Participatory Surveillance of Livestock Diseases in District Karachi–Pakistan

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ABSTRACT

Occurrence of various important livestock diseases particularly the Trans-boundary Animal Diseases (TADs) in the district of Karachi were determined by applying different tools of Participatory Disease Surveillance (PDS). Analysis of data indicated that haemorrhagic septicaemia was the most important, while foot and mouth disease was the most prevalent diseases in the area. Other significant livestock health hazards recorded during search program were mastitis, respiratory syndrome, worm infestation and buffalo pox. There was no evidence of rinderpest out-break after the year 2001 in the area of investigation. Participatory disease surveillance proved to be a useful tool to collect reliable data that can be utilized by the policy makers for the control/eradication of animal diseases in Pakistan.

Key Words: Trans-boundary animal diseases; Participatory disease surveillance (PDS); Haemorrhagic septicaemia; Foot and mouth disease

INTRODUCTION

The failure of formal data-collection methods to produce cost-effective and reliable information for designing rural development projects in developing countries was first recognized in the early 1970s (Chambers, 1983). This problem was related to the behavior and methods of researchers, which limited their capacity to understand the problems of the poorest and most marginalized people in rural communities. Response to this situation, alternative systems of inquiry have, since been developed. These systems include rapid rural appraisal (RRA) and participatory rural appraisal (PRA) which, to varying degrees, enable local people to play a more active role in defining, analyzing and solving their own problems (Chambers, 1994). Participatory Epidemiology is an emerging field that is based on the use of participatory techniques for harvesting qualitative epidemiological intelligence contained within community 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 (Schwabe, 1984). This information can be used to design better animal health projects and delivery systems, more successful surveillance and control strategies or as new perspectives for innovative research hypotheses in ecological epidemiology.

The PDS approach was developed in Africa as an accurate and rapid method to understand the distribution and dynamics of Rinderpest (Mariner & Roeder, 2003). This approach does not consider livestock owners as an inert substrate upon which development is to be practiced. They are active participants, who can and must bring important intellectual contributions to development, if development is to be successful. Lesson has been learnt in various countries that involvement of beneficiaries in designing, implementation, monitoring and review of a project increase its success tremendously.

In Pakistan, the concept of PDS was introduced during 2002 - 2005 under a FAO Trust Fund Project, "Support for Emergency Prevention and Control of Main Trans-boundary Animal Diseases in Pakistan (Rinderpest, FMD PPR)". Under this Project, 17 teams (comprising of 51 active veterinary officers) were constituted that searched more than 6,000 randomly selected villages throughout the country.

The information collected would be utilized to get accreditation of freedom from Rinderpest from OIE during 2007 and for planning new projects to control animal diseases in the country.

Large commercial dairy colonies in the suburb of Karachi city District provides excellent environment for the persistence and transmission of different animal pathogens. At present, total milch animals estimated during PDS activity is more than 7.5 million most of which is located in large dairy colonies. About 10% animals in every dairy farm become dry/un-economical every month and are replaced with the freshly calved animals brought mainly from livestock markets of Punjab and Sindh provinces. According to an estimate, 50% of the dry animals are sold to the butchers for slaughtering and remaining are transported

back for re-breeding (75% to interior Sindh & 25% to Punjab). This large movement of animals throughout the country is considered as a major source of spread of animal diseases. Increase in movement may alter pattern of existing diseases and introduce new infections in the area. For decades, these dairy colonies particularly Landhi Cattle Colony was a reservoir of Rinderpest virus. This paper presents the current situation of animal diseases as determined by PDS work undertaken in Karachi City District during Feb- 2002 to May- 2005.

MATERIALS AND METHODS

PDS team. The team consisted of three veterinarians working together as facilitator, moderator and recorder during field activities.

Selection of dairy farms. Randomly selected area (criteria 1000 to 2500 livestock population per interview/meeting) in each town of Karachi City District.

Arrangement of meetings/interviews. Before starting activity, an awareness meeting was conducted separately with the Government Veterinary Officers/Veterinary Assistants and Private practitioners. These meetings provided information and helped to schedule PDS activity in randomly selected dairy farms according to the convenience of the farmers (e.g. suitability of time, place, local politics, conflicts, weather etc). Efforts were made to include owner of the farm, his relatives and staff working at the farm.

The interviews began with identification of the respondents and a general (open ended) question about day to day life of the farmers leading to health problems of animals in the area. In order to avoid bias, the PDS Team did not mention about TADs during interview prior to the introduction of the subject by the respondents. When-ever a respondent indicated the occurrence of any TADs (Rinderpest, FMD, Peste des Petits ruminants), he was asked to describe the disease as a part of verification process and other probing questions specifically designed to elicit detailed information and to test information for internal consistency. If the respondent could not accurately describe the disease, the report was eliminated.

Check list. Participatory Disease Surveillance is a flexible approach. Therefore, instead of questionnaire, a check list was designed for the activities to be conducted during PDS exercise. For example, introduction of members of PDS team and participants, mapping, proportional piling, seasonal calendar, matrix scoring, identification of key informants, open and close ended questions to collect information about TADs and other important diseases in the area etc.

Direct observation. Direct observation was made during initial visit, while getting appointment from owner of dairy farmer for PDS exercise. Animals at farm were inspected and formal questions were asked about number of animals, feeding, vaccination, production and marketing etc.

Mapping. Farmers were encouraged to draw a map of the dairy farm on the ground with the help of a stick. This map was used to understand the resources available for animals, possible interaction with animals from outside and assessing the risk areas.

Proportional piling. Proportional piling was used to estimate the relative prevalence of livestock diseases in the area. For this purpose, 100 beans (or pebbles at some places) were given to the farmers and they were requested to make piles according to the relative incidence of five most prevalent diseases. They were encouraged to discuss and agree among themselves. Similar exercise was carried out to determine relative importance of those five diseases.

Seasonal calendar. Similarly, proportional piling was used to draw a seasonal calendar to describe the seasonal prevalence/importance of different animal diseases. Local names for seasons were used and each season was represented (on the ground or a white paper) using an object placed along the top 'x-axis' and sketch illustrations of diseases were placed along the 'y-axis' of the diagram.

Matrix scoring. Matrix Scoring was used to estimate the impact of livestock diseases on livelihood of dairy farmers in the area. For this purpose, dependence of livelihood directly on livestock was determined e.g. 40 beans were given to the farmers and they were asked to make piles according to impact of five most prevalent livestock diseases that can affect their livelihood. They were encouraged to discuss and agree among themselves. Similar exercise was also used to cross check the prevalence and importance of those five diseases.

Interviews with key informants. Key informants were identified during meetings and surveys of the area. Separate interviews were conducted with key informants including *Sianas* (local experts), progressive livestock breeder, livestock traders and veterinary and public health personnel to get secondary data about animal diseases.

Triangulation. Data collected during meetings with the farmers and from other sources were compared/assessed before making a final conclusion.

RESULTS

Local perceptions of disease recognition. First task of PDS team was to clearly understand Local (Traditional) names and clinical signs of important livestock diseases as mentioned by the farmers. Use of pictures of sick animals showing various symptoms was quite helpful and use of local name of different diseases encouraged the farmers to explain health problems of animals in a better way. For instance, pictures showing salivation and blisters in foot and mouth guided the farmers to share their knowledge and information about the occurrence of FMD in the area (Table II). Although in Karachi, about 95% farmers are well educated and have good knowledge about various diseases special TAD (Rinderpest, & foot & mouth disease), the awareness about peste des petits ruminants (PPR) were very low. Farmers usually confused this disease with mix

infection of entero toaxemia (ET) and contagious caprine pleuro pneumonia (CCPP).

Proportional piling. Proportional piling, the main tool of PDS proved to be an interesting and useful exercise to determine the prevalence and importance of major livestock diseases. After understanding the procedure, farmers took lot of interest and usually, there was healthy discussion amongst them before reaching at the final conclusion. The PDS Team members facilitated the discussion to enhance the flow of information in the right direction. Results of proportional piling are shown in Fig. 1 and 2.

Farmers agreed that mastitis, hemorrhagic septicemia (HS), FMD and Respiratory syndrome, which have resemblance with H.S, were the most serious health problems of animals and need immediate attention. Mastitis was reported as the most prevalent disease in the area. However, HS was ranked as the most important infection of cattle and buffaloes. Although it was difficult to understand the nature of Respiratory syndrome, most farmers were convinced that it occurred quite frequently and caused heavy losses and have resemblance with H.S. There was no history of Rinderpest in the area and it was not reported after 2001. The population of Sheep and goat is not significant in Karachi and are mostly found in large number only at livestock markets (for slaughter purpose). The awareness about PPR is low that's why few cases of PPR were reported and confirmed using Immuno-capture ELISA.

Other diseases commonly reported by the farmers were related with nutrition, reproduction, ticks, mange and other management problems like indigestion, hypocalcaemia, prolapse of uterus, retention of placenta etc.

Seasonal calendar. It was difficult to draw a seasonal calendar because the monthly tern-over of animals particularly at dairy colonies Karachi is very high and every disease can be found at any time of the year. However, the intensity of these diseases change considerably in different seasons. For this purpose, piling exercise was carried out at 5 - 15 dairy farms in each town of Karachi. Results are shown in Table III and Fig. 3.

Interviews with key informants. During PDS activity, a total of 1134 key informers (Government & Private Practitioners, Livestock Traders, Sianas etc) were interviewed in order to discuss and collect their opinion about TADs and other important diseases in the District. These key informers agreed that Rinderpest has not been seen in this area after the year 1999. Also, it was confirmed that FMD is very common throughout the year. Peste des petits ruminants (PPR) in sheep and goats is prevalent through out Karachi but the awareness amongst the field veterinarians as well as farmers is very low. Other important diseases in the District were H.S, mastitis, toxemia, buffalo pox and worm infestation.

Visits to livestock markets. There are four main livestock markets in District Karachi i.e. Landhi Cattle Colony livestock market, livestock market Malir on Bakra Piri road,

Table I. Livestock Population in City District Karachi

No	Name of Town	Number of Councils	Union Livestock population
1	Bin Qasim	7	342500
2	Landhi	10	8073
3	Korangi	9	44427
4	Shah Faisal	7	49402
5	Malir	7	79254
6	Gadap	8	152500
7	Gulshan-e-Iqbal	13	10900
8	Liaqatabad	11	5000
9	Site	9	4976
10	New Karachi	13	23500
11	Jamsheed	13	18325
12	Sadder	11	2500
13	Lyari	11	14865
14	Orangi	13	54429
15	Baldia	8	99350
16	North Nazimabad	10	12000
17	Gulberg	8	8500
18	Kiamari	8	14800
	TOTAL	176	945,301

Reference:- Estimated by PDS-A Team Karachi.

Table II. Traditional and English names of diseases as reported by the livestock farmers in Karachi City District

Sr. No	Traditional Name	English Name
1	Mok / Pok / Sit / Thadi / Mata	Rinderpest
2	Mookhar/ Moharo/ Samaro	Foot and mouth disease
3	Kata/Moosari/Nazla aur dast/Khooni dast	PPR
4	Gulghoto/ Gand /Patghoto	Hemorrhagic Septicemia.
5	Saru /Moosari/Chandri/Angari	Mastitis
6	Zeharbad / Taku	Toxemia
7	Raij/Pait ka Kiara	Fascioliasis/Worm infestation
8	Bhukhar / Tap	Pyrexia
9	Badhazmi	Indigestion
10	Aphara / Bharti	Tympany
11	Pakka	Buffalo Pox
12	Cheechar	Tick
13	Zakham	Wound
14	Dast / Teek	Diarrhea
15	Takku / Jhur jana	Rheumatism
16	Qabz / Qabzi	Constipation
17	Lashi / Ratmotra / Sarkand	Red water
18	Sootak	Hypocalcaemia/Milk fever
19	Khansi Khang	Cough / Bronchitis

livestock market Baldia Town and livestock market at New Karachi Town. There are also calves markets (selling 1 - 15 days old calves) at Landhi Cattle Colony (Road # 4) and sheep and goat mini markets each at Landhi Town, Lyari Town, Gulberg Town and Orangi Town.

During visits to these market and interviews with the key informants, it was general consenses on the statement that they there was no out-break of Rinderpest after 1999. However, FMD was reported as the most common disease throughout the year. There were severe out-breaks following the days of Eid-ul-Azha, when Muslims sacrifice animals.

Matrix scoring. Tool of Impact Matrix Scoring was used to cross check the results of proportional piling (Prevalence & importance of diseases) and impact on livelihood of dairy

Table III. Seasonal occurrence of main animal diseases in City District Karachi as determined by the livestock farmers using proportional piling

Seasons	H.S	FMD	Toxemia	Mastitis	Buff Pox	Worm infestation	Other diseases
			Percent Prevalence of Important Animal Diseases				
Spring	28	12	8	22	11	5.6	13.4
Summer	5	7	11	31	8	8	30
Autumn	13	11	10	28	8	9	21
Winter	31	9	5	11	5.6	11.4	27

farmers. Due to commercial farming in Karachi, it was not possible to carry this exercise on each selected dairy farm. However, information collected at one farm is given below. The exercise revealed that mastitis is the most important health problem affecting livelihood of farmers followed by FMD, HS, toxemia and buffalo pox.

DISCUSSION

Results of PDS activity performed in City District Karachi disclosed that there is no history of Rinderpest after 2001. Haemorrhagic Septicaemia (HS), FMD and Mastitis are the most Important and Prevalent health problems of animals in the area. Karachi, the former Capital of Pakistan is a cosmopolitan city with restriction to keep milch animals in the urban area. Increase in human population during the last 10 years has resulted in high demand of milk and milk products. It is estimated that per-day demand of milk is 80 million litres. Fifty percent of this is fulfilled by local production and remaining 50% comes from surrounding urban and rural areas, interior Sindh and also in the form of powder and pasteurized milk. Now-a-days there are small dairy colonies (5 - 10 dairy farms) around and between residential areas in Karachi, which is a continuous threat to human health. So it has been planned that these dairy farms will be shifted out side city and new dairy colonies will be developed on highways. Animals are continuously coming and going to interior Sindh and Punjab Province. This movement of animals from various parts of the country may introduce new diseases in comparatively susceptible animal population.

Haemorrhagic septicaemia has been reported as the most important bacterial disease of cattle and buffaloes in Pakistan (Munir *et al.*, 1994). Data collected during PDS work elaborated further that although FMD was the most prevalent disease, farmers still ranked HS as the most important animal health hazard due to the reason that it kills animals within a very short period that affects their livelihood. Participatory disease surveillance also determined that farmers have sufficient knowledge to diagnose the disease and explained all cordial clinical signs. Findings demonstrated much overlap between farmer's knowledge and scientific perception of the disease. However, it was difficult to conceive fully a relatively new health problem 'Respiratory syndrome' that resembles with H.S, but in most of the cases vaccinated animals against H.S were also affected and medicines did not have complete

proper response. Study revealed that this infection could have multiple etiology e.g. infectious, nutritional, managemental etc and needs thorough investigated to reach at any conclusion.

In addition to the data that emerged during Participatory research, the process of sitting and listening to the people had value in itself. This exercise took the form of providing people an opportunity to express their views and helped to improve the community's relationship with the researchers. Participatory approach to collect disease information using proportional piling, seasonal calendar, interviews with key informants etc. enabled to compare the results with different sources and when levels of agreement were moderate to high, data were compiled accordingly. Therefore, although the methods used were described as 'participatory', some quantification was also possible. We observed that the methods applied in the field were valuable for understanding local description of animal diseases, estimating disease prevalence, importance and analyzing seasonal pattern of animal diseases.

Collection of disease information by applying participatory techniques was a new approach in Pakistan. In the beginning, farmers in most dairy farmers were reluctant to share their information and hesitated to take active part in group discussion. However, once they realized the purpose of the meeting and importance of their indigenous knowledge, it was very convenient to extract information prevailing in the area. In Karachi City District, feeding, milking and other management practices are carried out by male farmers, because it is a purely commercial farming. This was the idea that female veterinarian was not included in the PDS team. Peste des petits Ruminants was observed as a new disease in the area. Since most farmers have not seen it before, they were confusing it with CCPP and enterotoxaemia. But after comparing the data from different sources (Poster & photograph showing symptoms of PPR, interview with key informants etc) it was easy to reach at the conclusion. Through PDS, the management of veterinary services became aware that HS was of great concern to farmer's livelihoods than the three target diseases of international concern i.e. RP, FMD and PPR. The PDS program has greatly enhanced the sensitivity of active clinical Rinderpest surveillance and directly contributed to Pakistan's confidence in the decision to declare the country provisionally free from Rinderpest to the OIE in January of 2003. The valuable data accrued by PDS work has been appreciated by the Project Management and all livestock

Fig. 1. Result of proportional piling showing percent prevalence of main disease of animals as determined by the livestock farmers of the city district Karachi
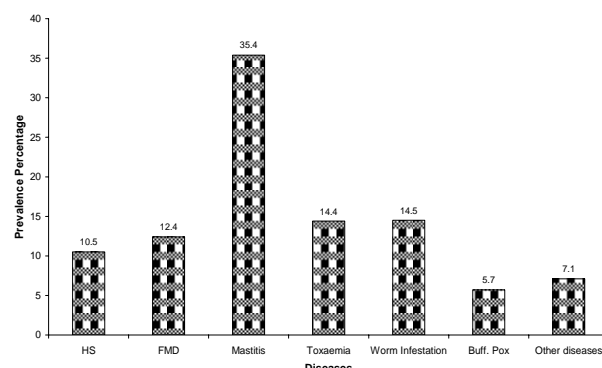

Fig. 2. Results of proportional piling ranking most important animal diseases as determined by the livestock farmers of the city district Karachi
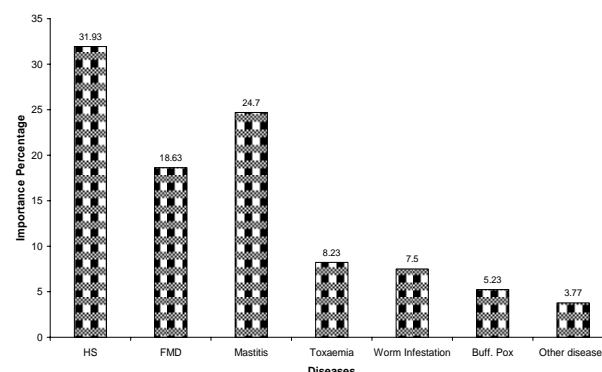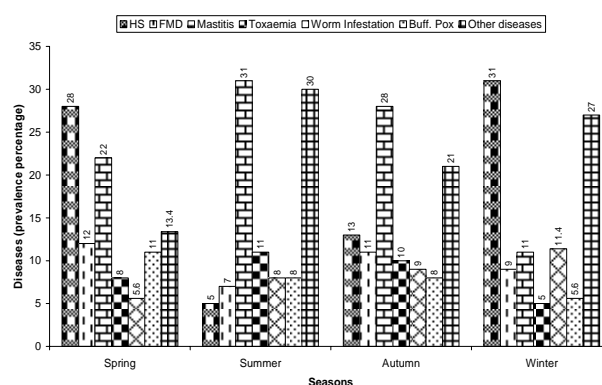

Fig. 3. Seasonal calendar showing occurrence of important animal diseases in city district Karachi

Parameters	Diseases				
Livelihood	**Mastitis**	**H.S**	**Buffalo Pox**	**Toxemia**	**FMD**
Income	••••	••	••	••	•••
Milk	•••••••	•	••	••	••••
Slaughter animal	•	••	•	•	•
Calf		•••		•	•
Result	12	8	5	6	9

departments in the country. This priority of disease prevalence and importance set by PDS work would help to better plan and execute measures for the control/eradication of livestock diseases in different parts of the country.

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