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Using Participatory Epidemiology to Assess the Impact of Livestock Diseases

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1. Introduction

In an era of declining public sector veterinary services in Africa, priority setting and rational allocation of resources is becoming increasingly important. Regarding livestock disease control, many countries lack the basic epidemiological and economic information that enables disease problems to be prioritised at local or national levels. Furthermore, information deficits are often most evident in those areas characterised by large livestock populations and high levels of poverty.

In recent years the methods of participatory rural appraisal have been adapted by epidemiologists to improve understanding of livestock diseases in resource-poor settings and in areas where conventional methods are difficult to use. The value of this approach is apparent from the emergence of participatory epidemiology (PE) as a distinct branch of veterinary epidemiology, and the application of PE by programmes such as the Pan African Programme for the Control of Epizootics (AU-IBAR) and the Global Rinderpest Eradication Programme (FAO).

This paper provides an overview of PE, outlines how PE has been used in impact assessment to date and proposes how PE can be adapted to understand how and why livestock keepers prioritise diseases.

2. What is participatory epidemiology?

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 (Table 1). 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 1.
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

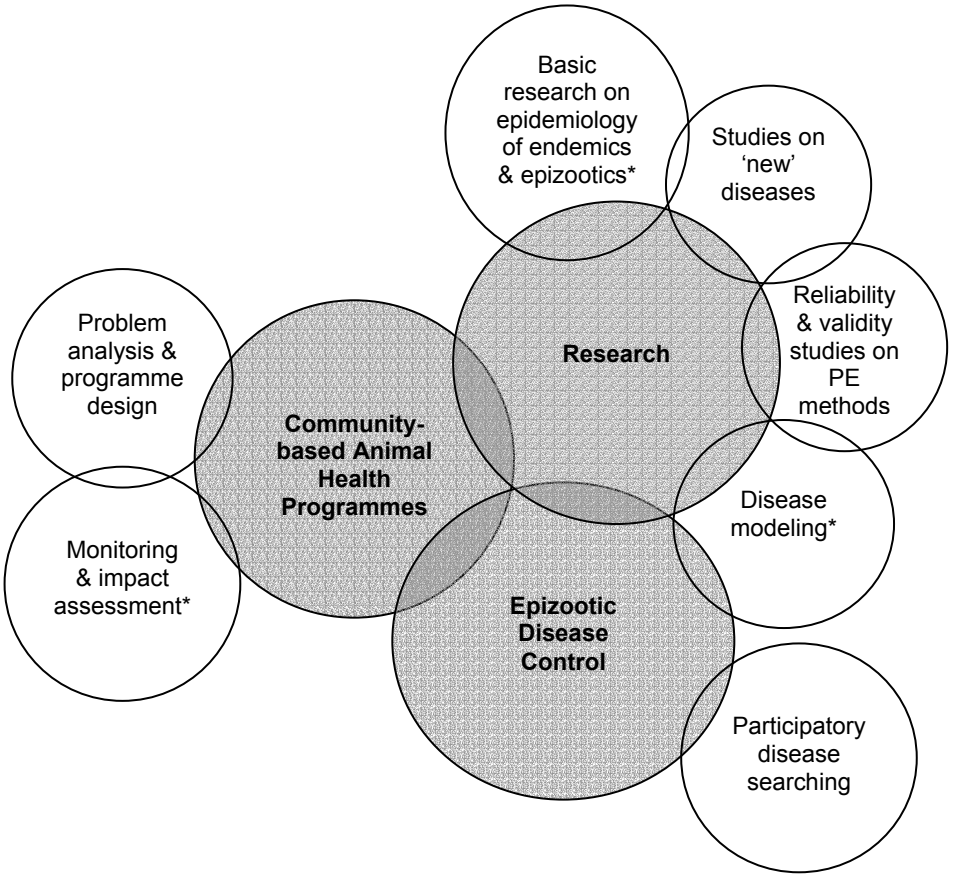
[a]Semi-structured interviews can provide information on all topics

3. Uses of participatory epidemiology

Uses of PE to date are summarised in Figure 1. Experiences of particular relevance to impact assessment are:

- Basic epidemiological research, including estimates of disease incidence and mortality
- Methods used in the impact assessment of community-based animal health programmes

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



Uses marked '*' are particularly relevant to impact assessment of livestock diseases

3.1 Basic epidemiological research: estimates of disease incidence and mortality

Participatory epidemiology studies have included estimation of disease incidence and mortality using methods such as proportional piling. Some of the benefits of the method include:

- Population data in terms of numbers of animals is not required. A population or herd is defined using spatial and temporal criteria. This avoids sensitive questions on herd size and means that the method can be used in areas with limited or no baseline data on population.
- Local definitions of herd structure and age groups are used, together with local disease names. This reduces translation errors and specifically, nondifferential misclassification bias (cf. questionnaires)
- The method is comparative and assesses up to 10 diseases simultaneously. If the researcher has an interest in a particular disease (e.g. CBPP), informants should not be aware of this interest.

Some of the difficulties or limitations of the method include:

- Very careful explanation of the method and therefore good training of researchers is required
- Most application so far has been with pastoral or agropastoral informants, with strong diagnostic ability. The method may be less useful with other types of livestock keeper. Cross-check diagnostic skills with other methods e.g. matrix scoring.
- Recall is an issue. Pastoralists seem able to accurately recall disease events over many years and in specific animals, but what about other livestock keepers? Cross-check with time-lines and secondary data on disease outbreaks.

Examples of the type of data that can be produced by proportional piling are shown in Figures 2 and 3.

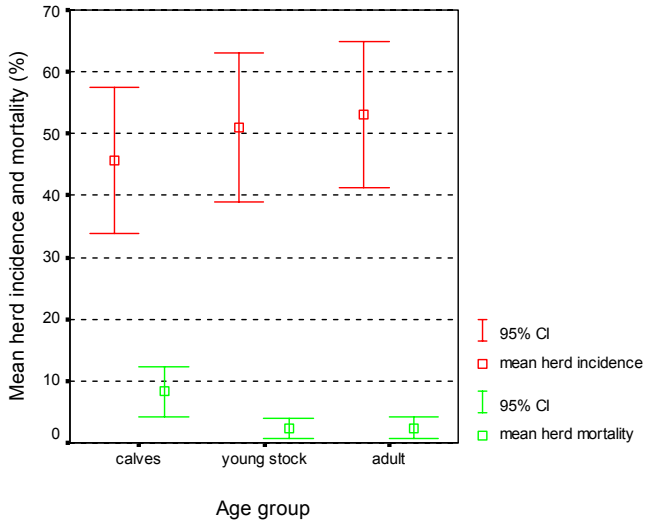
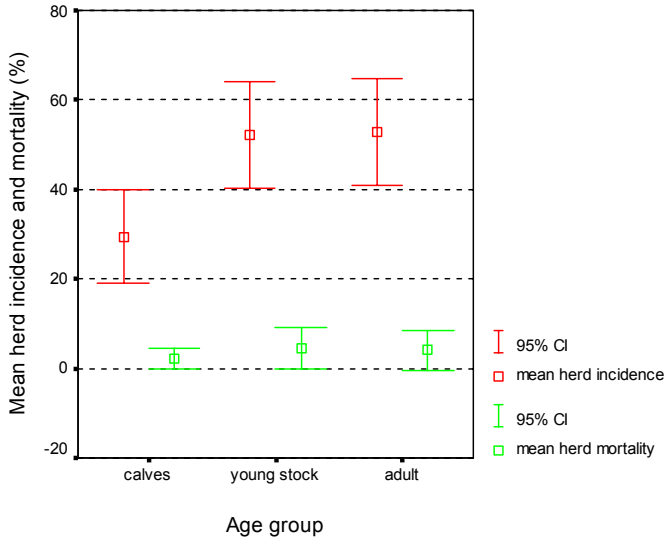
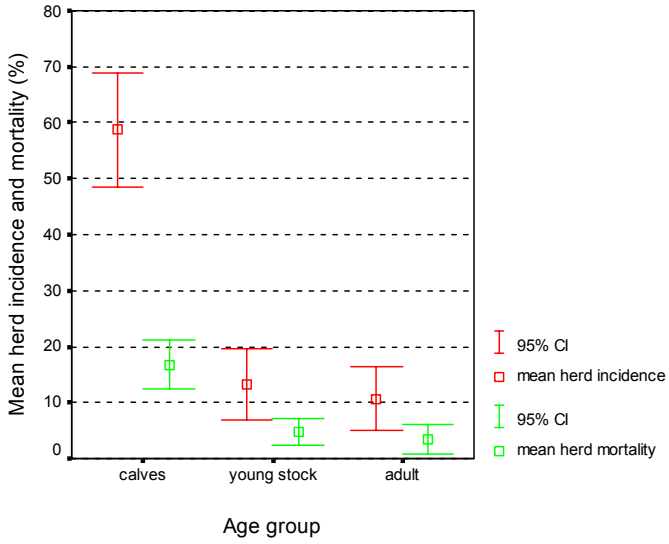


Figure 2.
Mean herd incidence and mortality estimates for three cattle diseases in Maasai herds, Morogoro region, Tanzania, 2000-2001 (n=50 herds) using proportional piling

a. *Olukuluku*



b. *Endorobo*



c. *Oltikana*

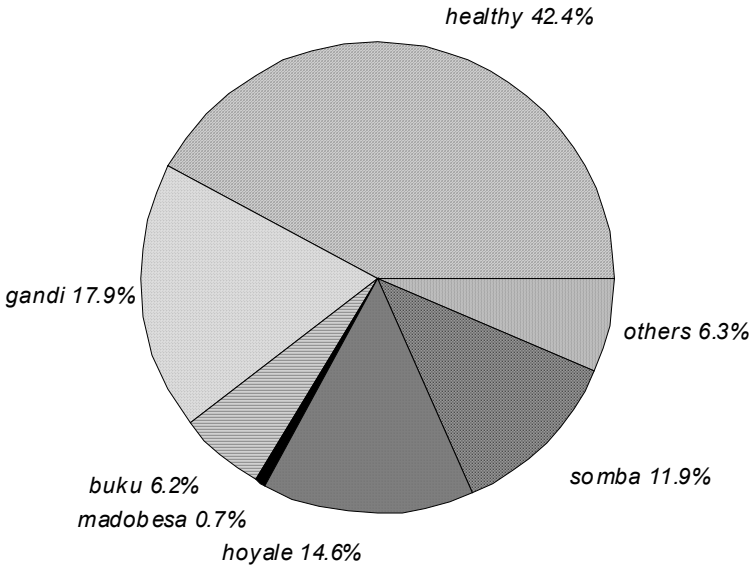


Figure 3.
Estimates of cattle disease incidence and healthy cattle in Orma herds, Tana River District, Kenya, 1999-2000 (n=50 herds)

3.2 Methods used in the impact assessment of community-based animal health programmes

Impact assessment of community-based animal healthy programmes has included the use of locally-defined indicators of the impact of diseases. One of the principles here is that livestock keepers determine impact using some indicators that veterinarians might overlook. For example, an impact assessment in Ethiopia revealed that Afar herders regarded various 'social payments' such as alms giving and dowry payments as important benefits derived from cattle. In these communities, marriage requires payment of cattle to the bride's father and alms giving includes 'gifts' of livestock to the poor.

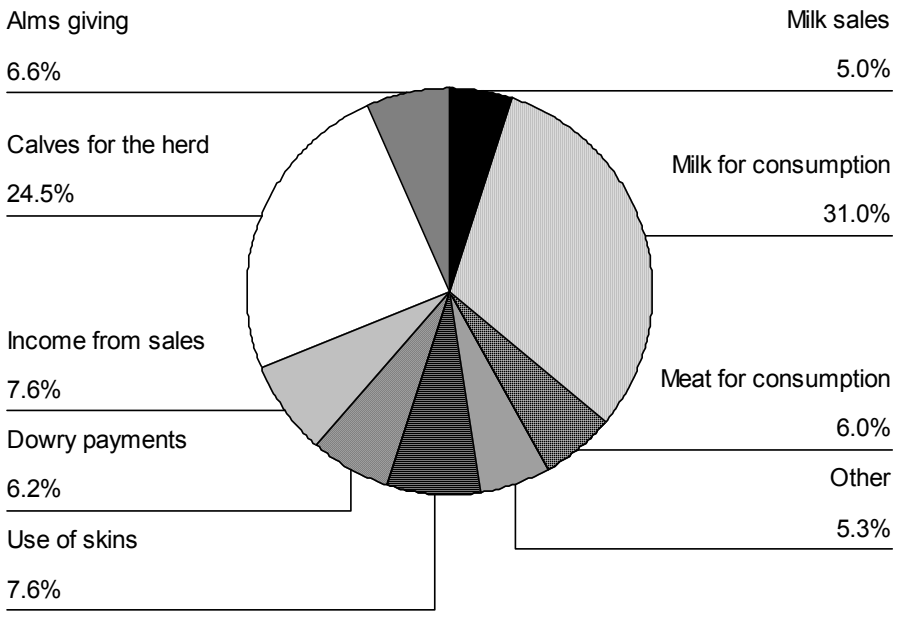
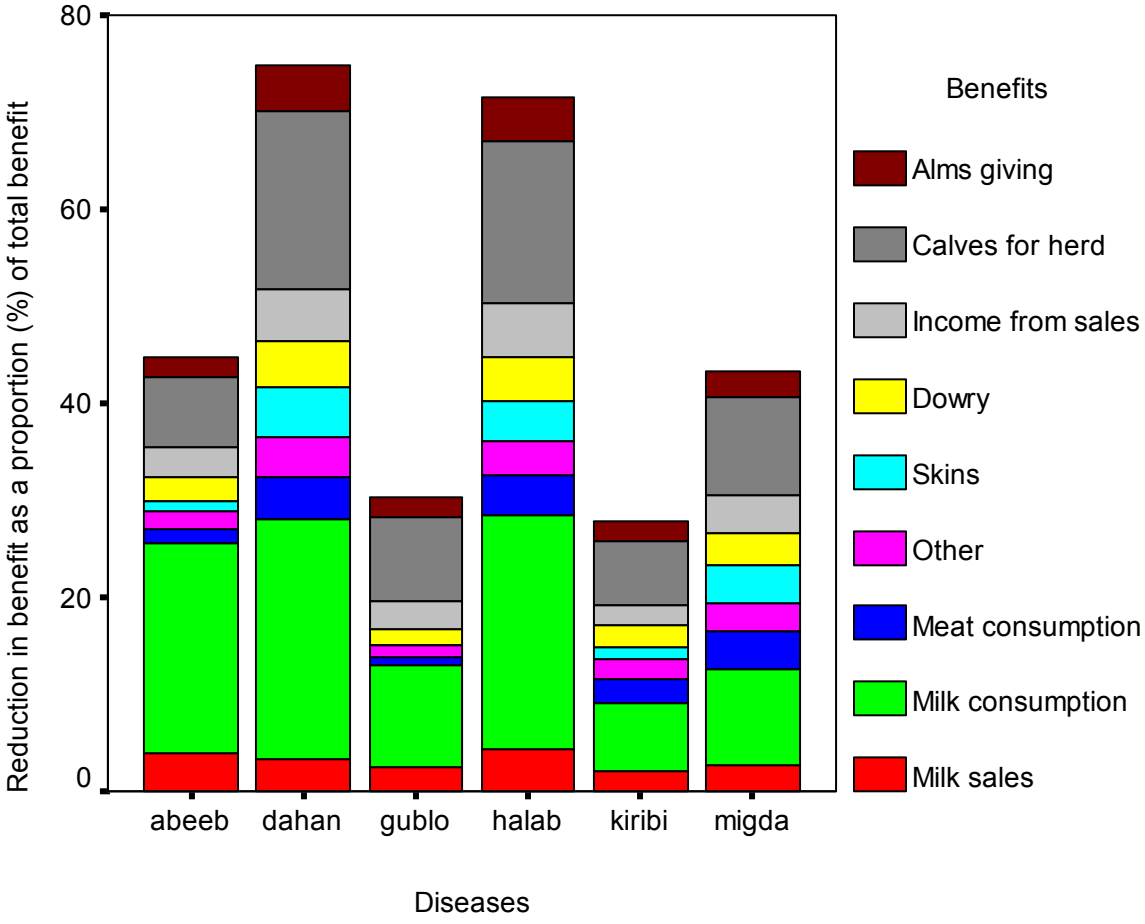


Figure 4.
Relative importance of benefits derived from cattle in Afar communities, Ethiopia (n=10 informant groups, proportional piling)

In the Afar example, standardisation of the method and repetition with different informants (or informant groups) allowed a statistical assessment of data reliability.

When livestock keeper perceptions of 'benefit' are known, it is then possible to compare methods such as proportional piling to show the impact of different diseases on each of these benefits. An example is provided in Figure 5. Note that depending on the specific questions asked, this method can capture perceptions of incidence, mortality and duration of impact as an overall 'reduction in benefit' indicator.

Figure 5.
Relative impact of six cattle diseases in Afar communities, Ethiopia



4. An outline PE-based methodology for assessing the impact of CBPP

Based on the PE methods outlined above, a draft methodology for the comparative assessment of cattle diseases is presented in Table 2. This involves initial stages of defining a systems boundary and community identification of the 10 'most important' cattle diseases. In the event that CBPP is not mentioned during this initial stage, the research team can choose to add CBPP as an additional disease. However, this risks biasing the research because informants may suspect that the researchers have a particular interest in CBPP.

Table 2.
Outline 'minimum' methodology for PE-based impact assessment of cattle diseases

Information required (per study location)	Participatory appraisal methods: Method	Sample size per location	Conventional methods/sources of secondary data
1. System boundaries: - spatial - temporal	Mapping Timelines	1 key informant group per method	Conventional maps DVO records
2. Livelihood sources by wealth group - sources of food - sources of income - contribution of livestock, by species, to livelihood	Wealth ranking; proportional piling	50 informants/ wealth group	Socio-economic reports (if any)
3. Identification of the 10 most important cattle diseases[a]	Simple disease ranking crosschecked with pair-wise ranking	50 informants/ wealth group	DVO records; previous research studies
4. Analysis of impact of the 10 most important cattle diseases - identify local impact indicators[b] - relate impact indicators to diseases[c]	 SSI Matrix scoring	 50 informants/ wealth group	Market records for value of livestock & livestock products
5. Incidence & mortality estimates	Proportional piling	50 informants/ wealth group	Previous studies
6. Options for preventing or treating the 10 most important diseases - identify control options used for each disease - rank/analyse preferences - identify & rank main constraints to control for each disease	 SSI Ranking/SSI SSI/ranking	 50 informants/ wealth group	
7. Market opportunities & constraints	Service maps, SSI, ranking	3 informant groups per wealth group	

Options/notes
a. This can be separated out by livestock species, but dramatically increases time inputs
b. Requires breakdown of general impact indicators e.g.
General indicator = cash
Specific indicators = uses of cash (food, school fees, clothes, medical etc)
c. Includes impact in relation to acute or chronic nature of the diseases