

Community Perceptions of Important Camel Diseases in Lapur Division of Turkana District, Kenya

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ABSTRACT

This paper presents the results of a study conducted in Lapur Division of Turkana District, Kenya, to estimate the incidence and mortality of camel trypanosomosis using participatory methods. Four livestock camps ('adakars') were conveniently selected for the study. Four informant groups comprising 6–8 key persons were used for the participatory exercises. The camel diseases identified by the pastoralists in their order of importance according to annual incidence were: trypanosomosis (11.4%); mange (10.8%); tick infestation (7.9%); haemorrhagic septicaemia (7.7%); and non-specific diarrhoea (7.6%). Almost half (49.3%) of the camel population suffered from at least one disease over the previous year. The annual incidence and mortality rates of trypanosomosis were estimated at 15% and 9.9% in adult camels and 6.9% and 5.2% in young camels, respectively. There was a seasonal occurrence of trypanosomosis, with most cases reported in the dry season. The prevalence levels of the disease reportedly declined from about 100% in 1978 to an almost stable state of about 15% in 2002. This study revealed that camel trypanosomosis is still an important disease in Turkana District, exacting a heavy toll in terms of morbidity and mortality. The economic losses due to the disease were likely to have been great owing to the central role the camel plays in this arid district of Kenya.

Keywords: camel trypanosomosis, participatory approach, Turkana

Abbreviations: ASAL, arid and semi-arid land; CBPP, contagious bovine pleuropneumonia; FAO, Food and Agriculture Organisation of United Nations; PRA, participatory rural appraisal; SSI, semi-structured interview; VDDL, veterinary drugs delivery levels

INTRODUCTION

Trypanosomosis is one of the most researched diseases in Africa (Mugalla, 2000). The disease is a major constraint to the expansion and production of livestock and their products on approximately 10 million km² of land, covering 37 countries (FAO, 2000). Most camels suffer from trypanosomosis (surra) caused by *Trypanosoma evansi* that is transmitted mechanically, independent of tsetse flies. Camels are also affected to a

lesser extent by the tsetse-transmitted trypanosome species *T. brucei* (Evans *et al.*, 1995). *T. evansi* is widely distributed wherever camels are found (Losos, 1980; Luckins, 1988). In Kenya, 95% of cases of trypanosomosis have been attributed to *T. evansi* (Wilson *et al.*, 1981). The disease manifests in different forms, namely acute, subacute, chronic and inapparent (Wilson *et al.*, 1983). The chronic form is the most common, characterized by severe anaemia, general wasting, reduced milk production, infertility, abortions, and death in some animals (Olaho-Mukani *et al.*, 1993). The disease affects camels of all ages, with a higher incidence of disease in sub-adult camels shortly after weaning (Evans *et al.*, 1995).

Camels are the most valuable species for 75% of Kenya's land area, which is arid and semi-arid land (ASAL) and is degrading rapidly towards desert (Evans *et al.*, 1995). It is estimated that Kenya has between 700 000 and 780 000 camels, kept mostly by the nomadic pastoralists in ASAL in the northern region of the country (Schwartz and Dioli, 1992). Camels are kept mainly for meat, milk, blood and transportation, and for bush control on ranches. The value of the camel varies among individual Kenyan pastoral groups. The Turkana pastoralists regard the camel as cattle (Ngeiywa, 1992; Evans *et al.*, 1995), whereas the Gabbra of the neighbouring Marsabit District regard camel husbandry as the mainstay of their subsistence. The Turkana of Kenya were originally cattle-keepers but acquired camels through intertribal raids from their camel-keeping neighbours, the Gabbra and Rendille (Evans *et al.*, 1995).

Among the pastoralists, camel meat is eaten only when adult male castrates are slaughtered during drought, on ceremonial occasions, or when a camel dies from disease or predation (Field and Simpkin, 1985). The Turkana use camel hides for making ropes, donkey carriers, sandals, and women's skirts (Ngeiywa, 1992). In addition, camels are given as bride price as well as being used as a 'bank', that is as security against drought, diseases and other natural calamities that have devastating effects on cattle, sheep and goats.

The provision of veterinary services to pastoral communities according to a western model is difficult owing to lack of adequate infrastructure and the veterinarians' limited experience of camels under pastoral production systems (Kohler-Rollefson *et al.*, 2001). In addition, most veterinarians are not adept in the diagnosis and treatment of camel diseases, partly owing to the relatively limited research on camels and the fact that camel diseases are inadequately covered in veterinary schools. These constraints, coupled with the low literacy levels of pastoralists, make data gathering using conventional methods inappropriate. Thus, participatory approach (PA) methods become necessary as data-gathering tools in pastoralist settings. Pastoralists possess an extensive body of traditional knowledge on which they rely to diagnose or treat many diseases (Kohler-Rollefson *et al.*, 2001).

The present study was undertaken to generate information to enable the relevant authorities to formulate and implement policies that foster improvement in pastoral incomes as well as improve the existing livestock pastoral production systems. In the study, the incidence and mortality of important camel diseases in Lapur Division of Turkana District were estimated.

MATERIALS AND METHODS

Study area

The study was carried out between February and April 2002 in Lapur Division of Turkana District in the Rift Valley Province of Kenya. The district occupies the north-western part of Kenya and covers an area of 70 000 km². It borders lake Turkana to the east, Uganda to the west and Sudan and Ethiopia to the north (Figure 1). The district is divided into 17 administrative Divisions.

Turkana District receives an annual average rainfall of 120 mm and temperatures are high and fairly uniform in the range 24–38°C. The area spans agroecological zones III to VII and has a human population of approximately 447 000 people (Central Bureau of Statistics, 1999). The geographic features include low-lying open plains, mountain ranges, Lake Turkana and the river drainage patterns. The altitude of the mountain ranges is between 1500 and 1800 m above sea level (Turkana District Development Plan, 2002–2008). According to the records at the Turkana District Veterinary Office, there are approximately 200 000 head of cattle, over 2.5 million small ruminants and 115 000 camels in the district.

Selection of livestock camps

Lapur Division was convenient for the study for reasons of logistics, terrain and security. The division has four main livestock camps ('adakars'), which were identified through the assistance of the local administration. The adakars were the basic units of interest. The adakar leaders ('emurons') identified the people who were used as key informants for the study.

Participatory appraisal tools

Semistructured interviews

Semistructured interviews (SSIs) were conducted according to Catley (1999), Catley and Irungu (2000) and Catley and colleagues (2001, 2002b). Each adakar provided three groups of key informants (men elders, women and herders) for a total of 12 informant groups for this exercise. Each group comprised of 6–8 persons. The semistructured interviews were used to gain some insight into the local perception of livestock diseases in general, and camel diseases in particular. The informants were asked to name the most important diseases of every livestock they kept as determined by their frequency of occurrence and their effects. In addition, they were asked to give the five most important diseases of camels and their clinical manifestations.

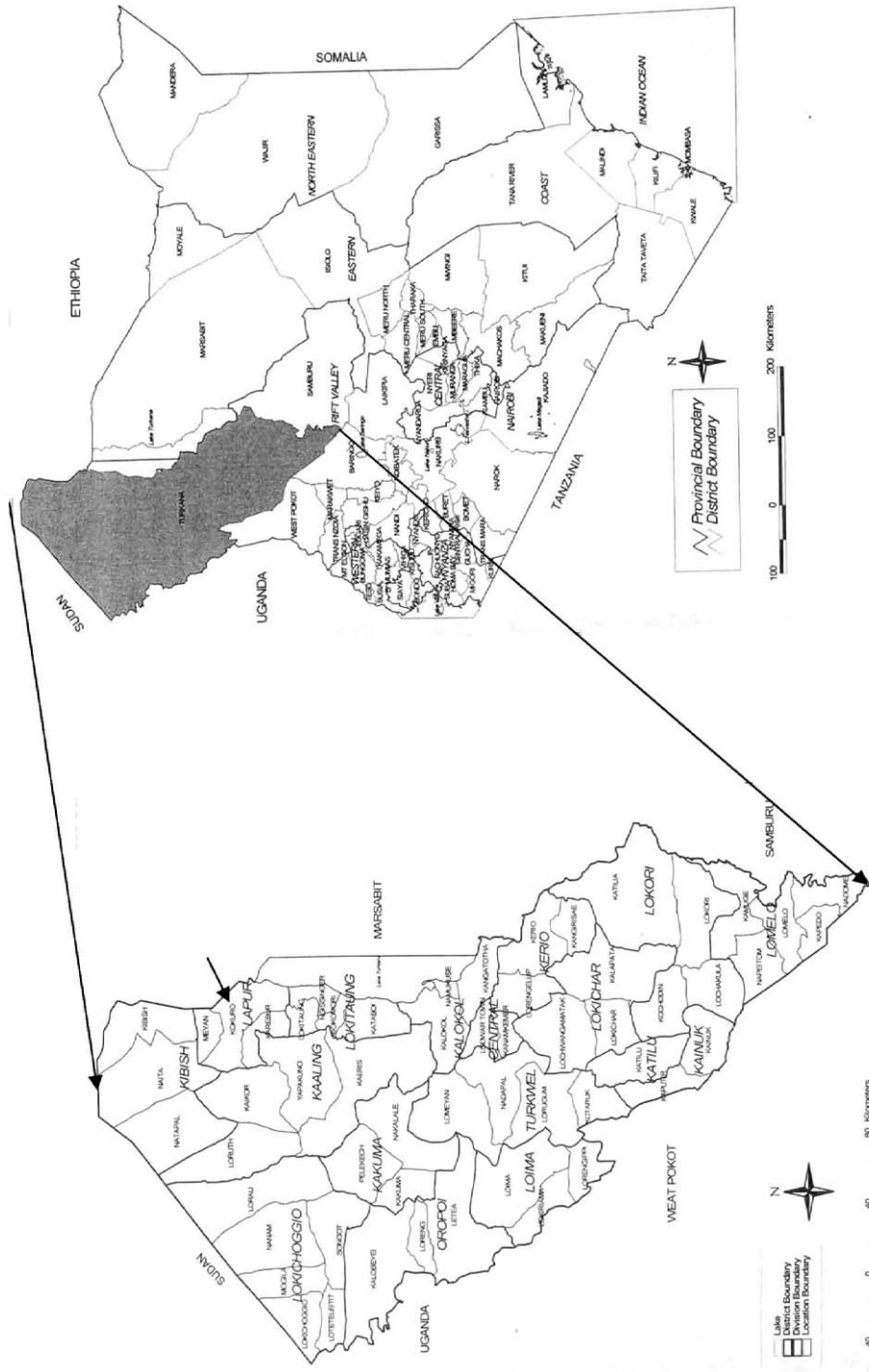


Figure 1. Map of Kenya showing the location of the study area, Lapur Division of Turkana District, Kenya

Pairwise comparison

Pairwise comparison was used to generate disease indicators/signs of the five most important camel diseases that were obtained through SSIs (Catley *et al.*, 2002b). The five diseases, by their local names, were written on five separate cards. Everyday objects (stones, leaves, cow dung, etc.) were used to represent the corresponding diseases. The informant groups were then asked to compare the diseases in pairs so that the differences in signs associated with the five diseases were obtained. The signs were subsequently related to modern veterinary literature. This exercise was conducted with the 12 groups of key informants.

Matrix scoring for disease signs

The five camel diseases were represented using everyday objects, which were placed along the top *X*-axis of the matrix and their signs (indicators) illustrated along the *Y*-axis on cards. The 12 informant groups were asked to score the disease signs one by one according to their relative importance using 25 stones.

Seasonal calendar matrix

Seasonal calendars, a time-related data source (Lelo *et al.*, 1995), were used to describe the seasonal prevalence of the five important camel diseases. Each adakar provided key informants for a total of four groups. The informants were asked to divide a calendar year according to their perception. They divided the calendar year into three seasons. The seasons by their local names were represented by everyday objects on the *X*-axis and cards with names of the diseases written on them placed along the *Y*-axis. The informants were asked to score the prevalences of the diseases across the seasons using 15 stones.

Trend lines

Information was collected covering the previous 24 years on the key events the community thought were important according to IIED (1994) and Lelo *et al.* (1995). The four groups of informants were encouraged to recall important events in the community. This activity was used to approximate the years in which the events took place. A cut-off date of 1978 was adopted because the informants associated it with the death of a famous elder called Lowoton. These events were then related to the prevalences of camel trypanosomosis, veterinary drugs delivery levels (VDDL) and contagious bovine pleuropneumonia (CBPP). The informants drew graphs on the ground using two sticks to represent the *Y*- and *X*-axes. The *X*-axis represented the key events over the years and the *Y*-axis represented the prevalences of camel trypanosomosis, CBPP and VDDL. Stones were used to score the levels of the two diseases and VDDL. This tool was used in combination with SSIs for triangulation purposes.

Proportional piling

Proportional piling was used to estimate the relative incidence of the five most important camel diseases during the previous year (Catley, 1999; Catley and Irungu, 2000; Catley *et al.*, 2001, 2002b). This activity was performed by four informant-groups representing the four adakars. Before the informants could score, they were asked to classify the camels into different age groups, i.e. adults and the young (suckling and weaners). Each informant maintained a pile of 100 stones for each age group. First, the informant split the pile of stones into two in relation to the number of camels that got sick and those that remained healthy during the previous year. Each informant was asked subsequently to remove some of the already allotted stones representing the sick camels to indicate the number that died during the same period. This activity provided estimates of the annual mortalities due to the diseases. An illustration of how proportional piling was conducted is shown in Figure 2.

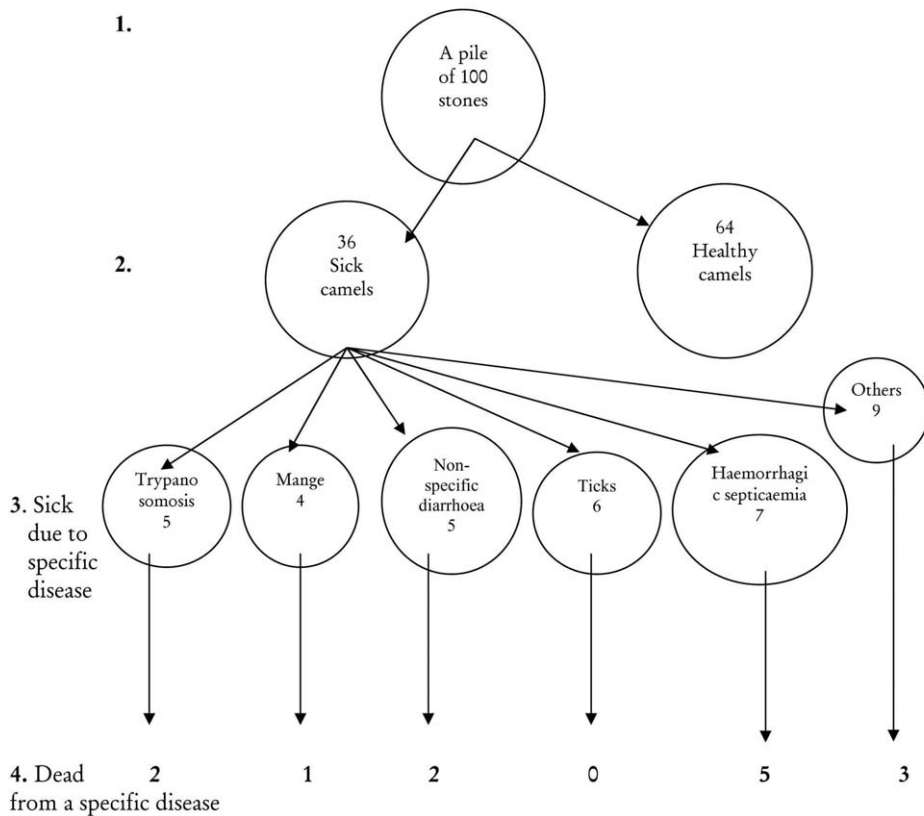


Figure 2. An illustration of the proportional piling exercise conducted by informants in Lapur Division of Turkana District, Kenya, 2002

Data management and analysis

Survey data were entered and stored in Microsoft Excel 2000 software. The data were then exported to Statistical Package for Social Sciences (SPSS) base 11 for statistical analysis. The level of concordance between the different groups of key informants was determined by the method of Seigel and Castellan (1994).

RESULTS

Characteristics of study area

Lapur Division comprises three locations covering an area of 4652 km² and a human population approximated at 13 700. The approximate numbers of livestock kept in the four adakars were: 950 cattle, 20 000 sheep and goats, 500 donkeys and 200 camels.

Disease signs matrix

The results of the semistructured interviews to determine the types of livestock kept and the three most important diseases afflicting each type of livestock are summarized in Table I.

TABLE I

Types of livestock kept by the Turkana pastoralists and the three important diseases affecting each type of livestock in Lapur Division of Turkana District, Kenya, 2002

Type of livestock	Diseases
Cattle	Contagious bovine pleuropneumonia (CBPP) (loukoi) Black quarter (lokichuma) Rinderpest (lokio)
Camel	Trypanosomosis (lotorobuo) Mange (ekoto) Nonspecific diarrhoea (loleewa)
Sheep and goats	Contagious caprine pleuropneumonia (CCPP) (loukoi) Pox (etune) Orf disease or contagious ecthyma (ng'ibuorok)
Donkeys	Trypanosomosis (lokipi) Black quarter (lokichuma) Anthrax (enomokere)

On further probing about the camel diseases, the informants listed the following diseases in their order of importance: lotorobuo (trypanosomosis), ekoto (mange), loleewa (nonspecific diarrhoea), emadang' (tick infestation), logooroi (haemorrhagic septicaemia), ng'ibuorok (orf or camel contagious ecthyma), lowala (camel pneumonia), etune (camel pox), akiserit dermatomycosis), long'okuo (rabies), lobusion (abscesses) and looketa (mastitis).

During this exercise, it emerged that Turkana pastoralists name various livestock diseases according to the presenting signs and the species affected. A particular disease can have various names; for example, trypanosomosis is called lotorobuo in camels and lokipi in cattle and donkeys. Both names mean ventral oedema, a sign of trypanosomosis in donkeys and camels.

The matrix scoring results of disease signs are shown in Table II. The most important signs of lotorobuo were oedema, emaciation, and infertility and abortion.

The agreement between the 12 informant groups on the signs of diseases varied from 'non significant (NS)', 'weak', 'moderate' to 'good' according to the critical values of Kendall's coefficient of concordance, W . The level of agreement was good for skin lesions ($W = 0.753$), oedema ($W = 0.885$), loss of hair ($W = 0.860$), moderate for infertility and abortion ($W = 0.675$), weak for emaciation ($W = 0.420$) and not significant ($W = 0.171$) for the high mortality disease indicator (Table II).

Additional signs of lotorobuo were explored through SSI. The listed signs were loss of appetite, reduced milk yield, rough hair coat, low-birth-weight calves, small udders, listlessness, swollen joints, coughing and a shrunken hump at the terminal stages. The postmortem lesions listed were watery and fibrous meat, lack of fat around the heart and watery bone marrow.

Seasonal calendar

The four groups of informants divided a year into three seasons, namely rainy season (akiporo), dry season (akamu), and an intermediate season (akiitiar). Akamu was from January to May, akiitiar in the month of June and akiporo from July to December. Although the agreement between the informants was weak ($W = 0.317$) as to when camel trypanosomosis occurred, the majority concurred that most cases were seen during the akamu season (Table III). There was good agreement for nonspecific diarrhoea ($W = 0.942$), moderate agreement for haemorrhagic septicaemia ($W = 0.517$) and no agreement for both mange and tick infestation ($W = 0.050$ and $W = 0.000$, respectively).

Trend lines

The Turkanas associate different times in their history with the occurrence of extraordinary events, e.g. an eclipse of the sun, famine, thunderstorms, wars, deaths of great men and women, disease outbreaks, etc. After intensive questioning of the informants, the year 1978 was chosen as a cut-off point. That year was associated with

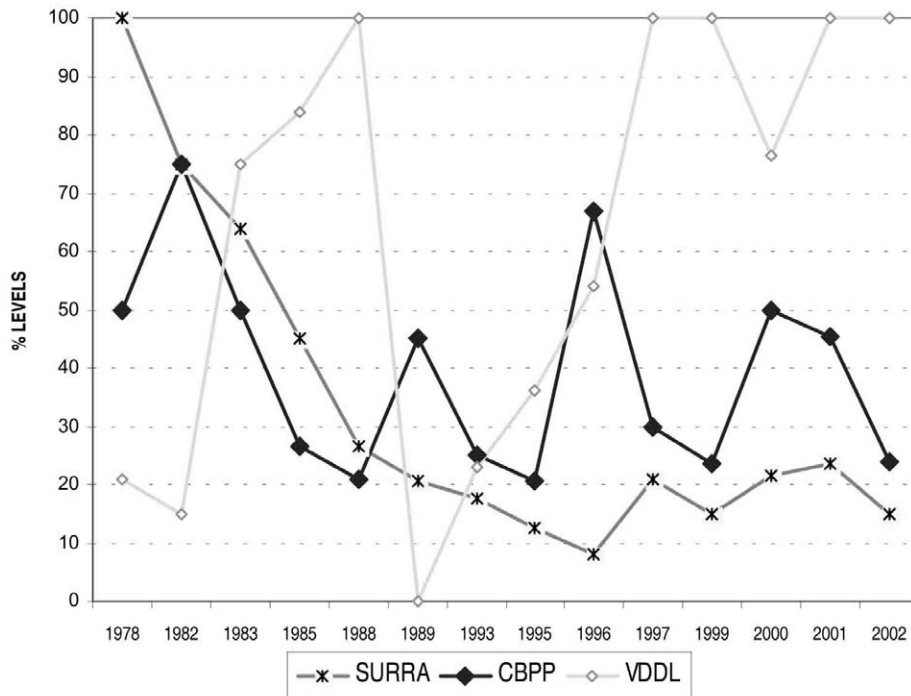


Figure 3. A trend line depicting variation of camel trypanosomosis (surra), contagious bovine pleuropneumonia (CBPP) and veterinary drug delivery levels (VDDL) in Lapur Division, Turkana District of Kenya from 1978 to 2002

Disease incidence

The informants categorized camels into three age-groups, namely adults (ng'ikala), growing stock (ng'isorok) and suckling (ng'itang'ikala). Because of the taxing nature of proportional piling, each informant was asked to categorize camels as either adults or young stock (suckling and weaners). On further probing into camel diseases, the informants listed the following five diseases in order of their importance as lotorobuo (trypanosomosis), ekoto (mange), emadang' (tick infestation), logooroi (haemorrhagic septicaemia), loleewa (nonspecific diarrhoea). Almost half (49.3%) of the camels suffered from one ailment or another during the previous year (Figure 4) with camel trypanosomosis constituting 11.4% of all the cases.

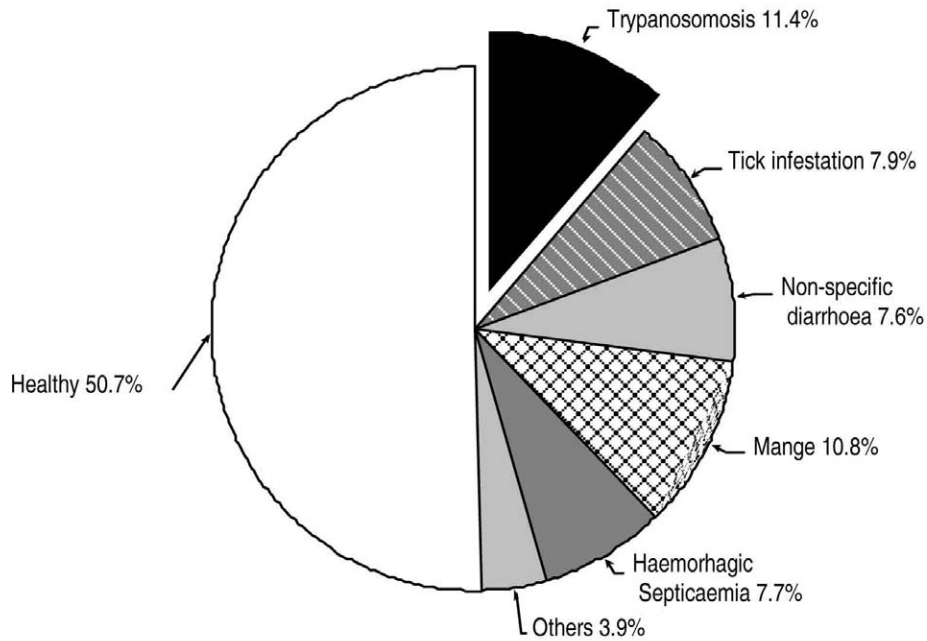


Figure 4. Mean annual incidences estimated by pastoralists of various camel diseases relative to the healthy in Lapur Division, Turkana District, 2001–2002

The estimated mean annual incidence of the five diseases in adult and young camels is shown in Figure 5. Among the adult camel diseases, trypanosomosis had the highest incidence at 15.1% but was low in the young group at 7%, indicating that the incidence of trypanosomosis increased with age (Figure 5). The same pattern was also observed in mange. Occurrence of tick infestation was higher in young camels than in adults.

Disease mortality

The results of proportional piling for disease mortality showed that 31% of camels died from trypanosomosis in the previous year, accounting for 7.8% of fatalities (Figure 6). The mean annual mortality of adult and young camels is shown in Figure 7. Among the diseases of adult camels, trypanosomosis had the highest mortality at 10% but was lower in the young group at 5%, an indication that the severity of trypanosomosis increased with age (Figure 7). This pattern was also observed to a small extent with mange and nonspecific diarrhoea. Mange and tick infestation were the leading causes of mortality in young camels.

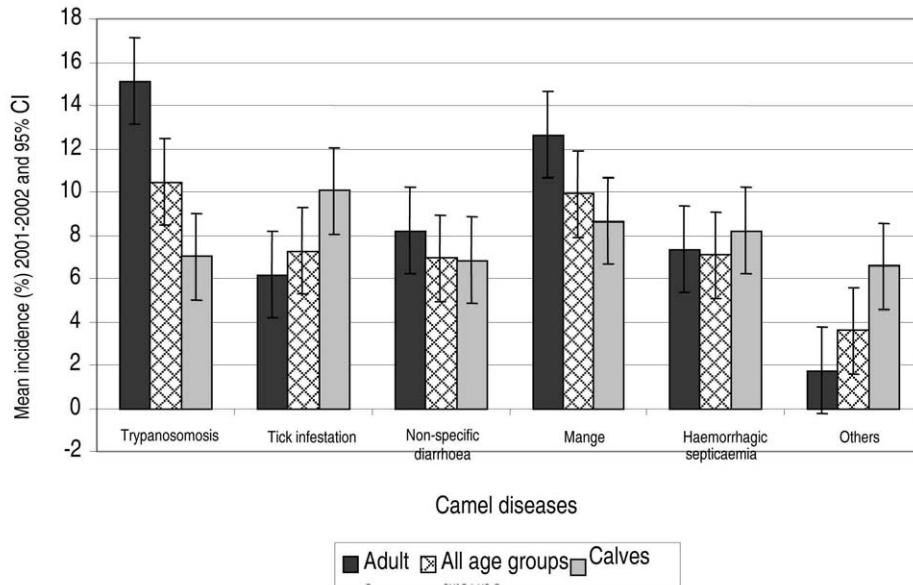


Figure 5. Age-specific mean annual incidences estimated by pastoralists of camel diseases in Lapur Division, Turkana District, 2001–2002

DISCUSSION

In a study of seasonal incidence of diseases of cattle, disease vectors and rainfall in southern Sudan, Catley and colleagues (2002a) used matrix scoring, a participatory rural appraisal (PRA) tool for gathering information in pastoralist communities. This technique was also found useful in this study. The key informants agreed on most of the presenting signs of the important camel diseases. Indeed, most of the signs listed for camel trypanosomosis were consistent with what appears in the veterinary literature (Evans *et al.*, 1995; Kaufmann, 1998; FAO, 2000). In a study by Noor (1999), foul-smelling diarrhoea and a sweet smell of urine of infected camels were reported as additional signs of camel trypanosomosis in Moyale District of Kenya by Somali pastoralists. In another study by Catley and colleagues (2001), loss of tail hair was also mentioned by Turkana pastoralists as a sign of camel trypanosomosis. However, the latter sign and the two signs reported by the Somali pastoralists, were not mentioned by the Turkana key informants in the present study. The informants were able to link increased cases of camel trypanosomosis to a build-up of the biting fly population (Mochabo *et al.*, 2003). It is known that biting flies play an important role in the transmission of camel trypanosomosis (Evans *et al.*, 1995; FAO, 2000). Catley and

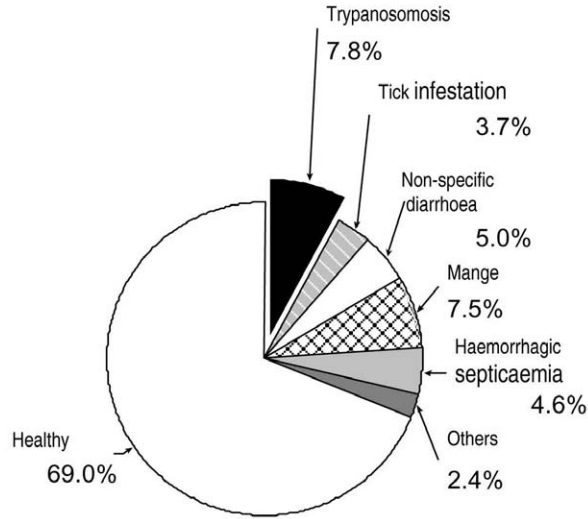


Figure 6. Mean annual mortalities estimated by pastoralists of camels due to diseases relative to the healthy in Lapur Division, Turkana District, 2001–2002

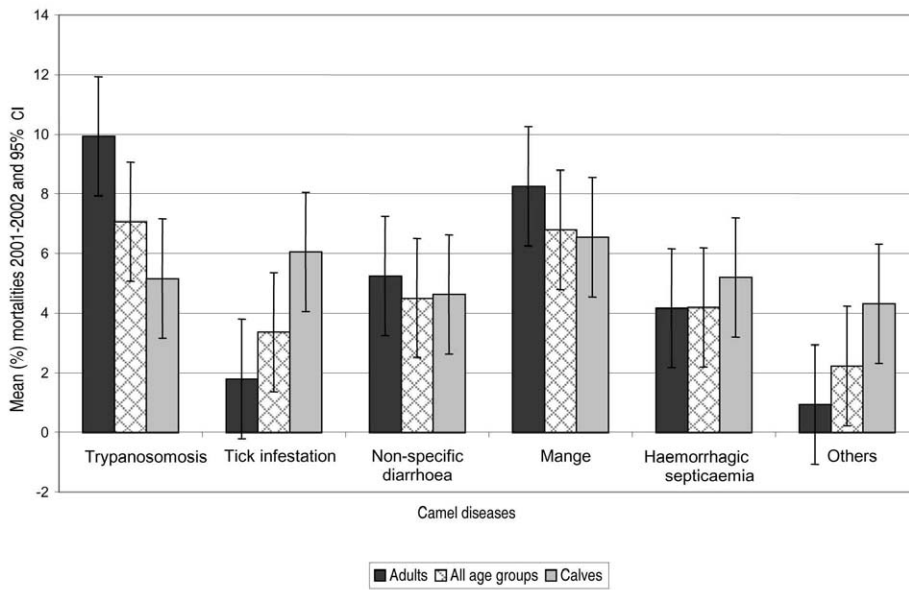


Figure 7. Mean annual age-specific mortalities estimated by pastoralists of camels due to diseases in Lapur Division, Turkana District, 2001–2002

Irungu (2000), in their study of bovine trypanosomosis using participatory methods, documented a similar knowledge base of livestock diseases among the Orma pastoralists of Tana River District, Kenya.

Trypanosomosis was identified as one of the leading diseases of camels in Lapur Division of Turkana District, Kenya. The practice of grazing livestock along rivers and swampy areas, favourable habitats for biting flies (Evans *et al.*, 1995), may have contributed to the high prevalence of the disease. Furthermore, the large population of sheep and goats may have acted as a reservoir, since they have been shown to harbour inapparent *T. evansi* inapparently (Evans *et al.*, 1995). Donkeys might also be infected but are resistant (FAO, 2000) and could also have acted as reservoirs.

The seasonal calendar was used to demonstrate temporal variations in the prevalence of camel diseases. There was poor agreement between the groups of informants as to when camel trypanosomosis occurred with the highest frequency. The lack of good agreement may have been due to the small number of informant groups (4) used for this exercise. Moreover, the participatory appraisal methods are still under refinement and there is no minimum number of informant groups to achieve good agreement. However, there appeared to be a general consensus that camel trypanosomosis occurred more frequently during the dry season. The upsurge of trypanosomosis during the dry season may be attributed to the build-up of the biting fly population after rains. In addition, during the dry season, camels are usually on a low plane of nutrition and trek for long distances in search of water and pasture. This is likely to stress the animals and subsequently trigger clinical signs of trypanosomosis in animals that would otherwise be subclinically infected. Evans and colleagues (1995) also reported a high prevalence of camel trypanosomosis during the dry season in semi-arid rangelands of Kenya.

The trend line drawn by the informants from 1978 to March 2002 showed a general decline in trypanosomosis prevalence from 1978 to 1996. Since 1996, the prevalence exhibited minor fluctuations, leading to what appeared to be a steady equilibrium. Although the delivery of veterinary services appeared to have improved during the period of low prevalence, it is difficult to attribute the low prevalence to veterinary interventions since veterinary services in this remote district of Kenya are grossly inadequate. It is, therefore, likely that the camel and *T. evansi* have established a stable relationship over time to reach an endemically stable state. Indeed, Njiru and colleagues (2000) have shown that camel trypanosomosis is endemic in camel populations of Kenya. Endemic stability has also been reported to occur in tick-borne diseases of cattle in central Kenya (Gitau *et al.*, 2001).

According to the informants, about half of the camel population suffered from at least one disease over the previous year with trypanosomosis having the highest annual incidence. The same pattern was also reflected in disease mortality. Trypanosomosis occurred more in adult camels. A similar pattern of trypanosomosis has been observed in Orma breed of cattle, for which the annual incidence was 17.9% in all age groups (Catley and Irungu, 2000). In a study of camel trypanosomosis among the Rendille and Gabbra communities of the neighbouring Marsabit District and the Somali communities of Wajir and Garissa Districts, Kaufmann (1998) recorded the incidence of camel trypanosomosis as 25%, 8% and 26%, respectively. As observed by Catley and

Irungu (2000), informants were likely to inflate the incidence of trypanosomosis in expectation of free drugs. However, infection rates of camel trypanosomosis in the range of 20–70% have been reported in the past (Wilson, 1984; Radostits *et al.*, 1994). The reported incidence (11.4%) of trypanosomosis irrespective of age of animal was within the range 3–20% reported for endemic and epidemic scenarios, respectively (Wilson, 1984; Evans *et al.*, 1995). The 7.8% mortality was high compared to a mortality of 3% reported earlier (Wilson, 1984). This discrepancy could be attributed to inflated estimates of mortality by the informants.

As observed by Catley (1999), participatory appraisal methods are relatively resource-friendly and flexible and do generate information that precisely describes the perceptions of local people on animal health problems. Trypanosomosis is an important disease in Turkana, exacting a heavy toll in terms of morbidity and mortality in the camel population. The situation is confounded by the by inadequacy of delivery of veterinary services in this large and arid area of Kenya, which is partly due to its vastness, hostile climatic conditions and insecurity. The present findings will enable the Kenyan government to formulate, prioritize and implement policies to change the approach of provision of veterinary services in the district in light of the fact that ASALs support an estimated 50% of the national livestock herd. In addition, there is a need to focus more attention on the control of camel trypanosomosis in the pastoral production system of Turkana District, with community participation as an integral component.

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Perceptions dans la communauté des maladies majeures du chameau dans la Division de Lapur du district de Turkana, au Kenya

Résumé – Cet article présente les résultats d'une étude conduite dans la Division de Lapur du district de Turkana, au Kenya, pour estimer l'incidence et la mortalité de la trypanosomiase du chameau en utilisant des méthodes participatives. Quatre camps de bétail ('adakars') ont été sélectionnés pour l'étude en raison de leur situation. Quatre groupes d'informants comportant 6 à 8 personnes clés ont été utilisés pour les exercices participatifs. Les maladies du chameau identifiées par les pastoralistes dans leur ordre d'importance en fonction de leur incidence annuelle ont été: la trypanosomiase (11.4%); la gale (10.8%); l'infestation par les tiques (7.9%); la septicémie hémorragique (7.7%) et la diarrhée non-spécifique (7.6%). Presque la moitié de la population de chameaux a été atteinte d'au moins une maladie durant l'année précédente. L'incidence annuelle et les taux de mortalité ont été estimés respectivement à 15% et à 9.9% chez les chameaux adultes et à 6.9% et 5.2% chez les jeunes chameaux. Il a été noté une apparition saisonnière de trypanosomiase, la plupart des cas étant signalés durant la saison sèche. Les taux de prévalence de la maladie auraient diminué d'environ 100% en 1978 à un état presque stable d'environ 15% en 2002. Cette étude a mis en évidence que la trypanosomiase du chameau est encore une maladie majeure dans la région de Turkana, revendiquant un taux de morbidité et de mortalité élevé. Les pertes économiques en raison de la maladie ont probablement été élevées en raison du rôle central joué par les chameaux dans cette région aride du Kenya.

Percepciones comunitarias de importantes enfermedades de camellos en la División de Lapur del Distrito de Turkana, Kenia

Resumen – Este documento presenta los resultados de un estudio llevado a cabo en la división de Lapur del distrito de Turkana, Kenia, para estimar la incidencia y mortalidad de tripanosomosis camellar utilizando métodos participativos. Cuatro campamentos de ganado ('adakars') fueron convenientemente seleccionados para este estudio. Cuatro grupos informantes comprendiendo 6-8 personas claves fueron utilizados para los ejercicios participativos. Las enfermedades de los camellos identificadas por los pastoreadores en orden de importancia según la incidencia anual fueron: tripanosomosis (11.4%), sarna (10.8%), infestación por garrapatas (7.9%), septicemia hemorrágica (7.7%), y diarrea no específica (7.6%). Casi la mitad (49.3%) de la población de camellos había sufrido al menos una enfermedad el año anterior. Los índices de incidencia y mortalidad anual de tripanosomosis fueron estimados en 15% y 9.9% en camellos adultos, y 6.9% y 5.2% en camellos jóvenes, respectivamente. Había una incidencia estacional de tripanosomosis, con la mayoría de los casos comunicados en la estación seca. Los niveles de predominio de la enfermedad constatados disminuyeron de aproximadamente un 100% en 1978 a casi un estadio estable de aprox. 15% en el 2002. Este estudio puso de manifiesto que la tripanosomosis en camellos es aún una enfermedad importante en el distrito de Turkana, ejerciendo un duro coste en términos de morbilidad y mortalidad. Las pérdidas económicas debido a la enfermedad fueron probablemente enormes debido al papel central que juega el camello en este árido distrito de Kenia.