Participatory Epidemiology and Strengthening Public Sector Veterinary Services

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1. Introduction

Public sector veterinary services in much of Africa are in decline. Restructuring of State Veterinary Services (SVS), including decentralization, has been associated with weakened capacity to investigate disease, or operate effective surveillance and reporting systems. Increasingly however, countries wishing to export livestock are advised to demonstrate their animal health status according to OIE guidelines. The guidelines raise many challenges, particularly for countries where substantial livestock populations are located in remote areas, with limited basic infrastructure or communications (e.g. Table 1). In these areas, conventional epidemiological methods are difficult to apply or sustain.

Table 1.
People, land, infrastructure and communications: a comparison of the USA and Horn of Africa (source: CIA Fact Book, 1999)

	USA	Horn of Africa
Human population	272.6 million	157.2 million
Geographical area	9.62 million km^2	5.21 million km^2
Population density	28.27/km^2	30.17/km^2
Roads - total	1.50/km^2	0.03/km^2
Roads - paved	0.41/km^2	0.004/km^2
Telephones/1000 people	626	4.3

This paper provides a brief overview of recent experiences with the use of participatory approaches and methods to improve understanding of animal health issues in pastoral areas of the Horn of Africa. These experiences include the emergence of participatory epidemiology (PE) as a distinct branch of veterinary epidemiology and activities to institutionalize the approach in national veterinary epidemiology units, universities and research centres.

2. What is participatory epidemiology?

Many veterinarians involved in epizootic disease control in Africa and with experience of pastoral communities, have noted a wealth of local livestock knowledge, including good diagnostic skills and awareness of modes of disease transmission. Participatory epidemiology is the use of participatory methods to improve understanding of animal health issues. Key features are summarised below:

Attitudes and behaviour
Practitioners are required to assess their own professional and cultural biases. Essentially, they needed to be genuinely willing to learn from local people, not lecture to them but actively and patiently listen. This requires respect for local knowledge and culture.

Combined methods and triangulation
Participatory epidemiology uses interviewing, scoring and ranking, and visualisation methods. Of these, interviews are the most important group of methods because they are used alone but also

complement and form the basis for other methods. The visualisation methods include mapping (natural resource maps, social maps, service maps), seasonal calendars, time-lines, transects, Venn diagrams, flow diagrams. Scoring methods include matrix scoring and proportional piling. These methods are combined with conventional veterinary investigation and epidemiological tools.

The use of key informants

Although pastoral communities generally are recognised as knowledgeable about animal health matters, certain people are known to possess special livestock knowledge and skills. These local experts are important key informants for participatory epidemiologists.

Action-orientated

Participatory epidemiology aims to generate information that can be verified with communities and leads to agreement on appropriate action. Initially, the aims of a particular study or investigation should be clearly explained to avoid raising expectations. In some situations, further laboratory results will be required and the mechanism for transferring these results back to the community should be defined.

Methodological flexibility, adaptation and development

Participatory epidemiology is a relatively new branch of epidemiology that is still developing. The approach is based on qualitative inquiry and complements the qualitative nature of standard veterinary investigation procedures. According to the needs of a given community or organisation, participatory epidemiology can also combine the benefits of participatory approaches and methods with quantitative inquiry. Methodological adaptation is encouraged.

Table 2.
Examples of participatory epidemiology methods

Information required	PE methods[a]
Background information:	
System boundary	Natural resource maps, social maps.
Social organisation	Social mapping, Venn diagram
Wealth groups	Wealth ranking
Relative livestock ownership	Proportional piling
Preferred types of livestock reared	Livestock species scoring
Food, income and other benefits from livestock	Proportional piling
Marketing systems	Flow diagrams, service maps
Veterinary services	Service map, Venn diagrams, ranking and scoring
Resources available to rear livestock	Natural resource maps, transects.
Disease-specific information:	
Priority livestock diseases, with reasons	Disease scoring
Local characterisation of diseases according to disease signs and causes	Matrix scoring
Estimates of incidence and mortality	Proportional piling; progeny history
Temporal information:	
- history of livestock diseases	Timelines
- seasonal variations in livestock disease, vectors and livestock-wildlife interactions	Seasonal calendars
Spatial information:	
- contact with neighbouring herds, wildlife, disease vectors	Mapping; mobility maps
- areas of disease events	Mapping
- preferred control options, with reasons	Matrix scoring

[a]Semi-structured interviews can provide information on all topics

3. Uses of participatory epidemiology

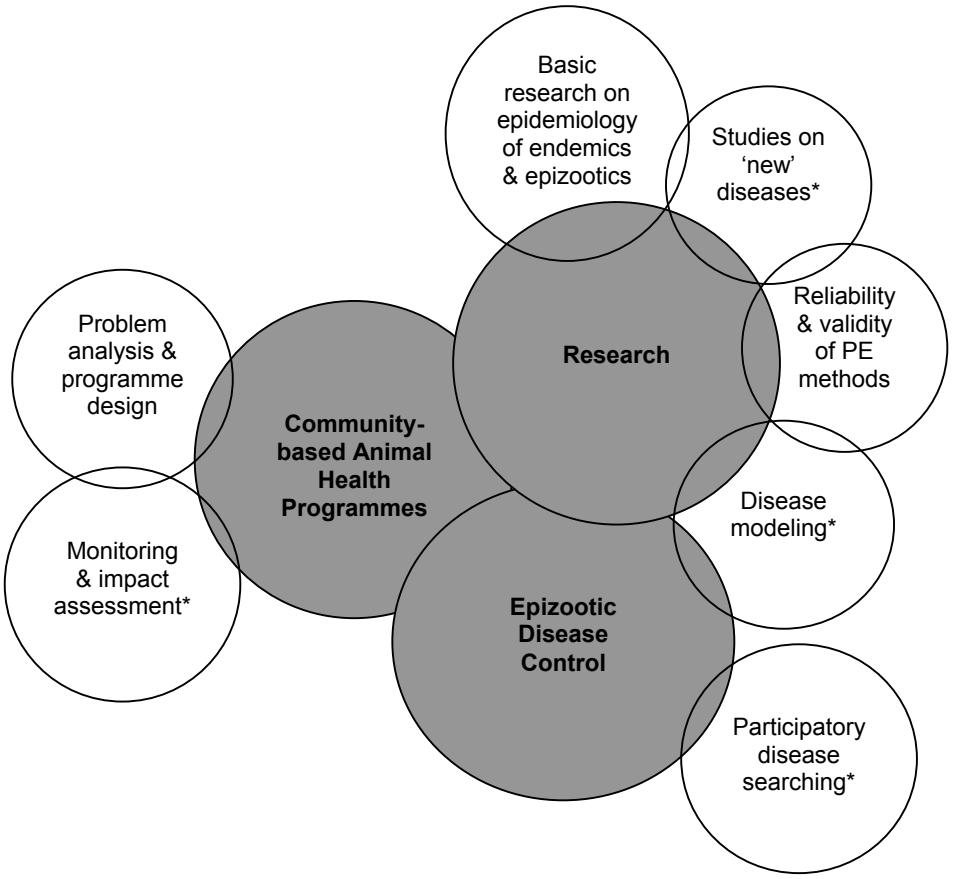


Figure 1.
Current uses of participatory epidemiology in pastoral areas of the Horn of Africa

Those uses marked '*' are particularly relevant to government veterinarians involved in epizootic disease control.

3.1 Community-based animal health systems

Probably the most common use of PE has been during animal health surveys and problem analysis conducted during the early stage of community-based animal health worker (CAHW) projects. Typically, a 'quick and dirty' approach has been used with one-off use of methods and limited triangulation with other PE methods or conventional investigation. However, many programmes based on this use of PE have shown good success. For example, rinderpest control in the Afar region of Ethiopia and in southern Sudan was achieved via CAHW programmes arising from participatory analysis with communities.

Increasingly, PE methods are also being used in impact assessment of CAHW programmes. For example, before and after' methods enable local perceptions of changing disease patterns to be understood and related to possible causes, such as the activities of CAHWs.

3.2 Epizootic disease control

Two specific adaptions of PE for epizootic disease control in the Horn of Africa are:

a. Participatory disease searching

Participatory disease searching (PDS) evolved in the Pan African Rinderpest Campaign and used pastoralists' knowledge of rinderpest to locate disease outbreaks in remote areas. The approach was based on PE methods such as semi-structured interviews and in particular, the use of probing questions to delve deeply into local knowledge about rinderpest. Also, mapping and time-lines were used to build an historical picture of rinderpest outbreaks in a given area. These methods were used in combination with conventional veterinary investigation methods such as clinical and laboratory examination. When the searching team actually located a rinderpest outbreak, the involvement of livestock keepers during the disease search meant that discussion on the action required to control the outbreak was easily initiated. At the time of writing, quality PDS will become increasing important within the Pan African Programme for the Control of Epizootics (PACE) as Horn of Africa countries try to identify remaining foci of rinderpest in remote areas. FAO EMPRES is also supporting PDS activities in Pakistan.

b. Disease modelling

Computer simulations of disease can assist epidemiologists to develop or improve disease control strategies. By understanding the way a disease moves between animals in a population, appropriate methods to interrupt disease transmission can be identified. A common criticism of disease models has been that the people developing the model are isolated from realities on the ground. Frequently, this means that the validity of the field data used to run the model is not fully understood and therefore, inappropriate conclusions are drawn. Similarly, recommendations for disease control should be informed by knowledge of local preferences for different control options.

In southern Sudan, PE was used to generate some basic data for a rinderpest disease model. The basic parameter for developing the model was a measure of rinderpest transmissibility, called the basic reproductive number (R_0). One method for calculating R_0 requires an understanding of herd structure and mortality rates due to rinderpest in different age groups of cattle. Methods such as proportional piling can be used to produce this kind of data. Other methods, such as mapping, can show contact between herds and seasonal variations in these contacts.

After R_0 had been estimated, a model was developed to show the effect of vaccination on rinderpest presence in a given population. This model was used to predict the level of vaccination coverage required for stopping transmission of rinderpest within and between herds in southern Sudan. Although work is still in progress, this 'participatory modelling' approach combines herders' expert opinions with sophisticated mathematics and conventional diagnosis to develop better disease control strategies. Furthermore, disease models can be developed with relatively small data sets provided that the reliability of the data is known. Work supported by PACE and FAO EMPRES is now in progress to develop disease models for contagious bovine pleuropneumonia in southern Sudan and Tanzania, again using PE to generate basic data for the models.

3.3 Research

Many organizations in Africa have used participatory methods in animal health research. In common with the design of CAHW programmes, methods have usually been used in a one-off manner, with limited attention to triangulation or comparison of findings with conventional methods.

a. Studies of reliability and validity

Most recently, research has been conducted to assess the reliability and validity of standardized PE methods when repeated with different informants. This work included comparison of data produced by PE with data produced by standard veterinary investigation and epidemiological methods. Three studies in different pastoralist locations and on different diseases were conducted and in all cases, PE methods were found to be reliable and valid. Results from two studied have been subject to peer review and published in reputable journals. Publication of findings from the third study is in progress.

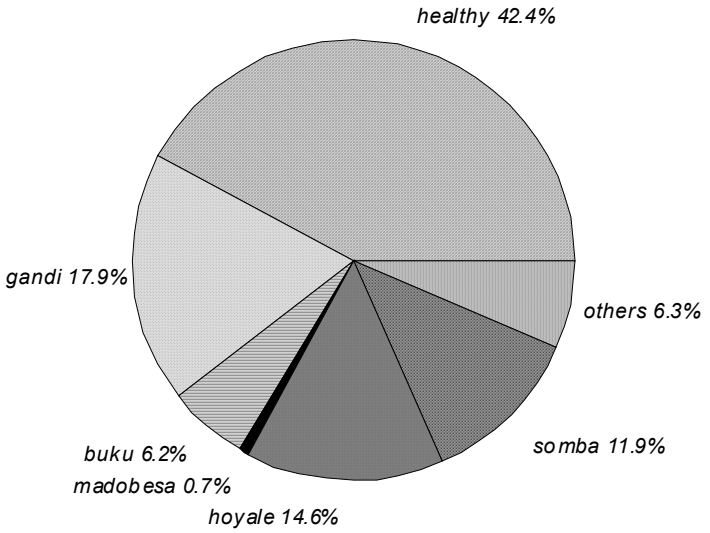
b. Research on 'new' diseases

In response to requests from pastoralist communities, studies have been conducted (or are in progress) to investigate apparently new, or previously undiagnosed diseases. These studies have utilized PE and include investigations into a chronic wasting disease called *liei* in cattle in southern Sudan, suspected chronic manifestations of foot and mouth disease in Tanzania (called *oleipangpang* by the Massai) and also in Tanzania, a circling disease in cattle called *ormilo*. Participatory epidemiology is a useful was to understand local characterization of disease and estimate morbidity, mortality and other variables.

c. Basic research on the epidemiology of endemic and epizootic diseases

Participatory epidemiology has been used to improve understanding of the general livestock disease situation in pastoral areas, often in locations where virtually no other information is available. In the example below, a simple proportional piling method was used to estimate the incidence of the five 'most important' cattle diseases as perceived by Orma herders in Tana River District, Kenya. Figure 2 shows the relative incidence of the five diseases during the pervious year and in comparison with cattle that remained healthy.

Figure 2.
Example of estimates of cattle disease incidence as derived from PE, Tana River District, Kenya



Notes
Method – proportional piling with 50 independent informants, representing 50 herds. Mean incidence estimates are presented.
Gandi chronic trypanosomiasis
Buku acute trypanosomiasis
Somba CBPP
Hoyale FMD
Madobesa ? rinderpest

4. Links between PE, PDS and CAHWs

Community-based animal health workers are community members who are selected by the community for basic training in disease prevention and control. They can also contribute to disease reporting by providing:
- regular activity reports to their supervisors (veterinarians or animal health assistants);
- reports of disease outbreaks to their supervisors.

Therefore, CAHWs can complement conventional disease reporting systems. CAHWs do not usually conduct participatory epidemiology – this is a role for veterinarians (see below).

A key feature of PE is triangulation or crosschecking information derived from different sources and methods. These different sources and methods include conventional veterinary investigation methods such as clinical and pathological examination, and laboratory diagnosis. Therefore PE should be conducted by veterinarians who have been trained in the approach, and not CAHWs.

Participatory disease searching (PDS) is one branch of PE. In PDS the objective is often to find cases of suspected rinderpest and then use laboratory test to confirm the diagnosis.As PDS requires

interpretation of information provided by livestock keepers and other informants, it is an activity that is best conducted by veterinarians trained in the approach.

Community-based animal health workers can assist veterinarians who are using PE or PDS by:
- providing a link between veterinarians and communities. CAHWs are trusted members of a community and can help to establish good rapport and understanding between the vets and community members;
- acting as key informants e.g. by advising vets about other key informants in the community and providing information on the local disease situation;
- helping to organize community meetings, visits to herds, sampling and so on; if trained and supervised, CAHWs can also be very useful for sample collection;
- assisting with feedback of results back to the community.

Although CAHWs do not conduct PE or PDS, they can greatly assist veterinarians who are undertaking these activities in marginalized areas.

5. Developing public sector capacity in participatory epidemiology

Although PE is used by only a handful of public sector veterinarians in Africa, there are clear opportunities to promote its wider development and application. In particular, the Pan African Programme for the Control of Epizootics (PACE) covers 32 countries and aims to eradicate rinderpest from Africa, improve control of other epizootics and develop the capacity of national veterinary epidemiology units. Regarding rinderpest eradication and epizootic disease control, these diseases are particularly difficult to control in pastoral and agropastoral herds. When combined with conventional veterinary diagnosis, participatory approaches can assist veterinarians to gain a better understanding of disease dynamics in pastoral areas and simultaneously, develop better working relationships with pastoral communities.

Within the PACE, the Community-based Animal Health and Participatory Epidemiology (CAPE) Unit is planning to encourage key regional and national-level veterinary agencies to learn more about PE in pastoral areas of the Greater Horn of Africa region. Some of the recent or planned activities of the CAPE Unit are as follows:

- Dissemination of experiences in participatory epidemiology via peer-reviewed and informal publications, and workshops. Recipients of publications and participants in seminars and workshops include senior level government epidemiologists.

- Training in participatory epidemiology for senior level epidemiologists in government veterinary services, veterinary schools and research institutes, followed by application in the field. CAPE has supported three research projects conducted by the University of Nairobi in Turkana District, Kenya and will support a further six studies in Kenya, Tanzania, Sudan, Ethiopia, Eritrea and Uganda in early 2003.

- Harmonization of PDS activities in the Somali ecosystem with PACE programmes from Somalia, Ethiopia and Kenya – planned for November 2002.

- In partnership with FAO EMPRES and PACE Tanzania, disease modeling of CBPP in pastoral and agropastoral areas of Tanzania and southern Sudan.

- Encourage veterinary epidemiologists to become involved in the design, monitoring and impact assessment of community-based animal health programmes in pastoral areas; create links between government epidemiologists and NGO programmes. In Ethiopia, a national impact assessment team has been established comprising representatives from agencies that influence and make national policy. The team was trained in PE with a particular focus on methods for impact assessment, and has transferred findings directly to policy makers.

- With veterinary schools, explore options for incorporating community-based animal health and participatory epidemiology into undergraduate or postgraduate curricula.

Ultimately, these activities aim to enable government veterinary services to improve information flow from and to pastoral communities, enable wider application of community-based animal health services and reduce the isolation of pastoralists from national and international livestock markets.

6. Training issues

During the emergence of participatory rural appraisal (PRA) as an important process for rural development, many agencies began running PRA training courses. The quality of these courses varies considerably, as does their relevance to government veterinary epidemiologists.

The PE training approach developed by the CAPE Unit currently focuses on:

- Inclusion of senior-level personnel – without understanding and commitment to PE at high levels, meaningful institutionalization of the approach will not occur
- A participatory training methodology, based on participant contribution, reflection and practice
- Highlighting the attitudinal, behavioural and communication aspects of PE
- A minimum of 10 days duration, with at least 5 days fieldwork
- Ways to standardize PE methods, and summarise and analyse data using statistical methods
- Methodological complementarity – combining PE with conventional veterinary investigation and epidemiological methods
- The role of PE in initiating action at community level
- The need for further field practice to consolidate the skills and methods learnt during the training

In addition, the right people need to trained – not everyone is suited to PE or feels comfortable with the flexibility and open-ended inquiry that PE often requires. In our view, a veterinarian wishing to use participatory epidemiology requires three main attributes:

- The right attitude – including a willingness to listen and learn from livestock keepers, and patience. While local knowledge and skills should be respected, gaps in knowledge and apparent anomalies compared with professional views need to be explored.
- Good background knowledge – including a thorough and critical understanding of the scientific and social literature for the areas and diseases in question. This awareness of secondary data informs the probing and triangulation processes.
- Willingness to learn, practise and apply participatory methods - including adaptation of methods according to the field situation.

7. Conclusions

In the Horn of Africa at least, epidemiologists in government, research centers and veterinary schools and have responded enthusiastically to recent developments in PE and are beginning to receive support for training and field application of the approach. The potential for PE to add value to epizootic disease control is clearly recognized.

A key challenge is to retain quality in PE practice while simultaneously, scale-up the approach in more countries. At present there are very few PE trainers available, but over the next year or so, more trainers and training materials will arise from the CAPE Unit. There may be an opportunity for other agencies such as FAO EMPRES to support wider training in PE, particularly for government epidemiologists involved in epizootic disease control.

Most of the recent advances in PE have arisen from work with pastoralist communities in Africa. The extensive livestock knowledge of these communities is well known and reported in the veterinary literature. In remains to be seen whether the PE methods that work well with pastoralists are also useful in more settled communities where livestock may not be so important as sources of food, income and social well being. It seems likely that PE will need to be adapted to suit different contexts and levels of indigenous knowledge on animal diseases. Adaptation of PE and further exploration of the roles and value of the approach should be encouraged.