Organisation of veterinary public health in the South Asia region

D.D. JOSHI *

Summary: In the South Asia region vast human populations are exposed daily and with considerable intensity to close contact with vast animal populations and their excreta.

There is no veterinary public health unit in the World Health Organisation (WHO) South-East Asia Regional Office (SEARO) in New Delhi (India), the Western Pacific Regional Office (WPRO) in Manila (Philippines) or the Eastern Mediterranean Regional Office (EMRO) in Alexandria (Egypt). However, these offices do support a number of activities on zoonoses and food-borne diseases in WHO member countries of the region.

Maintenance of the health of farmers and of their families (often termed "rural health") has assumed increasing importance in most member countries of the region.

In most of the countries, there is no actual veterinary public health unit functioning as a national body common to the ministries of health and agriculture.

Among the commonest zoonotic diseases prevalent in member countries are rabies, brucellosis, Japanese encephalitis, echinococcosis, tuberculosis, visceral leishmaniosis, taeniasis, salmonellosis, campylobacteriosis and leptospirosis. A national plan is necessary for each country to give priority to controlling these diseases, based on health systems research or primary health care, with intersectoral and regional cooperation through the South Asian Association for Regional Cooperation (SAARC) under Technical Cooperation among Developing Countries (TCDC).

There should be a strong unit for veterinary public health in all WHO regional offices to coordinate zoonotic disease surveillance, training and control programmes in countries of the region.

KEYWORDS: Bubonic plague - Food-borne infections - Kala-azar - Public health - Regional cooperation - Snake bites - South Asia - Technical cooperation - Veterinary services - Zoonoses.

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INTRODUCTION

In the South Asia region, human health is linked to a considerable extent to the animal population. It is vital to both the animal industry and human health that this fact be recognised and faced. Animal diseases are of great importance to human health in all parts of the world and in this region in particular, a fact which often goes unrecognised. Modern public health services are incomplete without a functioning veterinary public health component. In this region, vast human populations are exposed daily and with high intensity to close contact with domestic and other animals and their excreta.

The size and density of the human population of a country is a major factor in determining the state of public health, and also in determining the type of health policy which should be adopted, in planning services and programmes, and in evaluating services. The populations of seventeen countries of South Asia are shown in Table I.

<table>
<thead>
<tr>
<th>Country</th>
<th>Population (Thousands)</th>
<th>Area (km²)</th>
<th>Density (per km²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Afghanistan</td>
<td>13,051</td>
<td>652,090</td>
<td>20</td>
</tr>
<tr>
<td>Bangladesh</td>
<td>93,179</td>
<td>143,998</td>
<td>647</td>
</tr>
<tr>
<td>Bhutan</td>
<td>1,333</td>
<td>47,000</td>
<td>28</td>
</tr>
<tr>
<td>Cambodia</td>
<td>5,729</td>
<td>181,035</td>
<td>37</td>
</tr>
<tr>
<td>India</td>
<td>716,459</td>
<td>3,287,590</td>
<td>218</td>
</tr>
<tr>
<td>Indonesia</td>
<td>156,382</td>
<td>1,904,569</td>
<td>82</td>
</tr>
<tr>
<td>DPR Korea</td>
<td>18,778*</td>
<td>120,538</td>
<td>156</td>
</tr>
<tr>
<td>Laos</td>
<td>3,585</td>
<td>236,800</td>
<td>15</td>
</tr>
<tr>
<td>Maldives</td>
<td>161</td>
<td>298</td>
<td>540</td>
</tr>
<tr>
<td>Myanmar</td>
<td>36,615</td>
<td>676,552</td>
<td>54</td>
</tr>
<tr>
<td>Mongolia</td>
<td>1,754</td>
<td>1,565,000</td>
<td>1</td>
</tr>
<tr>
<td>Nepal</td>
<td>15,368</td>
<td>140,797</td>
<td>109</td>
</tr>
<tr>
<td>Pakistan</td>
<td>84,254</td>
<td>796,095</td>
<td>106</td>
</tr>
<tr>
<td>Singapore</td>
<td>2,414</td>
<td>618</td>
<td>3906</td>
</tr>
<tr>
<td>Sri Lanka</td>
<td>15,433</td>
<td>65,610</td>
<td>235</td>
</tr>
<tr>
<td>Thailand</td>
<td>48,561</td>
<td>514,000</td>
<td>94</td>
</tr>
<tr>
<td>Vietnam</td>
<td>52,742</td>
<td>331,689</td>
<td>159</td>
</tr>
</tbody>
</table>

* Projected from the UN population estimate for 1981, and assuming an annual population growth of 2.5%


According to the United Nations (UN) Demographic Yearbook of 1980 and 1988, the population of countries in the South-East Asia region was 1,035 million, in an area comprising 865,562 square kilometres. In 1980, the South-East Asia region
contained 24% of the total world population, although it accounts for only 6% of the total land mass. The average population density in the region is 130 persons per square kilometre, compared with a world-wide average of 34 persons per square kilometre.

The animal populations of countries of the region are shown in Table II. There are numerous diseases of animals caused by a great variety of infectious agents, some of them unknown in human medicine. Some of these diseases are of economic importance for animal production, while others are directly significant to human health.

### Table II

**Livestock populations in South Asia**

<table>
<thead>
<tr>
<th>Country</th>
<th>Cattle (thousands)</th>
<th>Buffalo (thousands)</th>
<th>Goats (thousands)</th>
<th>Sheep (thousands)</th>
<th>Pigs (thousands)</th>
<th>Pack animals* (thousands)</th>
<th>Poultry** (thousands)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Afghanistan</td>
<td>3,760</td>
<td>-</td>
<td>3,000</td>
<td>20,000</td>
<td>-</td>
<td>1,960</td>
<td>7,000</td>
</tr>
<tr>
<td>Bangladesh</td>
<td>23,500</td>
<td>1,900</td>
<td>10,800</td>
<td>1,120</td>
<td>-</td>
<td>45</td>
<td>69,000</td>
</tr>
<tr>
<td>Bhutan</td>
<td>395</td>
<td>7</td>
<td>30</td>
<td>25</td>
<td>62</td>
<td>45</td>
<td>NA</td>
</tr>
<tr>
<td>Burma</td>
<td>9,103</td>
<td>2,020</td>
<td>1,013</td>
<td>263</td>
<td>2,398</td>
<td>119</td>
<td>23,575</td>
</tr>
<tr>
<td>Cambodia</td>
<td>1,600</td>
<td>700</td>
<td>1</td>
<td>1</td>
<td>1,300</td>
<td>14</td>
<td>9,000</td>
</tr>
<tr>
<td>India</td>
<td>192,500</td>
<td>69,800</td>
<td>95,300</td>
<td>48,800</td>
<td>10,000</td>
<td>3,000</td>
<td>207,700</td>
</tr>
<tr>
<td>Indonesia</td>
<td>5,209</td>
<td>692</td>
<td>9,842</td>
<td>10,170</td>
<td>6,215</td>
<td>3,287</td>
<td>237,940</td>
</tr>
<tr>
<td>DPR Korea</td>
<td>2,051</td>
<td>-</td>
<td>150</td>
<td>4</td>
<td>4,801</td>
<td>4</td>
<td>64,619</td>
</tr>
<tr>
<td>Laos</td>
<td>593</td>
<td>1,050</td>
<td>74</td>
<td>-</td>
<td>1,565</td>
<td>44</td>
<td>8,000</td>
</tr>
<tr>
<td>Maldives</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Mongolia</td>
<td>2,674</td>
<td>-</td>
<td>4,937</td>
<td>14,142</td>
<td>192</td>
<td>2,743</td>
<td>370</td>
</tr>
<tr>
<td>Nepal</td>
<td>6,343</td>
<td>2,952</td>
<td>5,211</td>
<td>873</td>
<td>516</td>
<td>50</td>
<td>9,784</td>
</tr>
<tr>
<td>Pakistan</td>
<td>16,951</td>
<td>13,698</td>
<td>31,882</td>
<td>26,640</td>
<td>-</td>
<td>4,364</td>
<td>141,000</td>
</tr>
<tr>
<td>Singapore</td>
<td>1</td>
<td>-</td>
<td>2</td>
<td>-</td>
<td>459</td>
<td>-</td>
<td>8,000</td>
</tr>
<tr>
<td>Sri Lanka</td>
<td>1,788</td>
<td>963</td>
<td>510</td>
<td>28</td>
<td>95</td>
<td>-</td>
<td>8,645</td>
</tr>
<tr>
<td>Thailand</td>
<td>5,054</td>
<td>4,904</td>
<td>89</td>
<td>139</td>
<td>7,048</td>
<td>19</td>
<td>102,103</td>
</tr>
<tr>
<td>Vietnam</td>
<td>2,775</td>
<td>2,666</td>
<td>432</td>
<td>22</td>
<td>11,796</td>
<td>137</td>
<td>100,000</td>
</tr>
</tbody>
</table>

* Includes horses, mules, asses and camels  
** Includes ducks  
NA No data available

It would seem that zoonotic diseases are destined to increase in importance, and that their control is bound to have significant effects not only upon human health but also upon the economy of each country of the region. Maintenance of the health of farmers and of their families (often termed "rural health") has assumed increasing importance in most member countries of the World Health Organisation (WHO) in the region. Control of zoonoses is the key to rural health programmes, as farmers and their families live in close contact with animals, and are therefore more frequently exposed to the risk of acquiring diseases from animals.

The South Asia region is considered as covering the following countries: Afghanistan, Bangladesh, Bhutan, Cambodia, India, Indonesia, Democratic People's
Republic of Korea, Laos, Maldives, Mongolia, Myanmar, Nepal, Pakistan, Singapore, Sri Lanka, Thailand and Vietnam. Within the WHO regional classification, these countries fall into three different regions: the South-East Asia region (Bangladesh, Bhutan, India, Indonesia, Democratic People’s Republic of Korea, Maldives, Mongolia, Myanmar, Nepal, Sri Lanka, Thailand); the Western Pacific region (Cambodia, Laos, Singapore, Vietnam); and the Eastern Mediterranean region (Afghanistan, Pakistan). In view of the influence of WHO structures on international coordination of veterinary public health (VPH) work, the structure of the first section of the present article is based on these classifications. In the second section (which deals with the problems posed by zoonotic diseases), countries are generally listed in alphabetical order for each disease considered.

ROLE OF THE WHO SOUTH-EAST ASIA REGIONAL OFFICE

There is no VPH unit at the WHO South-East Asia Regional Office (SEARO). However, there are a number of VPH activities (surveillance and control of zoonotic diseases) in WHO member countries of the region assisted and supported by SEARO (43). In 1980-1983, a veterinarian was engaged as a medical officer in veterinary public health at the regional office, but since then there has been no-one to coordinate VPH activities.

The major objective of the SEARO zoonoses programme has been to collaborate with countries to reduce morbidity and mortality due to zoonotic diseases, by strengthening control programmes (particularly for rabies, which has been identified as a major zoonotic problem). The WHO has provided, and continues to provide technical support through funds, consultants, fellowships to study zoonotic disease control programmes in individual countries of the region and local subsidies for workshops and seminars on the surveillance and control of zoonotic diseases.

SEARO has placed great emphasis on the need for scientific and technical cooperation in the planning, development, execution and evaluation of zoonoses control programmes through the primary health care approach (30).

The regional office has collaborated with national authorities in reducing mortality due to canine rabies, human rabies and other zoonotic diseases, and in strengthening the national canine rabies control programmes through personnel development, the improvement of diagnostic laboratory services, health education and vaccination of stray dogs, together with a study of the ecology of dogs (an important strategy for controlling canine rabies in most countries of the region is to develop effective management of the dog population involving such studies). The WHO organised a meeting in Kathmandu (Nepal) in October 1986 which was attended by participants from Bangladesh, Bhutan, India, Indonesia and Nepal. A WHO consultant and a staff member from Geneva explained various techniques for ecological studies.

In Sri Lanka, the Arab Gulf Fund (AGFUND), WHO and Radda Barnen (Swedish “Save the Children” Fund) supported a project for controlling human and canine rabies (28). The WHO also initiated studies in Bangladesh, Myanmar and Nepal to control rabies using existing methods of control. In Bhutan, India, Myanmar and Nepal, rabies control measures were strengthened through a UN Development
Programme (UNDP) project (12). In Thailand, the WHO provided a consultant to assist in the production of tissue culture rabies vaccine for human and veterinary use, and to strengthen the rabies control programme. Through a UNDP-funded project, the technology for the experimental production of rabies vaccine in Verocay cells was introduced at the Pasteur Institute in Coonoor (India). The WHO provided technical assistance, particularly for quality control.

In Bangladesh, a WHO consultant participated and assisted in epidemiological work on zoonotic problems, particularly rabies, brucellosis, echinococciosis, snake-bite envenomation and Japanese encephalitis (43).

In Myanmar, the WHO initiated a project on snake-bite research which has progressed well. A clinical research unit has been established. WHO consultants participated in a study of nephropathy and coagulation disorders occurring in envenomation. In Nepal, the WHO supported epidemiological surveillance of the snake-bite problem in districts adjoining the Indian border. The WHO assigned a consultant to advise the Sri Lankan government on the feasibility of producing antivenin.

WHO support was provided to Maldives to establish a diagnosis of an epizootic disease of cats.

A tripartite meeting was held at SEARO to review the progress achieved in the control and treatment of visceral leishmaniosis (kala-azar) through a UNDP-funded project.

The WHO provided fellowships for staff of the Indonesian programme to study the epidemiology and operational aspects of toxoplasmosis, the epidemiology of plague, and control programmes for rabies, plague, anthrax and taeniasis. Essential supplies and equipment were also provided.

The WHO supported countries of the region by providing reagents for the surveillance of plague. Myanmar was supported in the prevention and control of plague; a Rodent Control Demonstration Unit in the Department of Health in Rangoon continued to be the WHO Collaborating Centre for field trials of new rodenticides. An international seminar on plague organised by the WHO in Rangoon in December 1985 reviewed the present situation of plague in a number of countries and provided guidelines for further action. A WHO consultant visited India, Indonesia, Nepal and Myanmar and prepared a status report on plague.

The WHO has initiated action to establish collaborating centres in the region for epidemiology, vaccine production and diagnostic techniques for rabies. The facilities of these countries were to be utilised for disseminating information on these spheres of activity (41).

The first WHO regional seminar on veterinary public health was held in Mukteswar (India) on 8-18 April 1970, with 22 participants from senior public health and animal husbandry administrations in India, Indonesia, Mongolia, Nepal, Sri Lanka and Thailand. The WHO Regional Director, Dr V.T.M. Gunaratne, traced the history of WHO-sponsored regional activities in VPH. Dr J.H. Steele, Assistant Surgeon General for VPH of the United States Public Health Services, who was acting as a WHO consultant, sketched the beginnings and present development of VPH in Asia and in other parts of the world.
This meeting referred to the resolution on the social and economic importance of zoonoses which was unanimously adopted by the 22nd World Health Assembly in 1969 (WHA 22.35).

The main objectives of the seminar were:

1. To review the present state of knowledge on zoonoses, including food-borne infections, and the other important aspects of VPH in South-East Asia.

2. To identify VPH problems of high priority in the region.

3. To consider the requirements of each country of the region for communication and collaboration between medical and public health services on the one hand and veterinary services on the other.

4. To make general and specific recommendations to WHO and to member governments with respect to VPH activities.

Discussions at the seminar centred on: specific zoonotic disease problems in South-East Asia; epidemiology and control of food-borne infections and intoxications; organisation and administration of VPH services at different levels; education in VPH, animal diseases and human nutrition; comparative medicine; new horizons in VPH; coordination and collaboration between public health and veterinary laboratory services; VPH legislation, regional standards with respect to food-borne infections and intoxications; and the roles of the WHO and FAO in developing and strengthening VPH programmes in countries of the region (39).

A second seminar on VPH took place at the National Institute of Communicable Diseases, Delhi (India) in 1974 and was supported by SEARO. This seminar assessed progress with regard to the establishment of VPH in the South-East Asia region.

Since then, no regional VPH seminar has been proposed or conducted by SEARO at the regional level. However, several national and regional seminars on zoonotic diseases have taken place in the region with support from SEARO.

At present, several WHO member countries in the region are active in the field of VPH and zoonotic diseases.

TECHNICAL COOPERATION AMONG THE DEVELOPING COUNTRIES IN THE SOUTH-EAST ASIA REGION

At their first meeting in 1981 in Jakarta, the Health Ministers of the member states of WHO in the South-East Asia region identified Technical Cooperation among the Developing Countries (TCDC) among member states as a powerful and effective mechanism for the development of health services. At the second and third meetings in 1982 and 1983, seven subjects were identified as important: health personnel training, control of diarrhoeal diseases, immunisation, maternal and child health, family planning, nutrition, and control of epidemics (including zoonotic diseases). Subsequent meetings have identified the needs and the potential for support within member states (44).
ORGANISATION OF VPH IN INDIVIDUAL COUNTRIES IN THE SOUTH-EAST ASIA REGION

BANGLADESH

There is no separate VPH unit in the national administration in Bangladesh. Veterinarians are employed by the Department of Livestock Services of the Ministry of Fisheries and Livestock, which also deals with the control of zoonoses (13).

Zoonotic disease activities are carried out by the Zoonoses Unit established at the Institute of Epidemiology of the National Institute of Preventive and Social Medicine, run by the Ministry of Health.

A WHO public health veterinarian has assisted in generating epidemiological and epizootic data on various zoonotic diseases (43).

BHUTAN

There is no VPH unit in the Ministry of Health or the Ministry of Agriculture. Rabies control measures were strengthened through a UNDP project under the Department of Veterinary Services. So far no other zoonotic disease activities are planned for implementation in the country (12).

INDIA

There is no well-developed VPH system under the existing administrative infrastructure, and there are no reliable data on the prevalence of zoonoses in India.

There is a VPH unit at the Indian Veterinary Research Institute (IVRI) in Izatnagar (Uttar Pradesh) and there is also a Zoonoses Division at the National Institute of Communicable Diseases (NICD) in Delhi. In addition, the following institutions are working on zoonoses:

- Haffkine Institute, Bombay
- National Institute of Virology, Pune
- All-India Institute of Hygiene and Public Health, Calcutta
- Veterinary College, Patwadangar
- Veterinary College, Madras
- large municipalities such as Delhi, Bombay, Calcutta and Madras.

Even at the municipal level, broad-based modern programmes are lacking, and veterinary supervision of most abattoirs is hampered by inadequate financial support and outdated facilities. The capturing and poisoning of stray dogs is practised.
There is a National Committee on Zoonoses constituted by the Indian Government with the Director of Health Services as the Chairman. The committee advises the government on the surveillance and control of zoonoses in the country.

National seminars and workshops on zoonoses were conducted in 1968, 1977, 1980 and 1981. In addition, various national workshops took place between 1980 and 1990 on rabies, visceral leishmaniosis and Japanese encephalitis.

A WHO-sponsored regional postgraduate Master of Veterinary Public Health (MPVM) course was offered at the All-India Institute of Public Health, University of Calcutta. The course operated for a few years, but has been closed since 1986.

WHO collaboration was extended to the National Committee on Zoonoses Control, the NICD, the IVRI at Izatnagar and other institutions under the Ministries of Health and Agriculture, as well as State Animal Husbandry Departments, to conduct training courses and the preparation of manuals and for a project for the control of canine and human rabies in the Delhi area (34, 43).

INDONESIA

There is a Division of Veterinary Public Health under the Ministry of Agriculture and a Division of Zoonoses under the Ministry of Health. In addition, public health veterinarians were appointed in two municipalities. Their activities include plague control, milk hygiene and meat hygiene. More than 400 veterinarians are engaged in livestock disease control. Two animal disease research institutes at Bogor and Surabaja are working on certain zoonotic diseases (43).

The National Institute of Health Research and Development and the specialised research centres dependent on the institute are also conducting research on zoonotic diseases with WHO assistance.

DEMOCRATIC PEOPLE’S REPUBLIC OF KOREA

There is no VPH unit in either the Ministry of Health or the Ministry of Agriculture. Veterinarians help to control some socio-economically important animal diseases like brucellosis, tuberculosis, mastitis, etc. The Korean Academy of Medical Sciences and other research institutes are conducting various types of research, including on such important subjects as Japanese encephalitis, rabies, salmonellosis, and zoonotic aspects of food hygiene and environmental health in rural areas (43).

MALDIVES

There is no VPH unit in any of the governmental ministries. Zoonotic disease surveillance, control and research activities are not given any priority in health programmes. A training programme is provided for community health workers, particularly concentrating on communicable diseases (43).
MONGOLIA

There is no VPH service as such in either the Ministry of Agriculture or the Ministry of Health. However, measures for the control of brucellosis in farm animals in Mongolia were begun in the early 1960s. Since then, brucellosis has spread widely in cattle, yaks, sheep, goats and camels. People have also contracted this disease from infected animals and their products. The Veterinary Services in agriculture are engaged in some of the zoonoses control activities (38, 43).

MYANMAR

There is no VPH service as such in either the Ministry of Health or the Ministry of Agriculture. However, the national Veterinary Services are engaged in some zoonotic disease control activities.

The Department of Medical Research at Rangoon is directly involved in some zoonotic disease activities: rabies diagnosis, rabies vaccine production, leishmaniosis diagnosis, chemotherapy research, Japanese encephalitis, snake-bite antivenin production and research, human plague and rodent control research (43), etc.

NEPAL

A Zoonotic Disease Control (previously “Veterinary Public Health”) Section was established in the Epidemiology and Statistics Division of the Department of Health Services at the Ministry of Health of His Majesty’s Government (HMG) Nepal in July 1979. This section is still in operation and has been working to procure and distribute rabies vaccine for post-exposure treatment of the human population (17).

The National Zoonoses and Food Hygiene Consulting Centre Ltd. was established as a private enterprise in November 1989 under the Nepal Company Act. The centre is an autonomous body, operating on a service-oriented, non-profit making basis, and has been endorsed and registered by HMG Nepal. The centre has the following objectives:

- to conduct epidemiological surveillance on zoonotic diseases and food safety problems;
- to conduct seminars and training workshops on zoonoses and food hygiene, and to provide suggestions and recommendations to HMG Nepal;
- to develop a data base on these diseases and link this up with WHO, the Food and Agriculture Organisation of the United Nations (FAO), the Office International des Epizooties (OIE) and the South Asian Association for Regional Cooperation (SAARC);
- to conduct health systems research on VPH subjects and food hygiene;
- to work as a national focal point for zoonoses and food hygiene activities and provide consultancy wherever it is needed.
At present this centre has the following projects in operation:

- the translation into Nepali of FAO English-language publications on animal production and health subjects for the use of rural farmers (supported by FAO, Rome);
- study of existing traditional veterinary medicine practices in Nepal (supported by the FAO Regional Office for Asia and the Pacific [RAPA], Bangkok);
- epidemiological study of echinococcosis in animals and humans in Kathmandu (supported by IDRC, Canada);
- study of existing animal slaughter practices in Kathmandu, Bhaktapur and Lalitpur (supported by FAO, Rome);
- study of the impact of milk collection and marketing activities by the Dairy Development Corporation on the income of rural milk producers (supported by RAPA, Bangkok);
- a fundamental entomological study of visceral leishmaniosis vectors in “terai” (marshy jungle) areas of Siraha district (supported by SEARO, New Delhi);
- planned epidemiological surveillance of human and canine brucellosis in milk-producing areas run by the Dairy Development Corporation of Nepal, and a vaccination trial in farm animals (to be supported by SEARO, New Delhi).

In addition, the Veterinary Services of the Ministry of Agriculture and the Institute of Agriculture and Animal Sciences of the Education Ministry are engaged in zoonoses control and research activities.

SRI LANKA

In 1953, a VPH unit was established in the Epidemiology Division of the Ministry of Health, for the purpose of epidemiological surveillance and control of outbreaks of zoonoses and food-borne infections, particularly those communicated through consumption of milk or meat and related products. Another important function of the VPH unit is to organise and conduct seminars and training workshops on zoonoses and food hygiene. So far, this VPH unit has concentrated on a rabies control project funded by AGFUND, WHO and Radda Barnen (Sweden) (28).

The Municipal Veterinary Departments of Colombo and other municipalities have employed veterinarians for meat inspection. Rabies diagnosis is performed at the Medical Research Institute of Colombo. This laboratory also works on brucellosis and leptospirosis.

THAILAND

In 1978, the Ministry of Public Health in Thailand established a Board of Veterinary Public Health. The board members consist of prominent representatives from all sectors concerned. The main functions of the Board are:
to formulate all aspects of VPH policy;
- to develop and coordinate VPH activities with the various governmental sectors concerned;
- to identify, evaluate and solve all problems relating to VPH activities.

Between 1979 and 1981, the Board reviewed the epidemiological surveillance of zoonoses and related human diseases, and assessed the extent of the problem. It came to the conclusion that a national VPH programme should be developed, and this was submitted to the National Economic and Social Development Board for consideration as part of the National Socio-economic Health Development plan. The VPH Board gave full agreement to establishing a VPH unit under the Zoonoses Section of the Division of General Communicable Diseases at the Ministry of Public Health.

Other government agencies which share VPH activities are as follows (9):

**Ministry of Agriculture and Cooperatives**

- Department of Livestock Development
  
  **a)** Division of Disease Control
  - Animal disease control
  - Meat export control
  - Animal disease eradication

**Ministry of Public Health**

a) Department of Communicable Disease Control

  - Division of General Communicable Disease Control
  - Veterinary Public Health Unit

b) Office of Under-Secretary of State

  - Division of Epidemiology
  - Research and Epidemiological Surveillance

c) Food and Drug Administration

d) Department of Medical Sciences

  - Division of Virus Research Institute
  - Rabies diagnosis
  - Vaccine Research Institute

e) Department of Health

  - Division of Environmental Sanitation

f) Government Pharmaceutical Organisation
Universities

a) Chulangkorn University
   - Faculty of Veterinary Science
   - Faculty of Science

b) Kasetsart University
   - Faculty of Veterinary Science
   - Faculty of Science and Arts

c) Mahidol University
   - Faculty of Public Health
   - Faculty of Tropical Medicine
   - Faculty of Science

d) Chiang Mai University
   - Faculty of Medicine

Ministry of Interior: Municipalities (slaughterhouses)

Ministry of Industry: Food and Dairy Products Factory

Ministry of Education: Institute of Agricultural Technology

The Thai Red Cross and Pasteur Institute
   - Rabies vaccine production
   - Rabies diagnosis
   - Snake antivenin production

Armed Forces Research Institute of Medical Sciences
   - Zoonoses research
   - Rabies diagnosis.

In the past, veterinarians have obtained an MPH degree from the School of Public Health, whereas veterinarians are now awarded an MSc in Tropical Medicine from Mahidol University. Both veterinary schools include a VPH course as an important part of the curriculum, with particular emphasis on food hygiene, meat inspection and zoonoses.

The organisation of VPH activities in Thailand still needs to be reviewed, strengthened and adjusted to enable better cooperation and coordination between all the relevant authorities.
ROLE OF THE WHO WESTERN PACIFIC REGIONAL OFFICE

There is no VPH or zoonoses unit in the WHO Western Pacific Regional Office (WPRO). However, all the relevant VPH activities are carried out through the Parasite Division at WPRO. The WHO is promoting the control of zoonoses (in particular rabies, brucellosis, echinococcosis, salmonellosis and Japanese encephalitis) in Cambodia, Laos and Vietnam, through the application of appropriate preventive and sanitary measures for humans, animals, animal products and waste. WHO support is being provided to an in-service training scheme for veterinarians and auxiliary personnel in the field of zoonoses control. Special attention is given to the transfer of technology, in particular in the development of rabies vaccines.

ORGANISATION OF VPH IN INDIVIDUAL COUNTRIES IN THE WESTERN PACIFIC REGION

On the basis of information received from WPRO, it appears there are no separate VPH units in Cambodia, Laos, Vietnam or Singapore. Veterinarians and public health personnel working in the Department of Veterinary Services and the Department of Health deal, respectively, with animal and human aspects of the control of zoonotic and food-borne diseases.

ROLE OF THE WHO EASTERN MEDITERRANEAN REGIONAL OFFICE

There is no veterinary public health unit as such in the WHO Eastern Mediterranean Regional Office (EMRO) in Alexandria (Egypt). Nevertheless, through the Communicable Disease Control Division, EMRO is supporting activities related to zoonotic disease surveillance and food safety programmes. The major activities undertaken by the regional office together with the national authorities of Afghanistan and Pakistan concern control of rabies in dogs, echinococcosis in cattle, sheep and goats and other parasitic zoonotic diseases. In Pakistan, a rabies vaccine production programme is supported by WHO. In-service training programmes and fellowships in zoonotic disease control are provided to concerned staff of WHO member countries.

ORGANISATION OF VPH IN INDIVIDUAL COUNTRIES IN THE EASTERN MEDITERRANEAN REGION

There is no VPH unit in Afghanistan or Pakistan. However, in Pakistan, the National Institute of Health in Islamabad and the Veterinary Institute in Lahore are working on a variety of activities related to zoonotic disease.
SOUTH ASIAN ASSOCIATION FOR REGIONAL COOPERATION

The member countries of SAARC (Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan and Sri Lanka) decided in April 1981 to constitute a study group on health and population activities. The first meeting, held on 1-2 October 1981 in Kathmandu, decided the areas for cooperation. Of the five most important diseases, rabies was chosen for regional cooperation. The first meeting of the SAARC Expert Committee on Rabies was held in December 1985 in Colombo (Sri Lanka), and the second meeting was held in March 1987 in Kathmandu (Nepal). The third meeting is due to be held in Islamabad (Pakistan) at the end of 1991. In general, these meetings agreed that there was a lack of comprehensive national rabies control programmes, inadequate diagnostic facilities, poor surveillance and reporting systems, an insufficient supply of potent safe rabies vaccines and inadequate funds (2).

PROBLEMS POSED BY ZOONOTIC DISEASES

RABIES

Rabies is one of the oldest recognised diseases in the South Asia region, and has been identified as the priority zoonotic disease in the region. Dogs continue to be the main reservoir of infection and are responsible for over 90% of human hydrophobia deaths. The entire human population is exposed to rabies. Diagnostic facilities are substandard in most of the countries of the region. There is no regular epidemiological surveillance system for reporting and recording animal and human cases of rabies (29). The frequency of rabies incidence in 1987 is shown in Table III.

**Table III**

**Rabies in South Asia, 1987**

<table>
<thead>
<tr>
<th>Country</th>
<th>Human cases</th>
<th>Case rate per million of population</th>
<th>Post-exposure treatments in humans</th>
<th>Cases in animals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bangladesh</td>
<td>2,500*</td>
<td>26.3</td>
<td>60,000</td>
<td>26,000</td>
</tr>
<tr>
<td>Bhutan</td>
<td>15</td>
<td>0.44</td>
<td>2,500</td>
<td>150</td>
</tr>
<tr>
<td>India</td>
<td>25,000*</td>
<td>34.9</td>
<td>500,000</td>
<td>40,000</td>
</tr>
<tr>
<td>Nepal</td>
<td>125*</td>
<td>6.58</td>
<td>7,000</td>
<td>12,000</td>
</tr>
<tr>
<td>Pakistan</td>
<td>5,000</td>
<td>57.5</td>
<td>60,000</td>
<td>650</td>
</tr>
<tr>
<td>Sri Lanka</td>
<td>150</td>
<td>7.89</td>
<td>10,000</td>
<td>15,000</td>
</tr>
</tbody>
</table>

* Estimated

NB: Not every case was confirmed by laboratory tests


Rabies is endemic in **Afghanistan**. Dogs constitute the main reservoir for cases resulting in human death or requiring post-exposure treatment in the country.

In **Bangladesh**, it is estimated that 2,500 people die from rabies each year. In 1987, about 60,000 people and 40,000 head of livestock were treated for rabies after exposure
(95% of the human cases following a dog bite). It is estimated, however, that as many as 100,000 people are exposed to suspect animals each year. The demand for rabies vaccine for humans and animals has increased in recent years. Both human and animal rabies vaccines are produced locally from sheep brain tissue. The Institute of Public Health and the Livestock Research Institute in Dacca produced a total of 7,500 litres of rabies vaccine in 1986. There is no comprehensive national rabies control plan, although a pilot project was set up by a WHO consultant in 1986.

A WHO consultant assisted epidemiological work on zoonotic diseases in Bangladesh, particularly on rabies, brucellosis, hydatidosis and Japanese encephalitis. National workers were trained in the managerial aspects of rabies control and diagnostic techniques (31).

In Bhutan, more than 90% of human rabies was acquired from dog bites. There is no vaccine production centre. No diagnostic facilities are available. A national rabies control programme was organised and implemented in 1985, and lasted until 1988, with UNDP support. An epidemiological surveillance system was introduced, but reporting and recording of human and animal cases was unsatisfactory. For human post-exposure treatment, Semple-type sheep brain vaccine was imported from India and "Rabisin" from France. Rabies control measures were strengthened through a UNDP consultancy project. All the rabies vaccine required is now being produced in the country (12).

In Cambodia, canine and feline rabies is a problem. Vaccination of dogs and cats is practised, and post-exposure treatment of humans is carried out in rabid dog-bite cases.

In India, about 25,000 people die from rabies each year and approximately 500,000 people receive post-exposure treatment. Ninety-six percent of the human rabies cases are acquired from dog bites. So far, no comprehensive national rabies control programme has been proposed by the National Institute of Communicable Diseases (NICD). Twelve laboratories produce Semple-type sheep brain vaccine for human and animal use. The WHO provided technical support to further strengthen the rabies control programme. A WHO project was successfully completed on the experimental production of tissue culture rabies vaccine at the Pasteur Institute in Coonoor. Experimental vaccine batches have been prepared and tested for immunogenicity. A training course was organised for participants from Bangladesh, India, Indonesia, Myanmar and Thailand.

The Indian government set up an intersectoral task force, including a WHO staff member, to coordinate activities for the development of health and agriculture, providing further technical and financial input to activate a rabies control programme in several states. India has also produced several educational documents (with WHO support) to disseminate information on the control of rabies, both for professional and paraprofessional personnel and for community education. Audio-visual material on human and canine rabies has been made available by the government for use in teaching programmes and health education campaigns (4, 34).

In Indonesia, rabies control activities are being implemented in areas where the disease is known to be endemic, with technical support for education and further strengthening of the programme. The country has made substantial progress in controlling rabies in several project areas (43).
In Laos, the main transmitters of rabies are dogs. The Rabies Diagnostic Laboratory is trying to produce anti-rabies vaccine within the country. There are special government regulations for rabies control (5).

In Mongolia, animal rabies is endemic. The main vectors are wild animal species. Rabies control is jointly carried out by the veterinary and medical institutions which have developed a programme for the vaccination of domestic animal species and the strengthening of post-exposure treatment in humans. Most cases are diagnosed in domestic animal species: 42.3% are cattle, 26.5% camels, 20% sheep and 9% goats. Investigations were systematically carried out to identify all persons who had been in contact with an infected animal. Forty-six thousand litres of cell culture live vaccine prepared with the ERA (Evelyn-Rokitnicki-Abelseth) strain are produced in Mongolia. With this vaccine, 23,000 dogs and 588,000 other animals are vaccinated annually. At present, due to a lack of modern diagnostic facilities in district laboratories, the final diagnosis is only made by the Central Veterinary Laboratory in Ulaam Baator. Mongolia is ready to export this vaccine to any country within the area (5).

In Myanmar, the WHO supported the development of an effective rabies control programme by assigning a consultant and strengthening diagnostic facilities (43).

In Nepal, 94.6% of the human rabies is acquired from dog bites and contacts. About 200 people die annually from rabies, and 125 cases were reported in 1987. About 30,000 people are estimated to receive post-exposure treatment. Reported post-exposure cases in 1987 numbered 10,000. On average, 55,000 dogs are immunised against rabies annually with Semple-type sheep brain vaccine. A rabies control project run by the Department of Livestock Services produces a sheep brain vaccine for human and animal use. A national rabies control project has been formulated, and in the near future "Vétérinaires Sans Frontières" of Lyons (France) and HMG Nepal will implement the project in stages in the Bagmati zone (24). The Zoonotic Disease Control Section has provided a comprehensive project document for rabies control. A WHO consultant assisted Nepal in organising a national meeting and in strengthening the national rabies control programme by undertaking dog ecology studies. Assistance was also provided to improve the quality of rabies vaccine and to train national personnel in the managerial aspect of rabies control and in diagnostic techniques.

Rabies is endemic in Pakistan. The dog is the most important transmitter of the disease to humans, with 88% of the cases occurring after a dog bite. About 60-65,000 people die due to hydrophobia annually. The National Institute of Health prepares a Semple-type rabies vaccine. Anti-rabies serum from horses is also produced locally (5, 27).

In Sri Lanka, over 90% of human rabies cases are caused by dogs. One hundred and fifty cases were reported in 1987. In the same year about 10,000 people received post-exposure prophylaxis after dog bites. The rabies control programme was strengthened through assistance provided by AGFUND and Radda Barnen (Sweden) (28). A consultant planned and implemented studies on the ecology of dogs. There has been a significant reduction in rabies cases. Strategies for rabies control have been modified to include the vaccination of stray dogs. A decline in the number of human deaths due to rabies in Sri Lanka has occurred as a result of a programme supported by the WHO, under which 50,000 doses of rabies vaccine were provided for use on animals.
The lowest number of annual deaths due to rabies recorded so far in Sri Lanka occurred in 1988. More than 200,000 dogs had been vaccinated and 50,000 destroyed in various districts in the country up to September 1988. The country has planned joint actions, and meetings have been held at regular intervals in collaboration with municipal veterinary departments (28).

In Thailand, the WHO supported a research project on suckling mouse brain vaccine to assess its efficacy at reduced dosage. Thailand has also initiated a programme to produce tissue culture rabies vaccine for human use (43).

In the northern part of Vietnam 1,243 people died from rabies over the period 1984-1988. All cases followed contact with dogs. A suckling mouse brain vaccine for human use is produced in three different laboratories in the country. An LEP (Flury Low Egg Passage) rabies vaccine for veterinary use is also produced under the supervision of the National Veterinary Research Laboratory in Hanoi. A programme for the control of the disease in the animal reservoir has recently been launched and expectations are that, as a result, about 700,000 dogs will be vaccinated in provinces in the northern part of the country (5).

**VISCERAL LEISHMANIOSIS**

Leishmaniosis is prevalent in Bangladesh, India and Nepal, but information on its occurrence is lacking. Leishmaniosis control programmes in Bangladesh and India are integrated into the primary health care systems. A reduction in kala-azar cases was observed in Bangladesh and India as a result of antimalarial control measures. A Tropical Disease Research (TDR) scheme has been launched in Nepal to study the epidemiology of leishmaniosis in certain districts adjoining the endemic areas of India (43).

In the 1960s, the disease had almost disappeared due to DDT spraying for malaria control. However, it has reappeared since the cessation of spraying, due to an increase in the density of the vector, *Phlebotomus argentipes*, and an influx of non-immune persons. Studies are needed on the effect of the biology of the sandfly vector and entomological factors in relation to disease outbreaks and endemicity, preferably with support from the WHO, UNDP, TDR and other donor agencies in the region.

An international meeting to evaluate the control of visceral leishmaniosis in Bangladesh, India and Nepal was held in December 1988 in Kathmandu (Nepal) with financial support from UNDP.

In Bangladesh, 477 cases of leishmaniosis were reported during 1980-1985. The focus was first located in Sirajganj but, by 1985, it had spread to five districts. No deaths were reported, and *P. argentipes* from Sirajganj was still found susceptible to DDT. The original focus at Sirajganj was controlled by insecticidal spray and the treatment of cases (43).

In 1982, a new area of kala-azar incidence was detected in Mymensingh, where an extensive survey was carried out in which clinical and laboratory investigations of bone marrow and spleen were conducted. An entomological survey confirmed the abundance of sandflies in this area. Measures were taken to provide continuous and systematic surveillance.
A diagnostic unit for parasitic diseases was set up at the National Institute of Preventive and Social Medicine in Dacca, in 1982, with assistance from a WHO consultant. This unit was capable of conducting surveys and surveillance more systematically than before.

In India, where a task force on kala-azar has been functioning since 1979, practical plans have been devised for surveillance and control of the disease in Rajasthan, Orissa, West Bengal and Bihar. Studies on the ecology and behavioural patterns of the sandfly have continued. Research has also been conducted on elucidating the inter-relationships between the vector, the parasite and host.

The states of Bihar and West Bengal were worst affected; of the 16,478 cases reported in 1984, 12,240 were from Bihar and 4,233 from West Bengal (i.e. only five cases reported from other states). Four districts of West Bengal were affected. During 1984 and 1985, 90% of the cases occurred in the District of West Dinajpur. During 1988, a total of 22,739 cases and 131 deaths were reported from India, of which 19,639 cases with 123 deaths were from Bihar and 1,934 cases and three deaths from West Bengal.

In Nepal, between 1980 and 1985, 604 cases were reported with 47 deaths.

The biology of the sandfly, vector potential and biological control measures for leishmaniosis have been studied in this region.

In the above three countries – Bangladesh, India and Nepal – a total of about 26,000 cases were reported in 1988 (21, 26).

**JAPANESE ENCEPHALITIS**


Japanese encephalitis is a zoonotic disease which occurs over a wide area of Eastern Asia, from Siberia to India, mainly infecting domestic and wild animals and birds; human beings are only occasionally infected. This is an arboviral infection which is generally maintained in enzootic form and appears as a focal outbreak only under specific ecological conditions (10, 40). Japanese encephalitis is caused by an arthropod-borne flavivirus transmitted by mosquitoes of the genus *Culex* which breed in rice fields. The virus is a cause of major epidemics of encephalitis throughout Asia (35). Pigs and birds (ducks and migrating wild birds) are important amplifying hosts for Japanese encephalitis virus, as indicated by the presence of antibodies in their serum. Infected pigs do not develop clinical signs of illness, except abortion and still-birth, but the Japanese encephalitis virus circulates in their blood, so that mosquitoes can become infected and can transmit the virus to man.

In India, Japanese encephalitis has been endemic for decades, particularly in the southern states of Karnataka and Andra Pradesh. In 1978, it was recognised for the first time in Bihar, Uttar Pradesh and West Bengal, where 7,463 cases were reported.
Following an epidemic in Goa in 1982, the National Institute of Virology carried out serological surveys and detected antibodies to arbovirus in 20% of the samples tested, 10% of which were due to Japanese encephalitis virus (3). Outbreaks have also been recorded in neighbouring districts of Uttar Pradesh and Bihar (7).

During 1985, Deoria, Gorakhpur and Basti districts in Uttar Pradesh reported cases of Japanese encephalitis (7). The total number reported from India was 2,003 cases with 763 deaths. In 1977-1978 an extensive outbreak had occurred in north-eastern India. A large number of cases had also been reported in 1960, and twenty-five thousand doses of vaccine were provided to assist in the control operation. In 1987, another outbreak occurred in India, and 2,877 cases and 1,172 deaths were reported. In spreading westward, the disease seems to have become established in a few regions of India. Japanese encephalitis has consistently been endemic in Bihar and West Bengal. In Bihar, during 1988, 6,684 cases and 11 deaths were reported, while 4,447 cases and 29 deaths were reported in West Bengal during the period 1987-1988. Fifty-six cases and 14 deaths were reported from Uttar Pradesh. India can produce two million doses of vaccine a year (1, 3, 33).

About 26 species of culicine mosquitoes belonging to five different genera have been incriminated in the transmission of Japanese encephalitis in India. They occur in paddy fields and the surroundings areas. (Rice-growing areas continue to increase in parallel with water development schemes, and this was the main reason for the continued outbreak of Japanese encephalitis in north-eastern India.) The most prominent species are Culex tritaeniorhynchus, C. gelidus, C. vishnui, C. pseudovishnui and C. fuscocephala. The bionomics of the vectors involved in Japanese encephalitis do not lend themselves to any simple and straightforward method of vector control. Control measures are initiated after cases have been reported. However, well-organised and systematically-funded mosquito abatement measures remain the most effective and economical methods of preventing human cases. In long-term planning, Japanese encephalitis control programmes should include the provision of Japanese encephalitis vaccine for humans and animals (particularly pigs and horses). Guidelines for the diagnosis, surveillance and control of Japanese encephalitis were formulated at an international consultative meeting on the surveillance and control of Japanese encephalitis in Colombo (Sri Lanka) in June 1988.

In Myanmar, Japanese encephalitis cases were reported mostly among children in Shan State. The disease first appeared in the country in 1974, and then gradually declined. Since 1980, no case has been reported.

In Nepal, Japanese encephalitis has appeared as a new major disease in the plain region of southern Nepal in 1978. All age groups were affected by the outbreaks which occurred between 1978 and 1982, with a higher fatality rate in children aged up to four years. In the period 1978-1984, a total of 2,508 cases of all age groups (and both sexes) were admitted to various hospitals; 886 patients died (case fatality rate 35.32%). For serological diagnosis, 1,505 human and 299 animal serum samples were collected; 33.36% of human sera and 33.78% of pig sera contained Japanese encephalitis antibody in titres ranging from 1/10 to 1/80 or above. In an entomological study, the percentages of different genera recorded were Culex (83.46%), Anopheles (12.61%), Mansonia (3.0%), Armigerus (0.76%) and Aedes (0.21%). Preventive measures were taken, such as vector and larvae control, health education and improvement of pig farming, together with appropriate hospital treatment (22).
The disease was first recorded in July 1978 in the Western Terai District and subsequently affected all 23 tropical terai districts (17).

In 1985, Nepal reported 692 cases with 183 deaths. Control primarily involved vector control by spraying insecticides in affected areas. In 1986, there were 1,299 cases with 357 deaths.

Low priority is given to Japanese encephalitis among public health problems in Singapore because the disease occurs only sporadically, although the environmental conditions appear to be favourable for Japanese encephalitis outbreaks (37).

In Sri Lanka, there have been several outbreaks, the latest from November 1985 to February 1986. Technical and material support was provided for a control operation. In November 1987, an outbreak occurred in Sri Lanka and 254 cases were reported, with 65 deaths.

In Thailand, Japanese encephalitis has been reported increasingly over the past ten years, primarily in north-eastern regions, with considerable mortality rates. In 1987, Thailand reported 1,426 cases and 149 deaths. A comparative study is in progress on the efficacy of vaccines produced locally and in Japan.

Encephalitis epidemics are confined to the northern region of the country (32), where a dramatic increase in hospital admissions for acute encephalitis occurs annually during June, July and August. No such increase is observed in the south. There are no obvious reasons for this difference.

Many encephalitis cases have been reported around Chiang Mai in the north, since the first epidemic in 1969 (11). Serodiagnosis of Japanese encephalitis and dengue haemorrhagic fever has been carried out, mostly by haemagglutination inhibition (HI) or complement fixation (CF) tests (10).

Pigs are probably the main amplifying host of Japanese encephalitis virus in Thailand. Most adult pigs reared in northern Thailand have serum antibody to the virus and sentinel pigs set out during the epidemic season rapidly develop the antibody (14, 37).

In Vietnam, Japanese encephalitis virus was first isolated from the blood of a patient in 1964. However, due to inadequate laboratory diagnosis, Japanese encephalitis was only diagnosed in a limited number of cases. Most Japanese encephalitis cases occurred in children under nine years of age. In North Vietnam, there were 4,122 cases of Japanese encephalitis in 1972, with 818 deaths; and in 1974 about 4,246 cases with 925 deaths. Overall, in Vietnam, the morbidity rate for Japanese encephalitis varied between 8 per hundred thousand and 205 per hundred thousand from 1975 to 1984. There was an major outbreak of Japanese encephalitis in 1985 when, in July, 1,212 cases were reported in fourteen provinces, with a mortality rate of 11.7 per hundred thousand.

SCHISTOSOMOSIS

Schistosomosis is endemic in Indonesia and in limited areas of India, Nepal and Thailand. Research projects on schistosomiasis are supported by the TDR programme in Indonesia and India. However, so far no such support has been received for
surveillance of this disease in Nepal and none has been conducted, but a proposal for support has recently been submitted to TDR.

**Indonesia** launched a well planned and coordinated programme for the control of schistosomosis due to *Schistosoma japonicum* in Central Sulawesi, where the disease is endemic. Endemic foci of *S. mekongi* on the **Thai-Cambodian border** continue to be present, leading to sporadic cases. Under WHO/TDR collaboration with the Centre of Malacology at Mahidol University, the role of the intermediate host in transmission was examined, along with practical methods for overall surveillance.

**TUBERCULOSIS**

Tuberculosis continues to be a major public health problem in the region. Attention is directed mainly to pulmonary tuberculosis, early detection of *Mycobacterium tuberculosis* by sputum microscopy, short-course chemotherapy for bacteriologically confirmed tuberculosis cases, and training activities to reorient and upgrade the knowledge and skills of tuberculosis workers for the effective implementation of national tuberculosis control programmes.

Bovine tuberculosis is an air-borne as well as milk-borne infection. The bovine form of the disease can be transmitted to dairy workers by the air-borne route.

In **Bangladesh**, 41,000 new cases were detected in 1988, and 23,316 existing cases were under treatment.

In **Bhutan**, the tuberculosis programme is pursued through other health-related projects.

In **India**, 1.5 million new cases were diagnosed in 1988. Several systematic tuberculosis surveys have been undertaken in different parts of the country among cattle, buffaloes and other animals, and these have indicated prevalence rates varying from 2.1% to 20.4% in various parts of the country. In pure-bred exotic breeds the prevalence rate was sometimes as high as 40%.

In **Indonesia**, a tuberculosis control programme is being evaluated with assistance from WHO in providing fellowships, essential supplies and equipment. Dairy animals are tested periodically and those found to be positive are slaughtered. Almost all the recorded cases among cattle and buffaloes have been caused by the bovine type tubercle bacillus.

In **Mongolia**, rapid diagnosis and control of tuberculosis is being carried out with the help of the WHO. Animals are periodically tuberculin tested and positive reactors are slaughtered.

In **Myanmar**, the tuberculosis programme has been partially integrated with public health care services in some areas. Eleven thousand new human cases were detected in 1986.

In **Nepal**, 2,602 sputum-positive cases were registered between July and December 1988, and 8,931 people were under treatment. Tuberculosis is a major health problem for cattle and humans in the country. Intradermal tuberculin testing was conducted in cattle and buffaloes, and the prevalence rates were 33.3% and 23.1% respectively.
There is a national BCG (Bacillus Calmette-Guérin) vaccination programme for children (19).

In Sri Lanka, about 6,000 new cases are detected every year and efforts have been made to increase case detection by involving health personnel, and improving the supervision and information of personnel.

In Thailand, the Tuberculosis Division is conducting field studies on chemotherapy and chemoprophylaxis, under a tripartite agreement between Thailand, Japan and the WHO. The incidence of cases positive to the direct smear test has been estimated at 95 per hundred thousand population (i.e. 50,000 cases annually). Conventional chemotherapy has been reported as achieving a success rate of 40%, while the Tuberculosis Division has reported 80% success (43).

SNAKE-BITE ENVENOMATION

This problem has been receiving increasing attention in the region.

India has planned a series of workshops on various zoonotic diseases, and a workshop on the surveillance and control of snake-bite envenomation was held in May 1989.

A research project initiated in Myanmar has progressed well with the establishment of a clinical research unit. Cases of snake-bite envenomation were studied to assess the pathophysiology, clinical efficacy and dosage regimen of antivenin and other therapeutic agents. Consultants were assigned for the study of nephropathy and coagulopathies occurring in envenomation. About 30% of the snake-bite antivenin continued to be produced in freeze-dried form.

In Nepal, studies have been performed on epidemiological aspects of snake-bite. Antivenin is imported from India.

The WHO has continued to support epidemiological and case management studies on snake-bite envenomation.

Snake-bite envenomation is a major problem in Sri Lanka, and antivenin is produced in the country.

PLAGUE

Yersinia pestis is still enzootic in a few circumscribed areas of some countries of the region.

Although human plague is no longer a major public health problem, Myanmar has reported occasional cases. The WHO organised an international seminar on plague in November 1985 in Myanmar, to assess the present situation in the region, review control measures and provide guidelines for preventing outbreaks (6).

Though no case of human plague has been reported in India recently, surveillance and ecological studies are being carried out through the Rodent Control Demonstration Units and Plague Surveillance Centres in both these countries.
In Nepal, there was an outbreak of bubonic plague in 1968 in Bajhang district in the Far Western region. The disease was acquired from rodents, and an estimated 28 people died while 47 survived infection (20).

**BRUCELLOSIS**

Brucellosis is a major zoonotic problem in the region, of economic significance to animal production and also important to human health. Serological surveys conducted over the past few decades have disclosed that the disease is prevalent in livestock farms and in the rural cattle population. The Indian Veterinary Research Institute (IVRI) is officially designated as the FAO/WHO Brucellosis Centre for countries in South-East Asia.

In Afghanistan, infections of *Brucella abortus* in buffaloes and cattle, *B. ovis* in sheep and *B. melitensis* in goats pose major problems for public health and the economy.

In Bangladesh, bovine brucellosis has been detected serologically, but there is no epidemiological surveillance system, and no national vaccination programme is envisaged.

In India, it has been estimated that about 3 million of the 75 million cows and buffaloes of breeding age in the country may have brucellosis, and 20% of the infected animals, or 600,000 animals in all, may be rendered sterile as a result of brucellosis. At 150 rupees per animal, the total loss is estimated to be about 90 million rupees. Reduction in the milk yield of infected animals could amount to at least 25%. This loss may be estimated as an additional 100 million rupees a year. Thus a conservative estimate of the annual economic loss due to brucellosis in cattle and buffaloes in India is 190 million rupees, or more than 0.5% of the total annual value of all meat and milk products produced in India.

About 75% of the approximately 500 million inhabitants of India live in villages. Here, the level of contact between humans and animals is high, and this rural population has a greater exposure than other population groups to zoonotic infections like brucellosis.

In Indonesia, brucellosis has become increasingly important for public health and the animal economy in the past ten years. The disease has been reported in most provinces except Bali, Makuku and Central Kalimantan. A five-year programme (1988-1992) aims to eradicate the disease from the country.

In Mongolia, brucellosis is recognised as a disease of the greatest public health importance. A national animal brucellosis control programme is in operation. Vaccination against brucellosis is performed mostly on dairy and beef herds, including yaks. The brucella vaccine production programme is effective, and there is a well-equipped diagnostic laboratory in the veterinary faculty. This is a very successful programme.

In Myanmar, since 1985, a survey has been conducted on randomly selected animals. Between 4 and 34% of cattle, up to 8% of buffaloes and 7% to 8% of pigs were seropositive to *B. abortus* Weybridge antigen. There is no vaccination programme and control is confined to removal of the reactors from herds.
Brucellosis is prevalent in Nepal among cattle, buffaloes, yaks, sheep and goats. A serological survey conducted on government farms showed that 10.1% of cattle, 10.8% of buffaloes, 35.3% of sheep, 7.3% of goats, 27.7% of yaks and 1.6% of humans were positive to brucella antigen supplied by IVRI. A health system research study should be carried out for brucellosis and control programmes should be planned (23).

*B. abortus* infection in buffaloes and cattle, *B. ovis* in sheep and *B. melitensis* in goats are major public health as well as economic problems in Pakistan.

*B. suis* infection in pigs is a problem in Singapore.

**ECHINOCOCCOSIS**

Echinococcosis is a public health and economic problem in the region, being widespread in buffaloes, cattle, sheep, goats and pigs in Bangladesh, Bhutan, India, Nepal, Sri Lanka and Thailand. There have been few comprehensive epidemiological studies on the disease in animals, and human surgical cases are rarely reported officially.

In Nepal, a preliminary survey of echinococcosis conducted in 1984 revealed a human prevalence rate of 0.28%. In animals, buffalo (18.6%), sheep and goats (5.95%) and pigs (15.5%) were affected (18).

Echinococcosis in cattle, buffalo, sheep, goats and pigs is quite prevalent in Afghanistan, Cambodia, Laos and Pakistan. Operated hydatid cases in humans are also reported from these countries.

Cysticercosis (*Cysticercus. bovis* and *C. cellulosae*) in cattle is a problem in Cambodia, India, Laos, Nepal, Sri Lanka, Thailand and Vietnam.

**LEPTOSPIROSIS**

A workshop on the surveillance and control of leptospirosis was held in India in May 1989. However, no specific work has been carried out on this disease in the countries of the region.

**ANTHRAX**

Anthrax in cattle, sheep, goats, pigs and horses is a problem in Afghanistan, Cambodia, Laos, Pakistan and Vietnam.

**FOOD-BORNE DISEASES**

Although countries in the region have realised the need to develop an integrated food safety programme, activities have been limited because of the lack of resources and poor coordination between implementing agencies and departments.
Most food safety programmes in countries of the region still concentrate on centralised activities, such as the establishment of regional or provincial laboratories and the provision of central services. Food legislation has been mainly directed at urban areas.

Careful planning and implementation of an integrated food safety programme with a multi-disciplinary team approach continued to be the main objectives of WHO efforts in this field. It must be realised that such a programme should cover all aspects of public health, and must be focused more at the rural and peripheral areas, where most of the population lives. Health education and community participation must play a major role in this approach.

The major food-borne diseases of public health importance are:
- Salmonellosis
- Campylobacteriosis
- Staphylococcosis
- Clostridium perfringens infection
- C. botulinum intoxication.

To control food-borne infections, it is necessary to pay attention to food hygiene, meat hygiene and the hygiene of processed foods (25).

CONCLUSIONS

In most WHO member countries of the region the veterinary services are at an early, but crucial stage of development. The success of animal health and VPH programmes depends to a great extent on:
- the quality and effectiveness of the national veterinary services;
- the competence of senior staff in the planning, organisation, management and economics of veterinary services and special projects;
- the application of progressive methods for effective decision-making;
- the establishment of a strong VPH unit in SEARO, WPRO and EMRO to aid further coordination, the development and publication of guiding principles on the planning, organisation and management of VPH programmes and projects, and the dissemination of these principles to all directors of VPH services, and to veterinary and medical schools in the WHO member countries in the region (41).

Only during this century has veterinary medicine been able to successfully control infectious diseases and combat the world-wide hunger connected with them. All countries of the region should develop realistic programmes aimed at:
- the control and eradication of serious zoonoses;
- increasing animal production and the supply of foodstuffs, particularly through the investigation and control of zoonotic and food-borne diseases and the protection of environmental health.
Both types of programme deal with improvement of the general health of the human population and an increased supply of animal protein for human nutrition.

The major constraint to the development of a zoonoses programme in the region is the lack of intersectoral collaboration. There is also a need to develop a primary health care approach for the successful implementation of this programme. Most countries need better diagnostic facilities (42).

When selecting appropriate measures for the surveillance, prevention and control of zoonotic disease, planners should identify the need for health systems research to generate new technologies. Health systems research should be used to arrive at the best ways of organising the infrastructures and resources for institutions dealing with VPH, animal health, human health and allied fields (4).

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ORGANISATION DE LA SANTÉ PUBLIQUE VÉTÉRINAIRE EN ASIE MÉRIDIONALE. – D.D. Joshi.

Résumé: En Asie méridionale, une grande partie de la population vit au contact permanent de nombreux animaux et de leurs déjections.

Les Bureaux régionaux de l’Organisation Mondiale de la Santé (OMS) pour l’Asie du Sud-Est (New Delhi, Inde), le Pacifique occidental (Manille, Philippines) ou la Méditerranée orientale (Alexandrie, Égypte) ne disposent pas de Services de santé publique vétérinaire. Ces bureaux apportent néanmoins leur aide aux actions des pays membres de la région en matière de lutte contre les zoonoses et les intoxications alimentaires.

La protection de la santé des éleveurs et de leur famille (appelée aussi «santé rurale») a pris une plus grande importance dans les pays membres de la région.

Dans la plupart des pays, il n’existe pas de Service de santé publique vétérinaire fonctionnant en tant qu’entité nationale dépendant des ministères de la Santé et de l’Agriculture.

Les zoonoses dont la prévalence est la plus forte dans les pays membres sont la rage, la brucellose, l’encéphalite japonaise, l’échinococcose, la tuberculose, la leishmaniose viscérale, la taeniasis, les salmonelloses, la campylobactériose et la leptospirose. Il est nécessaire que chaque pays établisse un plan national, fondé sur la recherche de systèmes de santé et sur les soins de santé primaires, afin d’accorder la priorité au contrôle de ces maladies; ces plans devraient s’appuyer sur une coopération intersectorielle et régionale, au travers de
l'Association pour la Coopération Régionale en Asie Méridionale (SAARC) et dans le cadre de la Coopération Technique entre Pays en Développement (TCDC).

Il devrait exister un Service de santé publique vétérinaire bien structuré dans chaque Bureau régional de l'OMS, afin de coordonner la surveillance des zoonoses et les programmes de formation et de contrôle dans les pays de la région.


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ORGANIZACIÓN DE LA SALUD PÚBLICA VETERINARIA EN ASIA MERIDIONAL. - D.D. Joshi.

Resumen: En Asia meridional, gran parte de la población vive en contacto permanente y estrecho con numerosos animales y sus deyecciones.

Las Oficinas regionales de la Organización Mundial de la Salud (OMS) para Asia del Sureste (Nueva Delhi, India), el Pacífico occidental (Manilla, Filipinas) y el Mediterráneo oriental (Alejandría, Egipto) no disponen de Unidades de salud pública veterinaria. Sin embargo, estas Oficinas brindan su apoyo a las actividades de los países miembros de la región relativas a la lucha contra las zoonosis y las toxoinfecciones alimentarias.

La protección de la salud de los campesinos y de su familia (llamada también «salud rural») ha tomado mayor importancia en los países miembros de la región.

En la mayoría de los países, no existen unidades de salud pública veterinaria que funcionen como organismos nacionales dependientes de ambos ministerios de salud y de agricultura.

Las zoonosis cuya prevalencia es más alta en los países miembros son en particular la rabia, la brucelosis, la encefalitis japonesa, la equinococosis, la tuberculosis, la leishmaniasis visceral, la teniasis, las salmonelosis, la campilobacteriosis y la leptospirosis. Es necesario que cada país dé la prioridad al control de dichas enfermedades mediante un plan nacional basado en la investigación de sistemas de salud o en la atención primaria de salud, con la cooperación intersectorial y regional a través de la Asociación para la Cooperación Regional en Asia Meridional (SAARC) en el ámbito de la Cooperación Técnica entre Países en Desarrollo (TCDC).

Cada Oficina regional de la OMS debería comprender una importante Unidad de salud pública veterinaria que coordine la vigilancia de las zoonosis y los programas de adiestramiento y de control en los países de esta región.

PALABRAS CLAVE: Asia meridional - Cooperación regional - Cooperación técnica - Kala-azar - Peste bubónica - Picaduras de serpientes - Salud pública - Servicios veterinarios - Toxiinfecciones alimentarias - Zoonosis.

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