

SIGNIFICANCE OF PARTICIPATORY EPIDEMIOLOGY IN VETERINARY PUBLIC HEALTH COMMUNITY-BASED SYSTEMS

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Introduction

Veterinary public health (VPH) was originally defined as “a component of public health activities devoted to the application of professional skills, knowledge and resources to the protection and improvement of human health” (1). However, a Joint FAO/WHO Expert Committee in 1999 (2) on VPH expanded this concept to “the sum of all contribution to the physical, mental, and social well-being of humans through an understanding and application of veterinary science.” In effect, this expansion recognized that veterinary medicine has the potential to make an enormous contribution to the improvement and maintenance of human health.

Participatory epidemiology (PE), surprisingly, is not defined in a recent Dictionary of Veterinary Epidemiology (3). But a recent FAO publication manual on PE (4) is subtitled “methods for the collection of action-oriented epidemiological intelligence.” PE builds on existing medical and veterinary knowledge especially in developing countries where sophisticated data gathering techniques focusing on random sampling of large populations by questionnaires/interviews are often impractical. Essentially, qualitative epidemiological techniques are adapted to gain information from a community using participatory rural appraisal techniques over limited time periods.

State of the art

Traditionally, VPH activities and services have included but are not limited to:

- zoonoses diagnosis, surveillance, control prevention and eradication;
- occupational hazards and diseases associated with live animals and their products;
- biologics development and production;
- control of animal populations which may serve as disease reservoirs or be noxious;
- prevention and control of food- and water-borne illness of animal origin;
- ante-mortem and post-mortem meat and poultry inspection;
- participation in outbreak investigations of suspected zoonotic origin;
- environmental activities including vector, water, wildlife, and use of animal monitors;
- biomedical research;
- emergency actions including natural and man-made disasters;
- issues relating use of service animals and human-animal bonding.

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There is very considerable diversity and variation in the effectiveness of how VPH services are delivered to communities both between and within countries. Even in developed countries, while there may be good VPH programs at national and state-provided levels, often at the local levels, services are uneven or less well-organized.

Taking the USA as an example, most States have a designated VPH component usually within their Department of Health staffed by one or more veterinarians with post-graduate training in public health. Larger States, such as California, have county and even city level services also, where zoonotic (especially food, water, vector, and rodent-borne) diseases are a primary focus. Usually, these groups have access to sophisticated medical and veterinary diagnostic laboratories ensuring rapid and accurate diagnoses and thus facilitating epidemiological investigations of both epidemic and endemic problems. However, even with these services there still may be variable medical/veterinary liaison.

Developing countries and those in transition whose economies are undergoing structural adjustment as well as increasing privatization of state veterinary services face significant VPH challenges as often well established, state-funded services have been discontinued or diminished such that zoonotic disease outbreaks have increased. Community VPH services at district and below levels are either absent or fragmented. Reactive responses to epidemic or disaster situations are more likely than any proactive preventive programs.

Zoonotic diseases exert a disproportionate effect on the poor primarily because livestock underpin the livelihoods of the poor throughout the developing world (5). Deaths and disabling disease are characteristic of most zoonoses. The poor, especially women, and their livestock are usually in very close contact, increasing the risk of pathogen exposure through direct or vector-borne routes of transmission. Unsanitary living conditions in both rural and large urban areas increase the risk of multiple exposures to zoonoses, especially where water supplies and sewage disposal methods are suspect.

John Snow's original investigation of the role of water and sewage in the transmission of cholera in 19th Century London was an example of participatory epidemiology; Snow relied on oral histories plus careful observations to draw his clearly enunciated conclusions and recommendations.

Participatory epidemiology is an emerging field that is based on the use of participatory techniques for the harvesting of qualitative epidemiological intelligence contained within communication observations, existing veterinary knowledge and traditional oral history. It relies on the widely accepted techniques of participatory rural appraisal, ethno-veterinary surveys and qualitative epidemiology. This information can be used to design better animal health project and delivery system, more successful surveillance and control strategies or as new perspectives for innovative research hypotheses in ecological epidemiology (4).

The many techniques of PE are well described in the FAO manual including how to identify and prioritize animal health issues, general disease surveillance, and participatory disease investigations.

The key features for successful PE (6) include:

- attitudes and behaviour. Epidemiologists should be willing to learn from local people, not lecture but listen and respect local knowledge and culture;
- combined methods and triangulation. Use a variety of techniques including interviews, visualization, and scoring methods and integrate with conventional investigative techniques;
- identify key informants wherever possible to assist;
- be action-oriented; and
- be flexible in methodology selection.

Some recent examples of PE include an analysis of seasonal incidence of diseases of cattle disease vectors and rainfall in southern Sudan (7), persistence of Rinderpest Virus in East Africa (8), Bovine Trypanosomiasis in Kenya (9), and Chronic Wasting Disease in cattle in the Sudan (10).

The use of participating appraisal techniques in Africa by veterinarians were surveyed recently (11). The authors found that government veterinarians were much less likely to use these techniques compared to veterinarians working with non-governmental organizations. While these techniques were shown to be useful in working with communities to analyze and solve local health problems, there were some constraints. These included lack of financial resources, low availability of relevant training courses and material, as well as time constraints and negative attitudes among colleagues. The authors concluded by advocating a much wider adoption of participatory epidemiological techniques by veterinarians in Africa, when attempting to develop services according to the priorities and community capacity.

The recent FAO-EMPRES Expert Consultation paper (6) describes how PE can be used to strengthen public sector veterinary services with particular reference to community-based animal health programs, epidemic disease control and research needs. A wide range of applications of PE were identified including:

- participatory disease searching;
- disease modelling;
- reliability and validity when used by trained workers;
- research on emerging diseases;
- basic research on epidemiology of endemic and epidemic disease.

Examples of community participation in the delivery of veterinary services in Africa (12) and Indonesia (13) have been recently described in some detail.

Rapid appraisal (RA) has been developed as an effective technique to collect human health data at the community level. Rapid appraisal is defined as a method of getting information about a set of problems in a short period and without a large expenditure of professional time and finance. It is also a method of needs-based assessment and involves the community. The focus has been primarily on urban areas. A 1988 WHO report (14), "Improving Urban Health: Guidelines for Rapid Appraisal to Assess Community Health Needs," describes the methodologies that have been used with some success. It is based on 'information pyramids,' which are defined a description of the health situation of people living in a defined geographic area. Pyramids have several characteristics:

- They are based on needs identified by the community.

- They are built on information gathered from documents, dialogues with community members and from observations.
- They are constructed with the recognition that urban, and to a lesser extent rural, communities often experience rapid change.
- They are built from data gathered by rapid appraisals.
- The quality of information generated is more crucial than the quantity of information.

It should be emphasized that rapid appraisals tells what these problems are and not necessarily how many people are affected by the problem.

RA was initially developed as a method to quickly supply resources to alleviate problems of the rural poor. While early studies were subject to investigator biases, ignoring seasonality effects and non-representative sampling, later effects were more successful if carefully planned and used with common sense. The three principles fundamental for RA are:

- do not collect too much or irrelevant data
- adjustment investigations to reflect local conditions and specific situations
- involve community people in both defining community needs and identifying possible solutions.

Data from RA methods is collected from three main sources:

- existing records;
- interviews with a range of informants;
- observations.

RA for identifying human health problems in low income urban and rural areas is best done by a multidisciplinary team. Detailed suggestions for carrying out RA for health needs are described in the WHO report. Generally, they should be completed promptly, usually within ten days. RA clearly has some limitations and should be used as a basis for planning to improve human health. Follow-up epidemiological investigations may be needed especially to identify individual or community risk factors.

Two examples of recent participatory research in human health, which may have implications for veterinary public health includes:

- Community health among indigenous populations in rural Ecuador was assessed using a participatory approach in 26 communities (16). From this, a number of health reform strategies arose including the development of a comprehensive plan for health improvement in conjunction with all stakeholders in the general population. In addition, the needs for intersectoral collaboration among both governmental and non-governmental organizations as well as the private sector were stressed.
- A recent Ugandan study (17) compared community-identified health problems with the more formal WHO Global Burden of Disease assessed health priorities. Using nominal group techniques, interviews, and group discussions with both community members and leaders were carried out in a district. It was found that the community-perceived health problems were similar to those identified by the global burden of the disease study. Prevalence, mortality, social and cultural stigma were included in the ranking.

Poverty and lack of knowledge were the perceived major causes of ill health in the community.

The burden of disease is estimated by a combination of time lost due to premature mortality and time lived with disability calculated as “Disability Adjusted Life Years” (DALYs). Knowing the cause of DALYs, global and regional ranking lists can be calculated to identify both national and district health problems. For example, of the top 27 infectious diseases based upon the Global DALYs burden, seven were diseases where there was a significant zoonotic component (i.e., the animal transmission cycle is important and that veterinary interventions could reduce the burden of disease. These seven diseases were trypanosomosis, schistosomiasis, leishmaniasis, Chaga’s disease, Japanese B encephalitis, hookworm, and hepatitis E virus (5).

Unfortunately, basic information on zoonotic diseases is lacking such that quantitative assessments of many zoonoses is difficult. Take rabies, for example, for which WHO data is available. A total of 1.1 million DALYs can be calculated adding this disease to the above list of seven diseases. Rabies is a preventable disease in humans and domestic dogs so, theoretically, a very high proportion could be prevented through veterinary interventions. The major advantage of DALYs is their regional or national ranking, as obviously, there is very considerable variation. It should be kept in mind that the relative importance of zoonoses will differ among the population and generally be higher for livestock keepers, agricultural wage labourers and consumers of livestock products than the general population.

UPCOMING TRENDS AND DESIRED SOLUTIONS

The WHO study group (2) in their recommendations stressed that community participation should play an integral role in the implementation of VPH programs and that local communities should be empowered to take ownership of, and manage their VPH activities. The following findings were considered important:

- encourage participation by all stakeholders including minority groups, women and children in decision-making at the local level;
- ensure that social and gender analyses are incorporated into VPH programs;
- involve both the private sector and local non-governmental organizations;
- establish multisectoral and interdisciplinary committees at local level for sustainability;
- build on indigenous knowledge by involving and training where necessary local influential people;
- extend and incorporate VPH activities into existing primary human and animal health care services.

The 2002 WHO/FAO/OIE Electronic Conference on VPH (18) received a number of recommendations relating to community effectiveness of VPH. Examples were cited where attempts had been made to reduce meat-borne zoonoses, such as cysticercosis by proper cooking and use of toilets (latrines). Later revisits showed no significant changes suggesting extension methods were failing because of cultural and other factors. Unless people truly wanted change

no improvement is likely to occur. The need for careful evaluation of pilot studies before embarking on a major community effort was also mentioned. Recognition of general differences between men's' and women's' roles in livestock production is also critical in many societies.

Many changes are foreseen in the next century, which will present new challenges for VPH (2). These include:

- Changes in farming methods. These included changes in the intensity of livestock production, expansion of industries, such as aquaculture and game farming, use of new biotechnologies, and larger volume high density livestock operations. The latter were likely to result in environmental hazards especially for workers.
- Change in food production, such as newer technologies and more emphasis on biosecurity and also food safety guarantees.
- Movement of animals and trade in animal products as well as human travel will increase. Notwithstanding that this can result in zoonotic disease problems, overall the results have been beneficial to importing and exporting countries.
- Interactions between humans and animals will change especially with increasing urban and peri-urban animal populations.
- Natural and man-made disasters, often weather-related, may involved both livestock and companion animals.
- Privatization of veterinary services, especially in developing countries together with reduced governmental funding will threaten many traditional VPH services. At the community level, how to balance VPH, which is essentially a "public good" activity poses a challenge in terms of funding an appropriate balance.
- Population increases continue to result in increasing organization such that by 2020, over 50% of the world's people will be living in urban areas. As rural people migrate to cities, they often bring their animals with them.
- Climatic changes, such as increasing temperatures, affect vector-borne disease agents that result in increasing human health risks in the long term.
- HIV/AIDS although probably of zoonotic origin affects VPH in several ways including increased risk of secondary zoonotic infections and its indirect effect on lowering agricultural productivity especially in rural areas, due to premature morbidity, and mortality.
- VPH research is often handicapped by a lack of basic knowledge of host-parasite interactions and even for many zoonotic diseases, the route(s) of transmission to humans are unclear. While a plethora of new laboratory techniques are now available for diagnosis and surveillance, these techniques are of limited use unless prior epidemiologic research has been undertaken to identify the important questions to be answered.
- Curricula of many veterinary schools have not kept current with the need of society and communities for a scientific evidence-based approach to VPH.
- While primary and public health services are continually changing, in many instances, the changes have not always been for the better. Laurie Garrett's writing in the "Betrayal of Trust—The Collapse of Global Public Health"

(19) describes through a series of examples an alarming deterioration of public health services especially in a developing countries and whose in transition. While VPH may only be a relatively small component of overall human health maintenance and promotion, it is still critical in less fortunate countries especially at local levels.

A joint WHO/FAO publication, “Guiding Principles of Planning, Organization, and Management of VPH Programs” (20), describes in detail the overall scope and administrative design of an idealized system with special reference to technical strategies in specific areas. In 1995, PAHO published a useful guide on the development and strengthening of local health systems specifically in relation to VPH (21). Some key points from this report were that there is no standard formula for the size and scope of local community health systems. Both depend on the political and administrative contexts in each country and on other factors such as geography, communications, transport, population density, etc., political and administrative decisions also constitute a basis for a local health system. Decentralization was seen as a prerequisite for community participation since without this the power relationships and space for decision-making among users and providers of health services cannot exist. Community participation in local health system as a social process seeks to make individuals and groups the architect of their own prospects for health. The downside of decentralization is that a national disease control program for example, may be adversely affected if central control is lost.

The degree of VPH community participation varies and is strongly influenced by social and cultural factors. In general, community participations can be reconciled more easily with health needs in urban and peri-urban areas than in rural areas. In part, this is the result of better communications and greater access to local health services but given the special position that domestic animals occupy in the social and economic structure of rural areas, VPH is integral to the overall well-being of rural families and agricultural communities.

Community participation is now being widely promoted as an important feature in the delivery of veterinary services, especially in developing countries (12). There are differing types of community participation ranging from so-called ‘manipulative’ participation through to true ‘collective’ actions, and this variation may have hindered the effectiveness of how community participation should be used and what it might deliver. A comparison of community-based animal health projects that encourage interactive participation and self-mobilization were most likely to result in sustained benefits for livestock owners.

Integral to the success of community participation has been the increasing use of Community Animal Health Workers (CAHWs) in developing countries. Two recent publications describe in detail how they can be used to improve veterinary services (22) and also how concerns relating to perceived threats to veterinary services, drug issues, economic, and related legal issues are being resolved (23). Overall, it is fair to state that CAHWs have the potential to make very significant contributions to both small holders and governments alike but to realize their full potential a sound regulatory and enabling environment will be needed. Policy and

legislative reform to support veterinarian-supervised CAHWs is underway in a number of African countries and, at international level, an ad hoc committee of the OIE is reviewing the role of para-veterinary professionals (including CAHWs) in veterinary service delivery (24). Guidelines for the control and regulation of CAHWs according to the principles of the OIE Code are also available (25).

Community Health Workers (CHWs) in various forms have long been used and valued in the human health in both developed and developing countries. In the former, they are well recognized as having an important and successful role in primary health care. But in developing countries, problems have arisen especially in translating the gains of local projects into nationwide programs. It appears that administrative aspects, rather than medical or technical aspects have been limiting factors (26). CHWs generally function as part of the district health management team but they may be employed by religious and other non-governmental organizations. How effectively CHWs are involved in VPH programs is poorly documented as is cooperation between CHWs and CAHWs.

In isolated communities, there have been innovative initiatives to combine both human and animal services. An example from Chad (27) showed that human and animal health status of nomads and their livestock (camels) could be assessed simultaneously using a cross-sectional study design. Perceptions of disease priorities were also carried. The results showed potential synergies between veterinary and public health services and confirmed that relationships between people and their animals is highly complex and reflects deep-seated cultural values. Other anecdotal evidence suggests that improving the knowledge and practices of women regarding health care of newborn livestock can translate into improved health care of their own infants.

THE WAY FORWARD

If VPH community-based systems are to be effective, especially in countries in transition and developing, better epidemiological information is a prerequisite. For example, the clinical and epidemiological features of human campylobacteriosis in developing countries especially where there is a high prevalence of HIV/AIDS appear to differ from developed countries (28). Ideally, qualitative data is needed for priority setting and at least semi-quantitative data for risk factor identification and assessment. Although PE has not been widely-used, especially by veterinarians and physicians in the public sector, there are many opportunities to promote its wider development and application. When combined with conventional medical and veterinary diagnoses, participatory approaches can assist both professionals to gain a better understanding of VPH issues and dynamics. This will necessitate training in PE at the community level. Given the variation in degree of communication and cooperation between physicians and veterinarians even in the public sector, joint training should be an advantage if a participatory epidemiological approach is to be successful.

CHWs and CAHWs have similar missions except the species of interest differed. Given the need for interdisciplinary collaboration, it would seem important to determine by way of pilot studies if some VPH cross-training could

be developed and its application evaluated in selected countries and districts. CHWs and CAHWs should also be included in pilot PE/VPH studies to provide guidance on local attitudes and behaviour, interview techniques selection of key informants, background information as well as any disease/problem specific information. Therefore, it is proposed that several PE initiatives in countries with differing VPH problems be developed to determine local priorities as well as local knowledge, attitudes and practices.

Each country initiative would be developed by a team of physicians, veterinarians, and other health professionals from both the public and private/non-governmental sectors. This group would be responsible for selection of community/districts (both urban and rural) to be included. Specific PE projects would be developed and field-tested. The role of poverty as a risk factor for zoonotic diseases should be explored in depth. All local resources in the community should be well-identified such as laboratories, clinics, abattoirs, etc. Geographical mapping techniques would be an integral component of these studies.

Once the local priorities have been established, the potential to focus on groups of zoonoses where there is a common host or transmission link(s) could be explored. For example:

- dogs in rabies and hydatidosis
- cattle in brucellosis, tuberculosis, and leptospirosis
- vector-borne zoonotic diseases
- food-borne pathogens of animal origin, such as cryptosporidiosis, salmonellosis, and campylobacteriosis

Once the local epidemiological situation with regard to animal husbandry practices, social customs, and beliefs are better understood, specific control/prevention programs at the local level can be developed in conjunction with CHWs and CAHWs. Test projects should then be developed using these workers to determine how best such programs can be introduced into test areas. Control areas where no program is present should be used for comparative purposes.

The costs of such PE initiatives are indeterminable at this stage. Local political support would also be important for their success. The economic costs and benefits of these 'pilot' programs should be carefully monitored in relation to their long-term sustainability.

Conclusions and recommendations

There is general agreement that community-based VPH programs are urgently needed especially in developing countries, not only to protect and improve human health but also to ensure that livestock production is healthy and economically viable. PE can play a major role in determining disease priorities, decision-making and control/prevention/eradication options. This will also require that interventions to reduce the risk from zoonotic or other animal-related problems are compatible with sustainable livestock enterprises. The critical elements needed for a successful VPH program will depend on a careful multidisciplinary review and ranking of the human health and veterinary resources. Individual owner and community responsibilities should be clearly identified.

Well-designed participatory epidemiological studies should be used to accomplish this objective. PE is designed to rapidly and reliably generate epidemiological intelligence on complex issues. In developing countries especially, we do not always have the luxury of access to sophisticated laboratory based technology. Therefore, clinical signs both human and animal together with simple field tests can provide a preliminary basis for PE studies.

Results will need to be evaluated and validated by professional medical and veterinary investigations. Preferably, these 'pilot' VPH program developments should be carried out in a number of communities in several countries representing a range of zoonotic disease and related-VPH problems.

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