeed provider characteristics explain very little, if any, variation in the chosen quality variable.

Table 10: Explaining the differences in service quality of veterinary service

Explanatory variables	Dependent variable: Number of visits to cure the animal		
	Gujarat	Rajasthan	Kerala
Intercept	1.11 (0.08)	1.119 (0.11)	1.270 (0.19)
GOV (1 if Government veterinarian, 0 otherwise)	-0.06 (0.90)	-0.053 (0.07)	-0.155 (0.17)
COOP (1 if cooperative veterinarian, 0 otherwise)	-0.09 (0.08)	-0.131 (0.20)	-0.585 (0.60)
SICK1 (1 if gynecological or surgical case, 0 otherwise)	0.07 (0.07)	0.104 (0.11)	-0.015 (0.17)
SICK2 (1 if pneumonia, FMD or HS case, 0 otherwise)	0.03 (0.11)	0.099 (0.10)	-0.032 (0.08)
Travel and waiting time	-0.03 (0.03)	0.010 (0.01)	0.010 (0.01)
SUPMED (1 if supplied medicines during the visit, 0 otherwise)	-0.03 (0.45)	0.090 (0.06)	-0.17* (0.07)
SOLVED (1 if the problem was solved in that visit, 0 otherwise)	0.21* (0.06)	0.139* (0.06)	0.29* (0.07)
Adjusted R-squared	0.03	0.005	0.04

Note: Figures in parentheses are standard errors. * Significant at 1 percent level

Price differences across provider types

The next question is whether, for same type of service, there are significant differences in the prices charged by various types of providers. More specifically, are the prices charged by government veterinarians any lower than private providers. Table 11 presents the results of regressions explaining the variation in visit price.

The table presents the results of three different regressions for each state. Model 1 includes, as the explanatory variables, the sickness type, provider type, place of service, and whether the household is poor. For this purpose, the households belonging to bottom 40

percent category based on wealth ranking are considered poor. Model 2, in addition to all the variables in Model 1, also includes travel and waiting time and the quality indicator variables (service time, number of visits to cure, whether supplied medicine during the visit, and so on). Finally, Model 3, in addition to all the variables in Model 2, also controls for village specific characteristics by including village dummies. The table, however, does not present the coefficients on village dummies.

Looking first at the coefficients on the variables GOV and COOP, it is clear that except in Gujarat, there was no significant difference in the fee charged by government and private veterinarians. In Gujarat, although the users paid prices that were higher than prescribed, these were still lower than the prices charged by private providers. Controlling for service quality as well as location specific characteristics, the average difference between private and government doctor appeared to be in the range of Rs.60.00-70.00. Service from cooperative unions in Gujarat were still cheaper⁸.

Another question of interest pertains to the price paid by poor vis-a-vis non-poor. That is, did the poor receive the services at a relatively lower price? In Kerala and Rajasthan, the coefficient on the interaction term between GOV and POOR is statistically insignificant in all the three models. Only in Gujarat, the coefficient is statistically significant at the 10% level in the first model. But, once the quality and area specific characteristics are included in the regression, the coefficient loses significance. This implies that there is no targeting of relatively cheaper services towards the poor in any of the three states. It appears that the prevailing price in poorer areas was somewhat lower than that prevailing in richer areas. But, within the given area, both poor and rich paid the same price.

Other statistically significant variables in the Table are home service, sickness types, and service time. Home service costed more. So did a relatively complex gynecological or surgical visit. Interestingly, the price was also positively linked to the time spent by the veterinarian during the visit. Perhaps that is an indication of at least the perceived quality of

⁸ Recall that the sample size for private veterinarians in both Kerala and Rajasthan was too small to allow meaningful testing of the differences. Thus, this finding no significant difference in these two states is not very robust.

Table 11: Explaining the variation in price

Explanatory variables	Dependent variable: Veterinarian charge per visit								
	Gujarat			Rajasthan			Kerala		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Intercept	87.68 (3.76)*	82.38 (2.81)	..	34.7 (0.87)	-65.89 (-1.10)	..	14.84 (1.45)	14.83 (1.24)	..
Service time	..	0.676 (2.72)	0.78 (3.07)	..	0.34 (1.32)	0.11 (0.45)	..	1.00 (5.34)	0.81 (3.89)
Travel and waiting time	..	-0.029 (-0.70)	-0.05 (-0.80)	..	0.03 (0.72)	-0.02 (-0.72)	..	-0.20 (-4.5)	-0.056 (-1.20)
SUPMED (1 if supplied medicines during the visit, 0 otherwise)	..	-1.29 (-0.12)	15.13 (1.40)	..	70.2* (2.4)	99.3 (3.6)	..	13.7 (3.18)	2.89 (0.63)
VETVIS (Number of visits to cure)	..	-9.86 (-1.17)	-16.5 (-2.01)	..	79.0* (3.2)	74.8 (3.6)	..	-5.73 (-2.09)	0.11 (0.04)
GOV (1 if government veterinarian, 0 otherwise)	-40.06 (-3.69)*	-44.85 (-4.07)	-67.3 (-5.16)	28.5 (0.85)	42.8 (1.23)	-13.4 (-0.4)	1.81 (0.18)	-4.31 (-0.42)	-4.72 (-0.66)
COOP (1 if cooperative veterinarian, 0 otherwise)	-108.4 (-9.25)*	-103.3 (-8.17)	-94.5 (-6.45)	-102.6 (-1.19)	-92.5 (-1.0)	-132.3 (-1.4)	..	..	..
SICK1 (1 if gynecological or surgical case, 0 otherwise)	35.13 (3.17)*	33.64 (2.97)	36.36 (3.27)	87.0 (1.97)	92.8\$ (1.76)	129.1 (2.75)	-5.75 (-0.58)	-14.6 (-1.35)	8.78 (0.77)
SICK2 (1 if pneumonia, FMD, or HS case, 0 otherwise)	-32.46 (-0.92)	-32.46 (-0.92)	-58.6 (-1.78)	9.44 (0.22)	12.00 (0.27)	26.7 (0.66)	-10.98 (-2.52)	-14.9 (-3.08)	-5.50 (-0.95)
SOLVED (1 if the problem was solved in that visit, 0 otherwise)	..	-0.48 (-0.05)	2.64 (0.29)	..	-61.0* (-2.07)	-79.9 (-3.2)	..	8.83 (2.01)	-4.3 (-0.9)
HOME (1 if home service, 0 otherwise)	67.63 (2.78)*	67.62 (2.78)	55.02 (2.25)	200.3 (7.52)	172.6* (5.4)	145.7 (4.6)	79.7 (20.9)	65.8 (13.9)	63.5 (12.7)
POOR (1 if household belongs to bottom 40 percent, 0 otherwise)	-0.16 (-0.01)	0.578 (0.045)	5.53 (0.42)	-99.35 (-1.27)	-101.9 (-1.23)	-81.2 (-1.01)	20.8 (0.83)	17.2 (0.68)	31.3 (1.33)
GOV*POOR	-33.05 (-1.82)	-27.81 (-1.62)	6.05 (0.28)	62.37 (0.73)	68.3 (0.78)	30.12 (0.36)	-20.22 (-0.80)	-15.05 (-0.56)	-22.71 (-0.95)
Adjusted R-squared	0.26	0.27	0.72	0.14	0.18	0.63	0.43	0.44	0.75
N (Sample Size)	356	356	356	340	340	340	612	612	612

Notes: Figures in parentheses are t-Statistics. * Significant at 1% level, \$ Significant at 5% level; @ Significant at 10% Level.

service. In addition, it might also be the case that those who spent more time per visit also provided advice about after care and so on, something the users may have valued positively.

Demand for veterinary services

We turn now to an investigation of demand pattern and demand elasticities for veterinary services. Regression results for demand for veterinary services are presented in Table 13. Since a large number of households reported zero visits during the reference period of the survey, the estimation is carried out using censored regression model⁹.

Primary variables of our concern in Table 12 are the price of veterinary care, the wealth index, and the interaction between price and wealth. The coefficient on price is negative and statistically significant in all the three states. This is consistent with economic theory and implies that a higher price does depress overall demand. It is worth recalling at this point that the number of visits per adult bovine was highest in Kerala where the price was lowest among the three states. On the other hand, in Rajasthan, where the price was highest, the number of visits was lowest. None of the other two variables – wealth index and the interaction between wealth and price – is statistically significant. This implies that income is not a major determinant of service utilization. The sign on this parameter is positive in Rajasthan and Kerala, which is consistent with a-priori expectations. In Gujarat, however, the analysis shows a negative wealth effect. We already saw in the previous section, that, in Gujarat, number of veterinary visits per year per adult bovine animal was higher for bottom and middle 20 percent compared to top 20 percent. That negative relationship persists even after controlling for visit price. One possible explanation for this result could be that, in Gujarat, the incidence of sickness may be lower for richer households compared to the poorer ones due to better diet and care whereas that relationship is not very strong in other two states. That would suggest that including the quantity and composition of diet and other care related variables in the regression might cause a reversal of sign on wealth index in Gujarat regression. For lack of data on those variables, however, we are not able to test that hypothesis. Estimates of price elasticity of demand are presented in Table 13. Although we saw that the slope of demand function does not vary with income, we have still

⁹ Such cases where the dependent variable is constrained, from below or above or both, by some limit value are classified as 'limited dependent variable models'. Censored regression model is a member of this class and uses maximum likelihood procedure to provide unbiased and efficient estimates in the presence of censoring (see Maddala, 1983 for details).

calculated the elasticities for different income groups by valuing them at the mean price and visits for the respective income groups.

It is evident from the table that overall price elasticity of demand for these services are quite low – close to zero in both Gujarat and Rajasthan. In Kerala, on the other hand, the demand is relatively more elastic -0.14 . This implies that an increase of 100 percent in the price could lead to a drop of 14.0 percent in use of veterinary services with not much difference across rich and poor. In Gujarat and Rajasthan, the price variation may not have much impact on the utilization rates. Since these are curative veterinary services and there are implications for loss of production if the animal is not treated, low elasticities make plausible sense.

Table 12: Tobit estimates of demand for veterinary services

Explanatory Variable	Department Variable: Number of veterinary visits during the reference period of the survey		
	Gujarat	Rajasthan	Kerala
Intercept	0.938 (1.04)*	-0.145 (-0.157)	1.00 (0.65)
Milk Price	0.002 (0.003)	0.005 (0.05)	0.262\$ (1.92)
Price of Veterinary Service	-0.010\$ (-2.12)	-0.003 (-1.59)	-0.013\$ (-2.53)
Wealth Index	-0.362 (-1.40)	0.417 (1.49)	0.204 (0.76)
Veterinary Service Price*Wealth Index	0.035 (1.23)	-0.002 (-0.89)	-0.002 (-0.56)
Average education in the household	0.040 (0.79)	0.042 (0.81)	0.030 (0.56)
Sickness Dummy (1 if no animal sick during the reference period. 0 otherwise)	-8.77 (-0.33)	-7.34 (-0.24)	-11.68 (-0.26)
Service Time (minutes)	0.080* (2.65)	0.007* (3.06)	-0.051* (-2.62)
Travel & Waiting Time (minutes)	-0.003 (-0.76)	-0.002 (-1.10)	-0.002 (-0.28)
Number of buffaloes owned by household	-0.020 (-0.25)	0.047\$ (1.79)	-1.27\$ (-1.82)
Number of cows owned by household	0.100 (1.10)	0.028 (1.25)	0.668* (4.76)
Sample Size	367	297	387
Log Likelihood	-289.71	-296.11	-567.80

* Figures in parentheses are Z values. * Significant at 1 percent level. Significant at 5 percent level.

Table 13: Price elasticity of demand for veterinary services

Category	Gujarat	Rajasthan	Kerala
Bottom 20 %	-0.017	-0.09	-0.15
Middle 20 %	-0.013	-0.03	-0.13
Top 20 %	-0.017	-0.03	-0.14
Overall	-0.016	-0.04	-0.14

4. Conclusions and implications

Our primary objective of estimating the demand functions was to evaluate the effect of introducing/raising user fees or the private sector delivery of these services. In evaluating this effect, either the cost recovery or privatization must be balanced against utilization of these services. Indeed, the primary rationale of providing the subsidized service is to reduce barriers to access for these services.

It is clear that any evaluation of the proposal of increasing user fees requires knowledge of demand elasticities and how do these vary across income groups. Our estimates show that price is not an important determinant of the decision to use these services. Also, there is practically no variation in the price elasticities across income groups. Given the fact that these services have direct impact on the productivity of livestock, and thereby on household income, the finding of low demand elasticity is quite plausible.

This finding of low demand elasticity across all income groups suggests that the fears of sharp declines in the use of these services as a result of full cost recovery and/or private delivery of these services are unfounded. On the other and, the rapidly rising demand for livestock products is likely to translate into a similar sharp increase in demand for livestock services by farmers in the decades to come and that the concurrent tightening competition for increasingly scarce government budgetary resources is going to place stringent budgetary constraints on the Animal Husbandry Department's ability to exclusively satisfy this ever rising demand for livestock services.

The fiscal crises in study states are today already impinging on their capacity to do so. As the curative veterinary services could cost-effectively be provided by the private sector, and given that the demand for these services is fairly inelastic, these conditions open critical windows of opportunity for the government to share the responsibility of delivering curative veterinary services with private providers. Although complete privatisation of these services

in the immediate future may not be a feasible, or desirable, the long term goal must be to move towards private delivery of those services, which are of private good nature. The issue, therefore, is how does one manage the transition from government to private services. There are several options open to the state governments to manage this transition, but optimising the existing service delivery system and manpower for vastly enhanced coverage and sustainable delivery of services will be the first step in the process of change, under all options. The discussion on these options is however beyond the scope of this paper.

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Appendix 1: The Asset Index

This study uses a composite index based on indicators of household assets to discriminate between poor and non-poor households. Households were ranked using this index and divided in different categories to estimate the demand elasticities. The index was constructed using weights chosen by principal components as proposed by Filmer and Pritchett (1998). This appendix describes the methodology used for constructing the index as well as presents some statistics to demonstrate the robustness and internal coherence of the index.

This index uses 24 asset variables which can be divided into four categories: ownership of consumer durables, characteristics of the house occupied by the household, ownership of land, and finally, ownership of livestock. Specific variables considered in each of these groups is listed below.

<u>Ownership of consumer durables</u>	<u>House characteristics</u>	<u>Land ownership</u>	<u>Livestock ownership</u>
<ul style="list-style-type: none"> • Radio • Camera • Scooter • Car • Refrigerator • Washing machine • Fans (number) • Heater • Television (B&W) • Television (colour) • Petromax • Cooker • Watches (number) 	<ul style="list-style-type: none"> • Own/rented • Number of rooms • In-house piped water supply • Flush toilet • Construction material 	<ul style="list-style-type: none"> • Irrigated land (acres) • Un-irrigated land (acres) 	<ul style="list-style-type: none"> • Number of local cows • Number of cross-bred cows • Number of buffaloes

The index is a weighted linear wealth index where the weights are obtained using the procedure of principal components, and is constructed as follows

$$A_{ij} = \sum_k f_k \frac{(a_{ijk} - a_{jk})}{s_{jk}}$$

where A_{ij} is value of index for i^{th} household in j^{th} state, f_k is the factor score coefficient for the k^{th} asset as determined by the principal component procedure, a_{ijk} is value of k^{th} asset for i^{th} household in j^{th} state, and a_{jk} and s_{jk} are the mean and standard deviation of the k^{th} asset over all households in j^{th} state. Table A1 presents the factor coefficients used as the weight, and the summary statistics for the states as a whole.

The index uses 7 continuous variables – number of watches owned, number of fans owned, number of rooms in the house, area under irrigated land, area under unirrigated land, and number of indigenous cows, crossbred cows, and buffaloes owned by the household. All other variables take the value 1 if the household owns that asset, 0 otherwise. The interpretation of the index is simple – for continuous variables, the difference between the value of index represents the difference between mean asset ownership weighed by f_{kj}/s_{jk} . For discrete variables, the ownership of asset simply raises the index by f_{jk}/s_{jk} .

Mean value of the index is zero by construction. The standard deviation ranges from 0.95 to 1.00 across states (Table A2). The mean for the poorest households is -0.84, -0.77 and -1.00 for Gujarat, Rajasthan and Kerala, respectively. Comparable figures for the richest households are 1.60, 1.57 and 1.56 (Table A3).

Table A2: Asset index: Summary statistics

Summary measure	Gujarat	Rajasthan	Kerala
Mean	0.00	0.00	0.00
Standard deviation	0.99	1.00	0.95
Minimum	-1.04	-0.94	-1.33
Maximum	5.80	5.59	3.54

Table A3: Mean values of asset index by wealth categories

Category	Gujarat	Rajasthan	Kerala
Bottom 20 percent	-0.87	-0.77	-1.00
2 nd quintile	-0.61	-0.58	-0.65
3 rd quintile	-0.34	-0.33	-0.28
4 th quintile	0.20	0.16	0.36
Top 20 percent	1.60	1.57	1.56

The index does very well in separating poor, middle and rich households. Table A4 presents the Summary statistics for the variables used in constructing the index across bottom, middle and top 20 percent categories as ranked by the asset index. It is clear that index produces a very sharp difference across these groups in nearly every asset. For example, in Gujarat, ownership of unirrigated land is 1.6 acres for the poorest households

and 7.6 acres for the richest households. Comparable figures for irrigated land are 0.328 acres and 5.00 acres. Similarly, the poorest 20 percent households in the sample in Gujarat owned 1.25 cattle compared to 1.27 for the top 20 percent. At the same time, however, the proportion of crossbreds in cattle stock was 1.8 percent for the poorest households compared to 42 percent for richest households. Similar separations can be seen across all variables in all the three states.

Table A1: Factor coefficients and summary statistics for the variables used in constructing the index

	Gujarat			Rajasthan			Kerala		
	Factor Coeff	Mean	SD	Factor Coeff	Mean	SD	Factor Coeff	Mean	SD
Own radio	0.084	0.446	0.582	0.082	0.435	0.560	0.067	0.852	0.417
Own camera	0.074	0.019	0.137	0.039	0.014	0.139	0.027	0.017	0.128
Own scooter/motorcycle	0.121	0.175	0.405	0.103	0.083	0.547	0.109	0.150	0.357
Own car	0.066	0.019	0.218	0.034	0.008	0.091	0.057	0.048	0.272
Own refrigerator	0.120	0.105	0.330	0.110	0.036	0.187	0.135	0.190	0.393
Own washing machine	0.052	0.002	0.490	0.054	0.003	0.053	0.061	0.076	0.364
Number of fans	0.146	1.242	1.303	0.143	0.784	1.357	0.139	1.657	1.696
Own heater	0.053	0.016	0.128	0.070	0.025	0.292	0.068	0.035	0.185
Own television (B&W)	0.061	0.187	0.397	0.121	0.216	0.486	0.007	0.147	0.355
Own television (colour)	0.096	0.064	0.246	0.097	0.022	0.147	0.119	0.369	0.483
Own petromax	0.007	0.014	0.119	0.049	0.003	0.053	0.030	0.021	0.145
Own cooker	0.136	0.419	0.642	0.120	0.066	0.335	0.126	0.335	0.573
Number of watches	0.124	1.402	1.258	0.118	1.177	1.287	0.128	2.230	1.500
Own phone	0.103	0.048	0.213	0.092	0.022	0.147	0.128	0.174	0.379
Own sewing machine	0.046	0.062	0.252	0.105	0.230	0.477	0.058	1.007	0.418
Own house	0.015	0.983	0.129	0.015	0.992	0.091	0.007	0.992	0.084
Number of rooms in the house	0.091	2.210	1.130	0.107	2.280	1.702	0.115	3.795	1.711
Concrete walls	0.016	0.134	0.341	0.002	0.089	0.285	--	0.000	0.000
Cement brick walls	0.076	0.326	0.469	0.092	0.230	0.421	0.050	0.140	0.347
Mud brick walls	0.019	0.141	0.349	-0.017	0.269	0.444	-0.002	0.502	0.500
Unbaked brick walls	0.009	0.019	0.137	-0.007	0.006	0.074	-0.002	0.119	0.324
Mud walls	0.048	0.249	0.433	-0.051	0.219	0.414	-0.043	0.069	0.254
In house piped water supply	0.039	0.205	0.404	0.089	0.162	0.369	0.089	0.193	0.395
Flush toilet	0.084	0.041	0.198	0.080	0.019	0.138	0.077	0.790	0.407
Irrigated land (acres)	0.094	1.763	4.542	0.076	4.304	8.416	0.076	0.496	1.329
Un-irrigated land (acres)	0.054	3.642	8.358	-0.004	6.662	18.67	0.004	1.130	2.045
Number of local cows	0.004	1.203	3.754	0.011	2.941	5.257	0.010	0.535	0.776
Number of crossbred cows	0.064	0.159	0.787	0.032	0.047	0.281	0.004	0.797	0.938
Number of buffaloes	0.008	1.605	2.585	0.026	1.510	3.108	-0.01	0.024	0.168

**Table A4: Summary statistics for the variables used in constructing the index
disaggregated by wealth categories**

	Gujarat			Rajasthan			Kerala		
	Bottom 20 %	Middle 20 %	Top 20 %	Bottom 20 %	Middle 20 %	Top 20 %	Bottom 20 %	Middle 20 %	Top 20 %
Own radio	0.079	0.415	0.902	0.103	0.403	0.845	0.506	0.893	1.036
Own camera	0.000	0.000	0.097	0.000	0.000	0.070	0.012	0.000	0.048
Own scooter	0.000	0.061	0.682	0.000	0.000	0.338	0.000	0.012	0.578
Own car	0.000	0.000	0.085	0.000	0.000	0.028	0.000	0.012	0.169
Own refrigerator	0.000	0.000	0.512	0.000	0.000	0.183	0.000	0.000	0.807
Own washing machine	0.000	0.000	0.012	0.000	0.000	0.014	0.000	0.036	0.034
Number of fans	0.202	0.902	2.866	0.039	0.264	2.745	0.129	1.524	3.687
Own heater	0.000	0.000	0.085	0.000	0.000	0.127	0.000	0.012	0.145
Own television (B&W)	0.022	0.134	0.439	0.000	0.014	0.817	0.082	0.226	0.084
Own television (colour)	0.000	0.000	0.317	0.000	0.000	0.113	0.000	0.214	0.879
Own petromax	0.011	0.000	0.036	0.000	0.000	0.014	0.000	0.024	0.072
Own cooker	0.034	0.146	1.244	0.000	0.000	0.323	0.000	0.131	1.024
Number of watches	0.416	1.427	2.707	0.211	0.986	2.479	0.824	2.214	3.759
Own phone	0.000	0.000	0.220	0.000	0.000	0.113	0.000	0.000	0.735
Own sewing machine	0.022	0.037	0.171	0.000	0.125	0.760	0.023	0.262	0.422
Own house	0.942	1.000	1.000	1.000	0.980	1.000	1.000	0.990	1.000
Number of rooms in the house	1.460	2.073	3.121	1.486	2.653	4.507	2.365	3.714	5.349
Concrete walls	0.056	0.085	0.207	0.039	0.099	0.113	0.000	0.000	0.000
Cement brick walls	0.045	0.305	0.622	0.000	0.167	0.619	0.000	0.190	0.301
Mud brick walls	0.213	0.195	0.048	0.210	0.292	0.183	0.459	0.560	0.469
Unbaked brick walls	0.034	0.024	0.000	0.000	0.013	0.000	0.129	0.107	0.048
Mud walls	0.449	0.256	0.073	0.552	0.139	0.028	0.235	0.012	0.000
In-house piped water supply	0.115	0.100	0.451	0.081	0.097	0.352	0.012	0.155	0.434
Flush toilet	0.011	0.012	0.183	0.000	0.000	0.098	0.376	0.917	1.000
Irrigated land (acres)	0.328	1.138	5.000	0.957	2.647	11.47	0.062	0.337	1.157
Un-irrigated land (acres)	1.645	2.227	7.560	3.380	8.313	4.112	0.263	0.725	2.713
Number of local cows	1.224	1.158	0.732	1.445	3.402	3.140	0.500	0.535	0.590
Number of crossbred cows	0.023	0.073	0.537	0.000	0.083	0.084	0.702	0.928	0.710
Number of buffaloes	1.247	1.585	1.500	0.878	1.312	2.309	0.059	0.000	0.012

PURCHASED
ADDITIONAL
GRATE/REPLACEMENT
PLATE
ACC NO.
VIKRAM SARABHAI LIBRARY
11 W, AHMEDABAD.