

WORLD HEALTH ORGANIZATION ORGANISATION MONDIALE DE LA SANTE

MEDITERRANEAN ZOOSES CONTROL CENTRE
CENTRE MEDITERRANEEN DE LUTTE CONTRE LES ZOOSES

Z O O N O S E S

**SURVEILLANCE AND CONTROL
IN THE MEDITERRANEAN AND MIDDLE EAST REGION**

**Report of a WHO/MZCP Workshop
Cephalonia, Greece, 30-31 March 1998**

Athens, 1998

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REPORT of
**THE MZCP/WORKSHOP ON ZONOSSES SURVEILLANCE AND
CONTROL IN THE MEDITERRANEAN REGION**
Cephalonia Island, Greece 30-31 March 1998

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1. INTRODUCTION

Zoonotic and foodborne diseases are known to be among the major public health problems, worldwide. They cause considerable morbidity resulting in an overall deterioration of human health and productivity. Moreover, certain groups of the populations, e.g. farmers, shepherds, abattoir workers, veterinarians, laboratory staff etc., are at particular risk of contacting zoonoses either because of occupation or because of constant proximity with infected animals, animal products and wastes.

Zoonoses can be a significant deterrent of the socio-economic development of the countries where they are endemic. Besides the human suffering caused by them, they have a serious impact on the national economic development because of the important losses in animal production (meat, milk, wool etc.).

The countries of the Mediterranean Region (MR), are not an exception in this situation. Moreover, they share the additional characteristic that more or less are facing problems created by almost the same zoonoses, i.e. brucellosis, echinococcosis, rabies, leishmaniasis etc.

Following some years of work in specific zoonoses such as brucellosis, echinococcosis, salmonellosis, leishmaniasis etc., it was considered appropriate and timely, that the Mediterranean Zoonoses Control Programme of the World Health Organization should dedicate a special meeting on the common aspects of prevention, surveillance and control of major zoonoses in the MR and beyond.

The focal target of this meeting was to strengthen the collaboration among the MZCP countries in their efforts to control zoonoses and foodborne diseases. This target could only be achieved through information and expertise exchange, as well as through recommendations resulted from thorough discussions between MR countries representatives and experts.

This report summarises the topics discussed, the information collected on the epidemiological situation of the participating countries on major zoonoses as well as the conclusions and recommendations issued at the end of the Workshop.

The technical contribution of the WHO/Collaborating Centre on the Research and Training in Veterinarian Epidemiology and Management, Istituto Zooprofilattico Sperimentale, Teramo, Italy, is acknowledged with appreciation,. Moreover, the organisational assistance and contribution of the Prefecture of Cephalonia as well as of the WHO/Collaborating Centre on Research and Training in Mediterranean Zoonoses, University of Crete, Heraklion, are deeply acknowledged.

1.1 Opening Session

In the opening session Dr A. Seimenis, Director of the WHO/Mediterranean Zoonoses Control Centre welcomed the participants on behalf of the Director-General of WHO, Dr Nakajima and he conveyed the greetings of Dr F. -X. Meslin, Secretary of the Joint Coordinating Committee of the MZCP for a successful meeting.

Dr Seimenis recalled the purposes and objectives of the Workshop which were as follows:

1. To assess the epidemiological situation on major zoonoses in the Mediterranean region.
2. To discuss the structure of national surveillance and information systems on major zoonoses.
3. To discuss the strategies for the control of major zoonoses.
4. To emphasise the contribution of laboratories in prevention and control zoonoses.
5. To stress the importance of intersectoral cooperation and public health education for the prevention and control of major zoonoses.
6. To recommend actions/strategies for strengthening of the surveillance and control of major zoonoses at national and sub-regional levels.

Prof Y. Tselentis, Director of the WHO/Collaborating Centre on Research and Training in Mediterranean Zoonoses, Greece, was elected Chairman while Dr Jabbour, Ministry of Health, Lebanon was elected Rapporteur.

2. GENERAL EPIDEMIOLOGICAL ASPECTS OF MAJOR ZOOZOSES IN THE MEDITERRANEAN REGION.

All the areas of the world (perhaps with the exception of Antarctic) are affected by zoonoses. In some of them, individual zoonoses (e.g. Chagas diseases in Latin America) have a strong social impact. The Mediterranean, however, seems to be the area where zoonoses are most numerous (with regard to their variety) and widespread. The reason for such a concentration are found in the geographical, historical and social characteristics which account for the existence of two factors indicated as responsible for this peculiarity of the Mediterranean, i.e. bio-diversity and the close coexistence between man and animals.

Bio-diversity is the availability, within comparatively restricted spaces, of different animal species and breeds, of human beings with different living habits and genetic characteristics, of vectors of different species, as well as of parasites.

Due to the close coexistence between man and animals, the infective agents which have their natural hosts in animals, find man available and infect him, although in the majority of cases man is a dead-end host.

An important factor is overcrowding, which should not be considered in terms of persons or animals per square kilometre, but also in terms of cohabitation, proximity and possible meeting of infective agents, so that the niche of animals crossed (like a "joint") those of man and of zoonotic agents.

Man-animal coexistence was and is true cohabitation. Often, occupational, familiar and nutritional exposures to pathogens coincide.

Practically, a series of infections which have their habitual hosts in animals (e.g. brucellosis, rabies leishmaniasis, Q-fever) have found in the Mediterranean conditions suitable for their becoming endemic; the proximity of such animals with people enables humans to acquire infections which are prevailing of the dead-end type.

The situation of the Mediterranean region (MR) is changing, developing modifications, which may influence zoonoses in many areas. These modifications may be as following:

- intensive urbanisation and peri-urbanisation
- intensive rearing of different species of domestic animals and fish
- the decrease in family farming
- increasing number of pets and recreational animals
- the reduction of natural zones and contemporaneously, the establishment of protected parks
- the remarkable increase in tourism (domestic and foreign),
- the introduction of guest workers
- the increasingly active trade exchanges
- the enforcement of EU regulations regarding husbandry, abattoirs, animal well being and control of animal diseases.

Also human susceptibility is changing: if, on the one hand, we have less occupational and familiar contacts with farm animals, on the other hand, there is an increase in the susceptibility of urbanised populations; finally, the problem arises of immuno-depressed persons who are especially exposed also to zoonotic agents.

The density and proximity of people and animals which characterise the Mediterranean are such that the predominance of zoonoses is not likely to disappear in the near future. However, the present conspicuous changes seem to anticipate a reduction or even elimination in some of them, either because of replacement of obsolete technologies, the changes of living standards, farming intensification or following the implementation of prevention, surveillance and control programmes. On the other hand, an increase may be seen to those zoonoses, which are linked to the change susceptibility as previously referred, of man and animals, to recent technologies and new living habits.

Table 1 presents a list of the main zoonoses in the MR divided into groups according to their characteristics. Three main features are to be considered :

- a) the high number of zoonoses which may complete their life cycles in the area;
- b) the diversity, related to agents, hosts and ways of transmission;
- c) the fact that many zoonoses have found in the Mediterranean conditions suitable to establish an endemic cycle.

An analysis of Table 1 shows that in the Mediterranean there are different endemic zoonoses (of course, the list is not complete) and that some of these, of great importance, have found especially favourable conditions in this region, at least originally.

TABLE 1

ZOONOSES IN THE MEDITERRANEAN	
<p><i>Cosmopolitan behaviour:</i></p> <ul style="list-style-type: none"> • Anthrax • Boutonneuse fever • Brucellosis (<i>Brucella abortus</i>) • Cryptococcosis • Cryptosporidiosis • Fasciolosis • Leptospirosis • Murine typhus • Salmonellosis • Toxoplasmosis • Trichinellosis (<i>Trichinella spiralis</i>) • Tularemia • Zoonotic tuberculosis <p><i>Especially associated with urban cycles:</i></p> <ul style="list-style-type: none"> • Dermatococcosis (<i>Mycrosporium canis</i>) • Visceral and cutaneous larva migrans <p><i>Associated with cycles similar to those existing in other parts of the world:</i></p> <ul style="list-style-type: none"> • Boutonneuse fever • Cryptococcosis • Fasciolosis • Leptospirosis • Murine typhus • Tularemia 	<p><i>Associated with technological processes:</i></p> <ul style="list-style-type: none"> • Dermatococcosis (<i>Trychophyton verrucosum</i>) • Listeriosis • Salmonellosis • Yersiniosis <p><i>Derived from original foci:</i></p> <ul style="list-style-type: none"> • Rift Valley fever (over the last few years, myiasis by <i>Cochliomyia hominivorax</i> has been imported into Libya but rapidly eradicated) <p><i>Typically Mediterranean:</i></p> <ul style="list-style-type: none"> • Brucellosis (<i>Brucella melitensis</i>) • Echinococcosis/hydatidosis • Trichinellosis (<i>Trichinella britovi</i>) • Zoonotic cutaneous leishmaniasis • Zoonotic visceral leishmaniasis <p><i>Not exclusive, but with Mediterranean characteristics:</i></p> <ul style="list-style-type: none"> • Dirofilariosis (<i>Dirofilaria repens</i>) • Q fever • Rabies (urban type) • Taeniasis/cysticercosis <p><i>Exported to colonised countries:</i></p> <ul style="list-style-type: none"> • Brucellosis • Coenurosis • Echinococcosis/hydatidosis • Taeniasis/cysticercosis

Table 2 comprises a scheme of the characteristics of the Mediterranean which may favour zoonoses. The geographic situation makes this area a suitable place for the meeting of human and animal populations (and infections) where they find favourable conditions; the most remarkable among others being :

- the high density of closely interdependent persons and animals which have created a suitable environment;
- the type of farming, food and living habits
- the frequency of trade exchanges over short, medium and long distances
- the presence of stray dogs.

All these elements, usually associated, maintain the presence of zoonoses.

TABLE 2

RISK FACTORS IN THE MEDITERRANEAN AREA
<ul style="list-style-type: none">• Geographical collocation• History• Climate• Migration of persons and animals• Density of: human populations, domestic animals, synanthropic animals, wild animals• Types of farming• Presence and type of sheep and goat farming• Pig rearing of the family type• Presence of stray dogs• Slaughtering habits• Food habits• Living habits• Trade

3. EMERGING AND RE-EMERGING ZOOSES IN THE MEDITERRANEAN REGION

In the recent past, in both developing and developed countries, a number of zoonoses have emerged, either as new pathological entities or as already known agents appearing in areas or species where they had not been previously reported. They could be grouped into four main categories.

1. Pathogens that were previously known but occurring in places or in animals where the disease was previously unknown.
2. Diseases that occur as epidemics in places where only rare or sporadic cases were imported before.
3. Diseases caused by new agents.
4. New animal diseases which are not proved to be zoonoses but may have implications for human health.

There are several reasons for this phenomenon in the countries of the MR. The reasons, for the emergence and re-emergence of zoonoses could be listed as following:

1. Increasing human and animal reservoir populations in urban areas. One example is the incidence of visceral leishmaniasis in different cities of the region due to the large population of stray dogs.
2. Encroachment of humans to natural foci of zoonotic diseases. One such example is Lyme disease.

3. Modified production methods for animal feed. Examples of this are salmonellosis, *E. coli* H:0157, and bovine spongiform encephalopathy.
4. Movement of wild reservoir hosts to rural and urban areas in search of food sources. Example, endemic typhus.
5. Increasing numbers of homeless people in urban areas. Example is trench fever.
6. Selection and spread of resistant strains to humans from animals that are fed antibiotics as a growth ingredient.

Source of the transmissible pathogenic agents, new or newly identified, isolated either in developed or developing countries, have been already expanded or might be expanded in particular situations in a high number of territories and countries, particularly due to the increased movement of people as well as the exchange of live animals and products. This expanding attitude would be farther increased depending on the easiness for transmission from their animal reservoir and/or from person-to-person or if these pathogenic agents are largely distributed in food of animal origin, water or drugs.

With regard to the latter aforementioned observations it was noted that new species of micro-organisms like *Salmonella enteritidis* and *Escherichia coli* H:157 were, and still are, the cause of food intoxications originating from developing countries to all continents. The agent of bovine spongiform encephalopathy, whatever its zoonotic character remains to be proved, represents a potentially threat going beyond European countries where the disease in bovines seems to be localised, to be expanded to some countries having imported bovines or products of bovine origin.

Rickettsioses, erlichioses, bartonellosis and Lyme borreliosis, are all infections of particular interest for the MR. During the last 10-15 years new species have been discovered to be pathogenic for humans and their epidemiological importance as human pathologies is under re-evaluation.

On the other hand, it is well known that major changes introduced into the environment may create conditions favourable to the emergence of vector-borne diseases in animals and humans, especially when the modifications are related to water resources management (e.g. building of irrigation systems, dams, etc.). Newly-available technologies (remote sensing/satellite imagery) have proved useful in predicting the risk of emergence of Rift Valley fever in eastern Africa. The technique is very promising and can be applied to many arboviruses on the African continent.

In certain circumstances, as shown by the description of outbreaks of cutaneous leishmaniasis, man may involuntarily create the best possible conditions for the explosion of the disease. Sometimes a new but fragile equilibrium can be established between newly-introduced human activities in the animal production field and increase population of vectors of the disease. As suggested in some outbreaks of vampire bat bites and rabies in Peru, it was when pig farms disappeared that the incidence of vampire bat bites and rabies cases in humans increased.

As such problems are likely to continue to appear, animal diseases and zoonoses surveillance will need to be reinforced and maintained at country and international levels.

At the country level, even more important than good laboratory support, is a surveillance system based on field staff properly trained in epidemiological techniques for

outbreak investigation. In order to facilitate the rapid flow of information at the global level, national surveillance systems must be linked to international scientific institutions and organizations by modern means of communication.

Zoonoses; surveillance systems are, still dangerously deficient in many places in the world, so that an emerging zoonotic problem may be undetected for a while until it has reached such magnitude that control requires huge efforts.

Systematic joint entomological, zoological and virological studies prior to the onset of projects related to water resources management in tropical countries would certainly allow for an evaluation of the risks of emergence of these diseases and the design of contingency plans for the control of the potential hazards. Along the same principles, special attention should be paid to potential zoonoses whenever human settlements are established in previously uninhabited areas. The role of veterinarians in assessing potential hazard and related risks, and in detecting and controlling outbreaks is crucial.

4. CONTROL OF MAJOR ZOOSES: DEFINITION OF PRIORITIES; METHODOLOGY; ANALYSIS OF RESOURCES AVAILABLE; EVALUATION OF THE RESULTS

Zoonotic diseases are important public health problems worldwide including most of the Mediterranean and Middle Eastern countries. They cause deaths, considerable morbidity and deterioration of human health with loss of income of the affected people.

They are also very detrimental for animal health where, apart from mortality, they are responsible for great economic losses due to reduced production of meat, milk, wool etc. There is no doubt that prevention and control of zoonoses contributes to primary health care, including the production of safe food, proper nutrition, safe water supply (prevention of pollution by animals) and basic sanitation.

The many factors involved in the prevention and control of zoonoses and foodborne diseases require the participation not only of the medical and the veterinary profession but also of those who deal with environmental health, food technology, trade and education. The lack of inter-professional co-operation can lead to stagnation of control efforts, despite the availability of technical knowledge, financial resources or even good will of competent authorities. International technical co-operation is also essential for the training of personnel, provision of technical expertise and transfer of technology necessary for national control programmes.

Presently, there are more than 166 recognized zoonoses - Viral (41); Bacterial (57); Fungal (2); Parasitic (65); and not specified (1).

The very young, the very old and the immuno-suppressed persons are recognized to be at greater risk of acquiring zoonotic infections because of reduced immuno-competency.

Unfortunately, the true public health significance of zoonoses is unknown or rather unclear in many countries because of lack of appropriate national programmes of surveillance and in particular of diagnostic laboratories, which could provide consistently accurate test results.

4.1 Priorities

To establish priorities for the control of zoonoses, the complexity of the socio-economic factors and epidemiological conditions involved in a country or region should be considered. The decisions to be taken depend not only on the resources available and the results of feasibility studies previously undertaken, but also on political commitment and social pressures.

The evaluation of the public health importance of any communicable disease is difficult and the existing assessing methodology is far to be perfect.

Usually, in order to establish priorities among zoonotic diseases for their control, studies were almost entirely relied on economic criteria. This involves estimation of the cost for the treatment of the disease, the wages, productive losses, evaluation of temporary or permanent disability etc.

4.2 Economic Importance of Zoonoses in Livestock

Animal diseases apart from the mortality they cause, which in some cases is extremely high, usually lower the efficiency of affected animals for the production of meat, milk and wool. Several zoonotic infections affect reproduction causing infertility, abortions and stillbirths. Also they reduce the resistance of the affected animals making them susceptible to other infections.

The presence of some zoonoses in a country, e.g. brucellosis and tuberculosis may also affect exports because of the import restrictions imposed by many developed countries.

The importance of these losses depend to a great extend on the disease and the characteristics of farming or livestock industry. In poor countries there is also a very important social or personal value placed on livestock ownership. The social impact of a disease in these countries are too complex to evaluate.

Evaluation of the public health and economic importance of a zoonotic diseases is the first step towards establishing priorities. It is then necessary to examine alternative programmes, their expected effect and cost, and the benefits that should result. Comparison of the costs of various programmes with the benefits that should ensue by means of cost/benefit analysis should farther aid decision-making on priorities. Once the decision has been made concerning the level of resources available for control and the particular objective that should be pursued, cost/effectiveness analysis can be used as an aid to decide the most effective use of the available resources. It may be necessary to assess the cost of the available options separately so that decisions can be made on the strategy that combines economy and effectiveness.

One approach to assessing the economic aspects of disease control has been to compare the costs incurred with the benefits gained. A worthwhile control programme is when the benefits exceed the costs, i.e. the rate of return is at least comparable with the use of the control resources elsewhere.

Dealing with optimistic choices, the criteria should be whether different control programmes may yield a better rate of return.

4.3 Epidemiological surveillance

Among the mechanisms to be installed for controlling/ and/or monitoring a disease, communicable or not, epidemiological surveillance is among the basic tools. It refers to activities specially planned to detect such diseases, measures its extend, identify interventions needed and evaluate established control programmes. It should be adequately planned, including passive or active (or both) activities for data collection, evaluation and distribution.

The principal purposes for the establishment of zoonoses surveillance could be the following:

- a) The early detection of outbreaks for immediate treatment of affected humans or animals or destruction of contaminated food and environmental disinfection
- b) The detection of health or asymptomatic carriers
- c) The detection of infection in potential host population
 - Definition of Intermediate Hosts for Parasitic Diseases
 - Evaluation of the role of wildlife
- d) The determination of the risk of exposure by estimating the period of infectivity and the shedding rate of the infective agent. This is of importance when the zoonotic agent is spread by direct transmission.
- e) The determination of the potential role of vectors in arthropod borne Zoonoses.
- f) To permit analysis for the selection of control strategies.
- g) For the prediction of epidemics, their effects and the cost for their control.

4.4 Choice of strategies for zoonoses control

For the control of a zoonotic disease the following alternative strategies may be chosen according to the available resources, operational facilities and the local constraints of social and economic nature in an area or a country.

Eradication is elimination of the infective agent from a defined population or geographic area. Eradication may be total or partial. Total eradication is usually difficult and very expensive. Partial eradication has also its limitations. A good example is the lack of effective methods for eradicating infections from wildlife reservoirs which consist of multiple species, e.g. rabies.

Prevention is the inhibition of the introduction of the infective agent into an area, or a population.

Control is the reduction of a zoonotic disease to a tolerable level and the maintenance of its incidence on that level.

Such pilot programmes are very useful for the decision to extend the programme in other regions of a country with similar epidemiological characteristics.

Partial control is useful when testing the efficiency of a programme in a small area

Coexistence with the disease is the option taken where the disease is not presenting a serious public health problem and where there is no available financial support.

Health education is the most effective disease prevention and control policy. The responsibility for educating the public belongs to all medical and veterinary professionals. In some countries facing serious financial and other constraints, health education of the public have been selected as the only option for protection against infections.

4.5 Measure for the Control of Zoonoses

The basic principles of zoonoses control and prevention programmes are focused on breaking the chain of transmission at its epidemiological weakest link i.e. the reservoir, the transmission from the reservoir to the susceptible host or the host. In general, when infection in the reservoir is reduced or eradicated, the other sources of infection become progressively less important or disappear. Therefore for the control of zoonoses the following measures could be adopted:

- ◆ **removal of infected individuals**, e.g. test-and-slaughter policy for brucellosis, tuberculosis, salmonellosis in poultry etc.
- ◆ **treatment of infected individuals - mass therapy**, e.g. treatment of dogs for echinococcosis. It is implemented where the diagnostic facilities are minimal, the cost for testing is high and the disease is endemic.
- ◆ **environmental manipulation**, e.g. adequate toilet facilities in order to prevent the spread of *T. saginata* and *T. solium* from humans to cattle and pigs. Reservoir neutralisation to break the transmission by reducing the survival of the infecting agent in vectors, e.g. pasture rotation to interrupt the ticks life cycle and of internal parasites by the death of larvae from starvation.
- ◆ **control of vectors**, e.g. protection of dogs from sandflies which transmit leishmaniasis. Insecticides application to animals by spraying, dusting, dipping or by collars. Harmful residues left in meat and milk should always be taken into consideration when using insecticides in productive animals.
- ◆ **vehicle manipulation**, e.g. pasteurisation of milk, irradiation of foods, water chlorinating.
- ◆ **limitation of contact with infection** e.g. isolation, quarantine, animal population control (stray dog control, wildlife control, rodents population control).
- ◆ **safe disposal of carcasses and waste**, e.g. for the control of anthrax, *Clostridium botulinum*, etc., carcasses are incinerated, or in case of use for animal feed, heat treated in a sufficient temperature in order to destroy the pathogens and render them safe for consumption. Carcasses can also be disposed by deep burial far from sources of drinking water.
- ◆ **increased host resistance**, e.g. immunization
- ◆ **individual animal identification**, e.g. brucellosis and tuberculosis eradication programmes
- ◆ **Implementation of hazard analysis critical control point programmes (HACCP)**,

e.g. identification and elimination of hazards from the harvest to the consumption of food. The only way to succeed in producing safe food is to maintain under control the raw materials, the environment and the handlers (see details in point 7.7 in Doc. MZCP/MILK/98.1)

- ◆ **communication** (i.e. all available information should be distributed to personnel involved in the programme)
- ◆ **community involvement - public education**

The evaluation of any programme is vital to maintain the progress. If the methods used appear not to be cost-effective, careful consideration should be given to the application of more cost-effective measures.

The comparison of alternative measures, activities and methods will indicate whether changes should be made to avoid failure in the future.

5. SURVEILLANCE AND CONTROL OF LEISHMANIASIS. (Example of the epidemiological complexity of a zoonosis and the difficulties encountered for the effective surveillance and control)

Leishmaniasis is a re-emerging disease, especially in southern Europe. It occurs in more than 80 countries around the world, putting at risk hundreds of million of people and causing 400.000 to 600.000 clinical cases per year.

There are some thirty (30) species of the protozoan parasite of the genus *Leishmania* of which at least twenty one (21) infect man. It is transmitted by small blood suckling flies of the genus *Phlebotomus* in the Old World. Dogs, carnivores and rodents are reservoir hosts.

Leishmaniasis is a very complex disease with many clinical forms produced by an interaction of the parasite species and the immunological condition of the infected person. It can be asymptomatic, mild and self-healing severe and fatal or take intermediate forms between the extremes.

Surveillance and control of leishmaniasis go hand in hand. An effective control programme requires a well organized and executed surveillance programme.

A good surveillance programme should include the human host, the reservoir host and the vector(s). Passive and active detection and treatment of human cases is very important in the anthroponotic forms, (e.g., visceral leishmaniasis caused by *L. donovani* and cutaneous leishmaniasis caused by *L. tropica*). In the zoonotic-form, detection and treatment reduces morbidity and mortality but not transmission to humans since they are dead-end hosts for the parasite.

Control of leishmaniasis depends on the responsible behaviour on the part of human host. Since transmission of leishmaniasis occurs through the bites of infected sandflies, contact between man and flies should be avoided by all means. Such means are the use of repellents, wearing clothes that cover most of the body parts. Other protective means are the use of mosquito coils and vaporising liquids indoors, sleeping under bednets impregnated with permethrin outdoors and screening of doors and windows.

Surveillance of reservoir hosts is valuable only for dogs and possibly for the peri-domestic rodents and opossums. However such programmes are labour-intensive, expensive and need to be permanent.

Dog surveillance has some shortcomings:

1. serological tests, such as Indirect Immunofluorescence Antibody Test (IFAT) and Direct Agglutination Test (DAT), fail to detect all positive cases.
2. a number of *Leishmania* - positive dogs do not show signs of infection in the early stages. These dogs are infectious to sandflies and most owners refuse to euthanize them. They prefer to treat their dogs with antimonials at high cost even though it is ineffective for complete cure.

One way to interrupt the transmission of *L. infantum* from infected dogs to healthy dogs and humans is by the use of dog collars made of PVC plastic impregnated with the pyrethroid insecticide deltamethrin at 40 mg/g

Surveillance of phlebotomine sandflies can be achieved by regular trapping by a variety of methods which include light traps, castor oil coated traps, malaise traps and animal hosts.

Sandfly collection provides information on population density, species composition, sex ratio and physiological condition of flies.

Control of sandflies can have satisfactory results in domestic and peri-domestic environments.

Sandflies are susceptible to most currently available insecticides. However unlike mosquitoes, biting midges and black flies, whose breeding sites of the immature stages are known or visible, and can be targeted for control, the breeding sites of sandflies are largely unknown or inaccessible to treatment with insecticides. Therefore the only stage for chemical control is that of the flying or resting adult. Such control methods have succeeded, to significantly reduce the vector sandfly population from many countries. In the case of zoonotic cutaneous leishmaniasis, where vectors are distributed over wide areas and live in deep ground barrows, application of insecticides have been proven difficult, costly and of questionable effectiveness.

6. ZOONOSES SURVEILLANCE AND CONTROL IN THE MEDITERRANEAN REGION

Prevention and control of the major zoonoses may be based on the two main pathways:

1. prevention of transmission from animal reservoirs to humans.
2. control or eradication of the infection in the reservoir population.

Prevention may be achieved:

- Through specific actions directed to break the epidemiological chain, based on the route of transmission to man and the risk factors for humans. Examples of specific actions directed to break the epidemiological chain may be in:
brucellosis, pasteurisation of milk, ripening of cheese for 60 days.
tuberculosis, pasteurisation of milk.
echinococcosis, proper disposal of infected organs to prevent dog infection, the treatment of dogs and proper washing of vegetables.
anthrax, proper handling, washing, disinfecting or sterilising of wool, hair, skins, bones; ventilating of plants; and vaccinating of personnel at risk.
- Through health education of target categories (farmers, butchers, etc.).
- Through health education of the general population (schools, villages, etc.)

Control or eradication

A sequence of different strategies may be applied (vaccination or treatment, test-and-slaughter, eradication plans) depending on the frequency of the disease in the population and on social and economical conditions of the involved territory. For the management of such complex programmes with different phases and changes of strategies, the classical sequence of the management process has to be applied.

The main tool to manage the process, with particular respect to the phases of planning (broad and detailed planning, evaluation, revision and re-planning) is the presence of an effective information system. This means in the case of health systems, the presence of an effective surveillance system. In fact, epidemiological surveillance is the application of epidemiology to single out, plan, manage and evaluate the important services for the health status of a population (i.e. prevention, control and treatment). Epidemiological surveillance, in its modern sense is not simply a passive disease reporting system. It is not even a comprehensive disease monitoring system with simple objectives of ascertaining the existence, spatial and temporal distributions and frequencies of diseases. While it does accomplish those research objectives, the principal purposes of a surveillance system are:

- determination of needs for immediate or longer range actions, in response to diseases and through data analysis,
- determination of priorities for such longer range actions,
- design for alternative actions, and
- determination of their likely costs and benefits.

Data collection for a surveillance system may be based on the whole population or on a sample basis.

Passive collection of data is performed on the whole population whether active collection of data has often a sample basis.

Sample surveys (i.e. active collection of data) may be performed :

- to evaluate the effectiveness of passive data collection systems, with particular

reference to :

- notification of infectious diseases
 - sensitivity of systems based on inspection techniques (clinical, anatomopathological)
 - data collected during prophylaxis campaigns
 - effectiveness of vaccination campaigns
- in pilot trials, to evaluate whether or not an emerging phenomenon deserves the implementation of a routine system of data collection
 - when data collection on the whole population is impossible or not economically worthy

Any surveillance system should have outputs. Such outputs are directed to:

1. DECISION MAKERS. In fact the outputs of the system allow the decision-making authorities to decide whether:

- a disease is of a major or minor prevalence,
- this prevalence is increasing or decreasing,
- it can be a priority health problem,
- it is an early warning of new events, or a detailed assessment of priority disease situation, activities performed and their progress.

2. PERIPHERAL COLLECTORS OF DATA. A major shortcoming in surveillance systems is that veterinarians, who are requested to perform extra work, quickly lose motivation since they see no obvious benefits. Continuous disease monitoring programmes in various parts of the world have failed for this reason.

3. GENERAL PUBLIC. For decision-making authorities the output is mainly composed by technical reports on health conditions and activities performed and their progress. These reports are aimed to give them the means necessary to decide the health policies.

For intermediate and central level technical authorities the output is in various forms:

- technical reports,
- early communications of new emergency events,
- periodical reports of the health status of animal populations (including both raw data and conclusions of the analysis of information).
- periodical reports of the activities performed (including both raw data and conclusions of the analysis of information).

For field operators, various possible forms exist:

- bulletins,
- newsletters,
- information on telecom line.

For the general public communication tools are various:

- interviews (TV, radio, newspapers, etc.),
- press release,
- brochures,
- Internet web pages, etc.

Communication using these different tools should be carefully prepared, taking into consideration the differences in the communication formats (e.g. use of images on TV *versus* radio or newspapers, interactivity of web pages, etc.).

7. THE CONTRIBUTION OF PUBLIC HEALTH AND VETERINARY LABORATORIES IN PREVENTION AND CONTROL OF MAJOR ZONOSSES

Traditionally, the main functions of laboratories include:

- laboratory testing (on samples of animals and animal products)
- vaccine and reagents production
- research for the development of diagnostic methods
- passive diagnosis of infectious diseases on samples delivered by field veterinarians
- mounting of specific research projects
- contribution in epidemiological surveillance

However the main purpose of the laboratory is to produce knowledge which is important for the veterinary services dealing with the prevention and control of zoonoses.

This knowledge is critical, but neither the laboratory alone (e.g. through specific research programmes or through the simple analysis of samples delivered by field veterinarians), nor the veterinary services alone are able to produce all the knowledge needed for the organization and management of a zoonoses prevention and control programme.

Data may be used to analyse the effectiveness of control programmes and the shortcomings in the activities involved. Moreover, it is the main tool used for continuous and systematic monitoring of food animals' health status.

Data collected at the laboratory may give information on:

- emerging/rare pathologies;
- biological and chemical risks for the consumers;
- proper execution of control/eradication programmes

Using data collected by the laboratory, a number of possible sources of bias have to be considered. For example:

- the sample examined at the laboratory is not representative of the population from which it originates, either because only animals/herds with health problems are sampled; or because the geographical location of the laboratory and the consequent ease or difficulty of access to its facilities.

- there is often lack of relevant epidemiological information (unknown origin of the animals, type of herd, of management practices, age of the animals, etc.)
- lack of a standardised set of analysis for each clinical or pathological syndrome observed.

Therefore, although the laboratory data may give useful information and even constitute an early warning system, a proper description of the quantitative aspects of the health problem can only derive from investigations carried out in the population from which samples should be taken for appropriate laboratory testing.

8. IMPORTANCE OF GEOGRAPHICAL INFORMATION SYSTEMS IN ZONOSSES EPIDEMIOLOGICAL SURVEILLANCE AND CONTROL.

Geographical information systems (GIS) can be defined as *automated information systems based on the methodology of geographical database management and query*.

Health and ill-health are affected by a variety of lifestyle and environmental factors. Therefore, both health and ill-health have a spatial dimension.

More than a century ago, epidemiologists and other medical scientists began to explore the potential of maps for understanding the spatial dynamics of a disease. Early mapping techniques were based in local distributions, particularly when studying infectious diseases.

Classic examples are the following events:

- a) The study of cholera in London - the classic epidemic disease of the XIXth century - in which the sources of infection were identified by using the distribution of residence, i.e., by using maps showing the geographical list of the distribution of cholera deaths in the Soho area of London in 1854. These maps demonstrated that the association between cholera deaths and contaminated water supplies, resulted in a striking geographical distribution.
- b) The study of endemic typhus in Alabama USA (1922-1926) in which the source of infection was identified by using the distributions of residence and workplace. It was noted that the cases were clustered in a factory and the factory canteen was eventually identified as the source of infection.

The above examples of mapping methodologies whatever their technical shortcomings, describe the use of spatial information in health research. In this context, geography has always played a role in health research. Medical geography embraces both the study of geographical variations in the provision of health care and the distribution of disease.

It is clear that the handling of spatial information can be defined as a methodology with strong links to geography, cartography and statistical science. It follows that this methodology has to be developed by specialists in the field of applications, which in this case are the epidemiologists.

The experience accumulated suggests that the application of GIS is definitely making significant contributions in facilitating the availability, integration and presentation of

information. A GIS can be defined as *a set of tools of collecting, storing, retrieving, analysing and displaying spatial data*. Its main tasks are the following:

- a) store, manage and integrate large amounts of spatially-referenced data, (locational and attributable data).
- b) enable spatial retrievals.
- c) provide methods of analysis which relate specifically to the geographical component of the data.
- d) display data on map forms of high quality.

Automated mapping is the most well known field of GIS in health research. Interesting patterns of spatial distribution of health and ill-health can often be revealed simply by mapping.

Once the characteristics of a mapped distribution of the disease are described, questions will be raised about the reasons for a particular geographical distribution. In this sense therefore, maps may provide an indication of those areas on the map in which further research may be useful.

Despite the extensive use of computerised mapping (CMP) techniques for country and county-level maps, there is only recent experience in using these techniques for small areas (villages, households, etc.). The following surveys could be reported as characteristic examples of the advantages offered by this modern technology in small-scale epidemiological investigations¹:

1. A human brucellosis epidemiological survey performed in some areas in continental central Greece and
2. An epidemiological investigation for some Rickettsioses, performed in Cyprus.

In the first study the CMP was used as key-element in order to verify that the population involved was representative of the whole in geographical and demographic terms. Using the time-space association, the origin of the disease could be identified as well as the time scaled development could be visualised. In the same way a time-space association of a risk factor (e.g. abortion) can be available and a possible correlation can be studied.

In the epidemiological survey in Cyprus, two villages were identified as high-risk regions and the followed analytical epidemiological study verified the risk factors and suggested that goats and sheep play an important role in the transmission of the Mediterranean Spotted Fever.

The rapid improvements in computer technology allows for more accurate and multiple interpretation of data into well designed and exact graphics. This type of mapping gives the opportunity for analytical epidemiological studies taking into consideration the dimension of space and time where events take place. Thus a dynamic study of the epidemiological event (e.g. epidemic) can be accomplished.

¹ Tselentis I., (1997), in press.

Scientists, worldwide, have used many different statistical methods for geographical spatial analysis concerning country/county-level computerised mapping. Some methods are simple and others are more complicated with different strengths in indicating the case clustering. It must be noted that the methodology described has as yet not been used in local distribution mapping (topographical map of a village). In the epidemiological studies where CMP was implemented, the administrative boundaries were used and for this reason many limitations occurred in the identification of clusters. The administrative boundaries are artificial and are not “recognized” by infective agents and epidemics.

Moreover, there is a potential risk to identify case clustering by chance or in the way boundary is defined. The CMP model referred was defined from the beginning to overcome these limitations. Using as background the information from villages or from the house-person units and as a tool the flexible sized squares, the analysis can include regions from different administrative boundaries.

In conclusion, GIS offers a new and practical methodology to define the spatial relationships between the health care system, disease distribution and the factors influencing the distributions.

If the analytical potential of GIS is properly exploited, allocation of options could be provided (e.g. decreasing the health budgets, reducing the number of staff etc.) and promotion of planning and monitoring of control of infectious and parasitic diseases can be obtained.

9. INTERSECTORAL COOPERATION: A BASIC ELEMENT FOR EFFECTIVE ZONOSSES CONTROL

Intersectoral cooperation (IC) for achieving health goals has been accepted as one of the guiding principles for a health strategy. Health is multi-dimensional therefore health policy and practice should be interdisciplinary and intersectoral. The Alma-Ata² declaration on primary health care (PHC) stressed that intersectoral approach is fundamental to universally accepted health policies and called for the coordination of health-related activities of the various sectors.

Conceived in these terms, the improvement of health requires more than the services delivered by the health services alone. The contributions of other sectors, in particular **agriculture, animal husbandry, food industry, education, housing, public works and communication**, was explicitly recognized as vital for improving the health and well-being of a population. Such a concerted action is particularly critical in developing countries with weak infrastructures and limited resources. They have to ensure the optimum utilisation of available resources and minimum duplication of efforts.

Therefore, IC has been defined as *the common action between health and other related social and economic sectors for the achievement of a common goal, while the contribution of the different sectors is closely coordinated.*

Despite the fact that the Alma-Ata declaration mentioned above recognized

² Former USSR, 1978 : Primary Health Care (PHC), Report of the International Conference on PHC, Who, Geneva, 1978

intersectoral cooperation as one of the pillars of worldwide health ideology, public health planning and animal health planning remained more or less self-contained exercises, within the health and veterinary sectors respectively. In fact, there is a wide gap between intentions and reality, declarations and practice in intersectoral cooperation.

Intersectoral involvement and cooperation, although universally recognized as essential factors for health development and promotion, in all respects, create different kinds of obstacles, sometimes becoming barriers, impeding the so needed process for their achievement. Due to this situation, in most countries the cooperation prevailing among sectors and even within a sector is at a very low level. Collisions occur between sectoral interests and administrative and financial constraints, while rigid bureaucratic, centralistic systems create further limitations to intersectoral actions.

Health professionals or veterinarians perform the activities in isolation from other development processes. This isolation is reinforced by the tendency of most sectors to perceive public health or animal health as comprising mainly of medical or veterinary services respectively. In this context, other development sectors tend to regard intersectoral collaboration for health as a diversion of time and resources from their own sectoral priorities.

9.1 Intersectoral Cooperation in Animal Health and Veterinary Public Health (VPH)

The concept of a multi-disciplinary approach to health has been widely advocated and strongly promoted for years. It is through this multi-disciplinary concept that the veterinary public health programmes were formally evolved as part of public health activities.

VPH has been defined as "*a component of public health activities devoted to the application of professional veterinary skills, knowledge and resources to the protection and improvement of human health*". The principles on which it is based are deeply rooted in the biological, physical and social sciences and are widely shared in agriculture, medicine and the environmental sciences. VPH involves veterinarians, animal health scientists and professionals, medical specialists, environmental and sanitary engineers, medical and veterinary assistants. It defines a broad set of activities, tasks and responsibilities in animal health, which directly relate to public health. It serves as a focal point to channel independent efforts and resources in the various sectors, institutions and disciplines involved in animal health and production towards the improvement of human health.

9.2 Process of Development of Intersectoral Cooperation

Processes involved in planning and implementation of intersectoral actions are complex. Each country, region or sub-region must develop its own strategy and approaches for intersectoral action. Existing administrative, economic and human conditions and situations, should always be taken into consideration.

The institutional and administrative structure of the country, the legal bounds of the authorities and the parameters of institutional relationships should be recognized by those involved in planning and implementing the concept of intersectoral collaboration.

The process for the development of the intersectoral cooperation will include the

following:

- elaboration and implementation of policies, rules and requirements aiming at effective collaboration in specific projects, including supervision of the project and sub-projects;
- improvement of communications throughout the bureaucratic structure;
- establishment an appropriate information system;
- identification of health and related problems requiring intersectoral action;
- identification of technical and financial resources;
- identification and allocation of specific responsibilities and activities for each of the co-operating sectors;
- location and provision of funds for each individual participating sector;
- plan and implementation of joint in-service training programmes for workers from various sectors;
- identifying contradictory and/or conflicting policies between different sectors and also other constraints resulting in hampering effective collaboration;
- establishing interministerial committees.

Traditionally, emphasis on zoonoses has been directed at programmes for their *prevention, control* and *elimination*.

Within these broad groupings, it is proposed that increased consideration be placed on intersectoral programmes in two integrated categories: *diagnosis* and *surveillance*. Attention to these two more specific programme areas will produce a greater success in preventing and controlling diseases.

9.2.1 Diagnosis

By their very definition, zoonotic diseases affect human and animal populations and thus any programme targeted at these diseases must involve both human (public health) and veterinary medicine for effective control and/or elimination. Thus, it becomes essential that veterinary and public health laboratories co-operate and communicate in all phases of zoonotic disease diagnosis. Diagnostic capabilities rely on adequately trained personnel in well-equipped laboratory facilities. Such laboratories are costly to develop, maintain and staff. Duplicity of such laboratories cannot be justified under the economic constraints present in most countries.

Assistance in most of the zoonoses diagnostic facilities, techniques, materials and equipment are the same or similar regardless of the species involved. When resources, both technical and economic, are limited, it is far more cost-effective to share laboratory facilities between health and veterinary sectors. It is possible that only through sharing of facilities can any laboratory assistance be justified in an area.

9.2.2 Surveillance

Epidemiological surveillance includes systematic collection, consolidation and evaluation of morbidity and mortality reports and other relevant data. Intrinsic in the

concept is the regular dissemination of the basic data and interpretation to all who have contributed and to all others who need to know. This common sense definition of surveillance was published more than three decades ago³. However, those who need to know, often are never officially informed of activities that are occurring in other units, divisions or ministries. Too often, each unit acts independently from all other in collecting, analysing and distributing surveillance data. Such activities create duplication of information, and at times, conflicting data. Similar problems exist with surveys and on-going monitoring programmes.

For effective zoonotic disease monitoring, surveillance and reporting, animal and human health services must be closely connected to develop the best possible information on populations at risk. Information on increased incidence and prevalence of a zoonotic disease in a human population or in an animal population usually denotes an increased risk to the other population. There is, thus, a need to share the information between ministries on public health and animal health. Additionally, this need extends to other Ministries or governmental agencies, which may be impacted by zoonotic diseases in a given geographical area.

By combining a national laboratory with an active intersectoral surveillance programme, and implementing these activities at all levels of zoonotic disease prevention and control within governmental services, a maximum efficiency with a minimal duplicity of activities should be obtained.

9.3 Problems in Intersectoral Collaboration between Public Health and Veterinary Services

Health and veterinary professionals, as well as most of the decision-makers, recognize that zoonotic disease control cannot be achieved without simultaneous actions of all sectors involved. Regrettably, this is the theory, because the practice in most of the countries is completely different. Experience has shown that many programmes in zoonoses control have failed because it was felt that a liaison office or a veterinary public health scheme alone, at the national level, would solve the problem. In the absence of a national programme (i.e. commitment to a comprehensive plan), such liaison offices often have a difficulty in functioning usefully. Similarly, the establishment of intersectoral committees including directors of services seldom lead to successful programme implementation because budgeting, staff supervision, and information exchange still remain strictly vertically oriented within the various sections, without making practice of the horizontal communication.

Animal and human health service committees or intersectoral zoonoses committees, may be able to prepare the technical background and plans for a national zoonoses control programme. However it should be made clear that, such a programme concerning one or more diseases, has to be approved by the ministries concerned. Then these ministries should eventually execute it jointly. This means that decisions are to be made at ministerial level, not only on the operational aspects, but also on the allocation and commitment of funds, staff and equipment. A concrete example could be brucellosis.

Both Health and Veterinary Departments should be involved in its control but often

³ Langmir A. (1963), New Eng. Med. J. 263, 182

the lack of cooperation between these sectors seriously impedes progress on control efforts. Health Departments focus their efforts on the clinical disease in man, often not taking into consideration that chronic, debilitating and unrecognised infection in people exert a great toll in physical misery and loss of work capacity. Likewise, they do not trace back to the source of human infection in order for the veterinary authorities to take appropriate measures.

In the agricultural sector, Animal Health departments concentrate on control of abortion in cows, but frequently ignore the importance of control efforts in infected sheep and goats, which are the most important reservoirs of human disease, because of their lower economic value. Furthermore, they do not inform the health authorities about the developments related to brucellosis in animals.

Another example refers to foodborne diseases. Cooperation for the control of these diseases at national level is also often hampered by the diversity of technical specialisation required. Thus, it is not surprising to see up to five ministries maintaining services, including laboratories, which deal with the control of a distinct zoonosis such as salmonellosis. Such services may be found under the Ministries of Agriculture, Health, Education, Trade and Environment Protection. There is no sign that this is going to change in the near future. Unfortunately, such multifocal services very often have no working contacts with each other related to food safety at national level because integrated systems are largely missing.

9.4 Importance of Close Collaboration between Health and Veterinary Services in Protection of Human Health

It is clear that there is no possibility for success of any zoonoses control programme if there is no horizontal communication, concerted actions and long-term coordinated activities.

Zoonoses control programmes which in their implementation overlook the importance of the multi-disciplinary approach in general and this between the human health and veterinary services and professions, are condemned to fail as only partial results can be obtained.

Health problems and their solutions often cannot be realized in the absence of effective cooperation between the human health and veterinary branches of government. Duplication of manpower, facilities, and administrative activities directed at zoonotic disease control that occur in the respective Ministries of Health and Agriculture in virtually every country could be minimised, or curtailed entirely, if active efforts were put forth by the members of the veterinary and public health communities.

Working together to solve major problems as well as in the every day practice is the only methodology, which could assure the maximum possible effectiveness. Where horizontal network among inter-related disciplines and sectors exists, duplication of efforts, useless increase of expenses, in appropriate use of the staff can be avoided.

10. PUBLIC HEALTH EDUCATION AND COMMUNITY INVOLVEMENT IN HEALTH DEVELOPMENT

Health education of the public has been recognized as potentially the most effective or among the most effective preventive devices. However, it was not until the beginning of this century that the governments included health education among Public Health actions. *Winslow*, one of the pioneers in this field, in his definition of "Public Health", mentioned health education "as one of the most important actions to promote and protect people's health". Among the Italian pioneers in this sector, Prof. Seppilli from the University of Perugia, defined health education as "a process aiming at making individuals and groups of citizens responsible for the safeguarding of their own and other people's health".

After some decades of experience it has been shown that health education of the public is quite a difficult and complex task. Moreover, it has been proven that programmes based on scientifically sound techniques frequently flounder and fail because of ignorance or lack of complete understanding on the part of the recipient public.

The need for health education are universal. Every stage of life, every type of person or social group, all occupations and professions are appropriate targets of programmes for the prevention of illness and disability, control of diseases, and the promotion of well being. Since the need is prevalent, health education must be provided in a wide variety of settings that ideally blanket a community, schools, organizations, governmental agencies, hospitals, educational institutions, communications media, unions, business and industry.

10.1 Health Education Goals

Health education must aim not only at specific measures, but also at improving the responsibility towards ones health and the community health. Therefore, the goals of health education are the prevention of diseases and the maintenance of health. The major objectives are to enable people to define their problems and needs; to understand what they can do for these problems with their own resources combined with outside support; to decide on the most appropriate related actions. These can be achieved through a deep knowledge of the social and environmental contexts, in which people work and live.

Health education leads to a set of activities such as:

- inform people about health, illness, disability and ways in which they can improve and protect their own health
- motivate the population to want to change their practices and habits to healthier ones
- help them to learn the necessary skills in order to adopt and maintain healthful practices and lifestyles
- encourage teaching and communication skills in all educators about health
- advocate changes in the environment which facilitate healthful conditions and healthful behaviour and
- add to knowledge through research and evaluation concerning the most effective ways of achieving these objectives.

10.2 Health Education Field of Action

The whole community is a field of action for health education. For example:

- Health education in school
- Health education in the work place.
- Health education in the community.

10.2.1 Health Education in School

The school represents the most important learning situation for a large and significant group of the population. What is learned, as a child, tends to have a deep and lasting influence throughout its life. A child is reached and influenced primarily through two channels: parents and teachers. This points to the importance of a carefully designed, comprehensive sequential programme of health education for all students aiming at the development of healthy life-styles and the acquisition of healthy habits.

It has to be remembered that many school-age children and young people in endemic areas do not attend school. Health education should therefore, extend beyond the school in order to reach educationally-deprived children.

Since parents serve as models for the establishment of good practices, they should be assisted in fulfilling their role.

10.2.2 Health Education in the Work Place (here the education of the Food Handler and Consumer in Food Hygiene has been chosen as an example)

The public as well as food workers need to be informed of the dangers of bad hygiene and to be motivated to avoid them. It is essential that good hygienic practice becomes a habit. It will never be possible to guarantee that any food, even free of *Salmonella*, will not cause other types of foodborne diseases if not handled hygienically.

It is essential for the manager of a food establishment to understand the hazard of poor hygiene and not to respond only to immediate commercial pressures. Hygienic measures taken by food handlers and by consumers to control salmonellosis will be equally effective in the prevention of other types of foodborne diseases of bacterial origin.

Managers should reassure food handlers that they will not lose their jobs if they report symptoms such as diarrhoea or infected skin lesions.

The most important products handled, and for which health education is necessary, are foods of animal origin e.g. meat (both raw and processed), milk (raw and processed), fish and other sea products (raw and processed), eggs and honey.

Food handlers must be educated on occupational risks and on risks concerning consumers. They have a fundamental role to the protection of consumers' health. Therefore, education of food handlers in this field should be stressed in food hygiene programmes. The principle items on which this education should be based could be the following:

1. *Awareness of risk.*
2. *Legal information*

3. *Cooperation with the food inspection authority.*
4. *Proper technologies for food processing, preservation, presentation and serving.*
5. *Measures of personal hygiene.*

10.2.3 Health Education in the Community

Populations should be protected from health risks through appropriate education. This education, when well planned and implemented, could become the appropriate tool for the gradual elimination of unhealthy attitudes and habits and the adoption of healthy practices.

For example, health education programmes should inform the public about the risks connected with consuming raw food of animal origin. They should learn that, eating raw meat exposes one to salmonellosis, trichinellosis, taeniasis, etc.; or that drinking raw milk and eating freshly prepared cheese, exposes one to brucellosis or other infections. Moreover, health education programmes should inform people on early symptoms of the more important zoonoses or of, the specific zoonoses under control and motivate them to undergo regular medical examinations.

10.3 Community involvement in health development-Target groups.

Community participation in health development has been identified and adopted as one of the fundamental strategies for accomplishing the priority objectives of Primary Health Care (PHC). According to the Declaration of the International Conference in PHC (Alma-Ata, ex-USSR, 1978), "*Community participation is the process by which individuals and families assume responsibility for their own health and welfare and for those of the community, and develop the capacity to contribute to their and the communities development*".

By the process of education and by acquiring experience and knowledge, individuals and communities learn to understand their own situation and motivated to solve their problems. Community participation in PHC enables individuals and communities to become agents of their own development, rather than passive receivers of information and assistance. Community involvement in health generates in individuals a sense of responsibility for their own health and welfare. To be successful, they have to acquire the capacity to evaluate situations, choose options and determine their contributions. In other words, individuals and families, and the community as a whole, are not obliged to accept otherwise conventional solutions that may be imposed, but are not suitable.

Moreover, the individual and the community must be willing to acquire new knowledge, and to translate it into wholesome habits and constructive behaviour patterns. Human, animal health and veterinary public health systems are responsible for providing clear information and explaining the favourable and adverse consequences of the various intervention measures being proposed, as well as their relative costs.

Health programmes are unlikely to succeed if community involvement is not an integral part of the structure and execution at local level. Laws, regulations and veterinary policy measures alone will not bring the desired results.

The higher the level of self-reliance and social awareness, the more the individuals and families will accept responsibility for protecting their animals and themselves from disease hazards transmitted directly, through food of animal origin, or through

environmental vectors or fomites. The relevant community education programmes should concentrate on what people can do in order to build their own health.

Community members should be completely involved as participants in the implementation of health programmes in their communities. They have the important advantages of speaking the local dialect, knowing how to reach people, enjoying social acceptance and they also know local situations or local needs.

Both in rural and urban areas, community groups are all important in the planning and implementation of programmes. They provide the resources needed for adapting plans to local conditions, carrying out tasks at little or no cost, and overcoming constraints. They must be informed about their approach and their role in achieving the aims of the programme.

In the early phases of a control programme, the general public especially of communities in endemic areas, have to be made aware of the danger to health as well as the economic importance of zoonoses and foodborne diseases. Concurrently it should be made full use of the mass media of informing each community. One of the most effective methods has been found to be the discussions in small groups. In such discussions, the health worker (educator) suggests some kind of concrete action, for example, formation of working committees, which may be formed soon after the discussions. Such committees have proved to be extremely useful in the early phases of several control programmes.

The most common teaching aids and media are posters, documents, pictures, slides, films, radio and television programmes. Communicating the health message is very important, and the different methods and techniques have to be combined to accomplish the educational purpose. However, the information must be correct, complete and acceptable to the people. The language of the messages must be understandable.

10.4 Other Considerations

It is important that health education and community participation should be included in a zoonoses control project or food hygiene programme from the start and should be closely linked to and coordinated with all changes to it. Continuing evaluation of the impact and the limitations of health education should be undertaken and modifications should be made as and when indicated. The control programme should be technically sound, realistic and useful, and not make promises, which cannot be fulfilled later on. The educational material should be based on local problems in order to be effective and exercise a considerable impact on governmental officials, managers, farmers, health professionals, etc. It should take into full consideration the beliefs, perceptions, behaviour, expectations and needs of the people. In other words, education of the public should not be a passive procedure but a dynamic and progressive one, adjusted to the changing demands and progress of the campaign.

11. COUNTRY REPORTS

11.1 African Tick Typhus

SPAIN: The rate of the disease is 1,22 per 100.000 people.

11.2 Anthrax

BULGARIA: Compulsory vaccination of cattle and sheep is financed by State budget. Four cases in ovines and ten in bovines were recorded during the last two years.

CYPRUS: The disease in sheep and goats was a very serious problem in Cyprus before 1950. The implementation of a comprehensive vaccination programme with locally produced vaccine resulted in controlling the disease. Since 1975 no more vaccinations are performed.

SPAIN: A lower incidence zoonotic disease in Spain. The rate of infection was 0,13 per 100.000 population in 1996. Higher rates according to the region range between 0.6 to 1.26 per 100.000m population.

TURKEY: Hundred of cases of anthrax among bovines, ovines and equines were recorded in 1997. Regular vaccinations are carried on in these animals using Stern strain spore vaccine.

11.3 Botulism

ITALY: 164 cases in humans were reported during the years 1993 1996.

11.4 Brucellosis

BULGARIA: The country is free from bovine, ovine and caprine brucellosis. Sixteen cases were recorded during 1996 in swines (*B. suis*, var. *danica*). Serological tests are performed regularly for monitoring purposes and compulsory bacteriological tests are performed in all aborted foetuses.

CYPRUS: Although the prevalence of the infection in productive animals was relatively low, an organized campaign was initiated in 1972. This campaign resulted in the successful eradication of the disease in 1985. Serological monitoring is performed yearly with satisfactory results.

EGYPT: 872 cases of human brucellosis were reported in 1997. The policy of testing, isolation, slaughtering and compensation, in cattle, buffaloes, sheep and goats is still going on.

GREECE: For the last 5 years the rate of infection in humans is estimated to be 1,7 average per 100.000 population. An eradication programme in bovine is implemented since 1975. In sheep and goats a test-and-slaughter policy with compensation is implemented since 1991.

ITALY: 1.896 cases in humans were reported in 1996. In 1997 the rate of the infection among 3.723.436 bovine tested was 0,46% and among 7.090.810 sheep and goats was 1,79%.

LEBANON: 316 cases in humans were reported in 1997. The rate of infection among 308 bovines tested for brucellosis the same year, was 10,35%

SPAIN: Since 1988, an official "Livestock Sanitation Campaign", is implemented every year to control and eradicate brucellosis among the Spanish livestock. In 1996, the rate of brucellosis in humans was 4,85 per 100.000 inhabitants (1904 cases recorded).

SYRIA: It is one of the most serious zoonotic diseases with increased incidence every year.

6.868 cases in humans were reported in 1996. The infection rate varies according to the region from 5 to 9.8% (data of 1994). A vaccination programme with strain 19 and REV. 1 *brucella* vaccines, is expected to begin in 1998.

TURKEY: The prevalence of infection in 1991 was 1.1% in cattle and 1,83% in sheep and goats.

11.5 Campylobacteriosis

CYPRUS: The average contamination rates for poultry and quail carcasses by thermophilic *campylobacter* have been found to be 56% and 81% respectively. No data regarding the infection in humans are available.

11.6 Contagious Diarrhoea (other than salmonellosis)

ITALY: 2.066 cases were reported in humans in 1996.

11.7 E. coli (Enterohaemorrhagic or verocytotoxic 0157:H7)

CYPRUS: A survey is planned to investigate the presence of this microorganism in various foods of animal origin.

11.8 Echinococcosis/Hydatidosis

BULGARIA: 476 cases in humans were reported in 1997. The infection is high in small ruminants and cattle due to the large numbers of stray dogs. Confiscation and destruction of infected offal is performed.

CYPRUS: The disease was eradicated but reappeared in 1993. A 5-year plan is implemented successfully by the veterinary services. Lately, the coproantigen ELISA test for the detection of infected dogs was introduced for the first time in the island.

EGYPT: The infection rate in dogs is 3-10%. In humans is estimated that 1.4 million persons are infected.

GREECE: The morbidity rate is reported to be approximately 3,5 per 100.000 population. The rate of infection among animals and humans during the last five years is the lowest recorded during the last 20 years. A countrywide anti-echinococcosis control programme is been implemented since 1986.

LEBANON: In 1997 were reported 35 cases in humans

SPAIN: At present, no agreement between the State General Administration and the Autonomous Communities is in force. No financial support by the EU was obtained for the 1998. The rate of infection in humans was 0,9 per 100.000 population in 1996 (356 cases reported). There is a clear decrease of the annual incidence since 1985.

SYRIA: It is considered among the important zoonoses in the country but no data are available because the disease is not notifiable. In 1993 a survey was performed in the slaughterhouses with the following results: 2,8% of sheep, 2% of goats and 3,3% of bovine carcasses were found infected. A national E/H control plan is under preparation.

11.9 Fascioliasis

EGYPT: The infestation rate in animals is around 30%. During 1997, a total of 471 patients were diagnosed and treated.

11.10 Foodborne Infections/Intoxications

LEBANON: 147 cases in humans were reported during the years 1995-1997.

SPAIN: A programme on foodborne infections and intoxications prevention and control is in force since 1987. The programme evaluation showed an increase in foodborne infections and intoxications. The etiological agent for 50-60% of the reported cases was *Salmonella*. In 1996 the rate of infection for foodborne intoxications was 53,86 per 100.000 persons.

11.11 Leishmaniasis

CYPRUS: Canine leishmaniasis was present before 1970. In 1996, a serological survey using ELISA test, indicated that less than 2-10% of the dogs examined were seropositive.

EGYPT: During 1997 there were 14 cases of zoonotic cutaneous and visceral leishmaniasis in humans.

GREECE: The morbidity rate is estimated at an average of 0,5% per 100.000 population. The mortality is 0 for the last 7 years. The disease exists among the dog population where a 4-6% of the animals are considered infected.

ITALY: In 1996 33 cases of cutaneous and 145 cases of visceral leishmaniasis were reported in humans.

SPAIN: An action plan has been carried out by some Autonomous Communities. The rate of infection was 0,24 per 100.000 people in 1996.

SYRIA: Cases of cutaneous leishmaniasis in humans are increasing (12.888 in 1993, 17109 in 1995 and 13.996 in 1996).

11.12 Leptospirosis

ITALY: In 1996 were reported 74 cases in humans, 14 cases in bovines, 2 in swine and 32 in other species.

SPAIN: It is a lower incidence zoonotic disease in Spain. In 1996 the rate of infection was 0,02 per 100.000 population.

11.13 Listeriosis

CYPRUS: In an extensive survey during the last six years the contamination of animal products with *L. monocytogenes* was found as follows: poultry carcasses 26%, beef meat 18%, minced meat 88%, meat products 9%, live snails 50%. Among 19.910 samples of raw milk and dairy products tested, 1.2 % and 0.6% were contaminated Non human cases were reported.

ITALY: In 1996, 40 cases in humans were reported.

SPAIN: Control was established after 3 deaths in Switzerland due to cheese consumption (no data are still available).

11.14 Mediterranean Exanthematic Fever

SPAIN: The rate of infection was 1,22 per 100.000 people in 1996.

11.15 Q-Fever/Rickettsiosis

CYPRUS: Q Fever was first reported in 1951. Currently a study is under process to investigate the presence of *R. conori*, *R. burnetti* and *R. typhi* in humans and animals.

ITALY: In 1996 1.349 cases of human rickettsiosis were reported.

SPAIN: It is a lower incidence zoonotic disease(no data available).

11.16 Rabies

BULGARIA: There were 24 cases of rabies in animals (dogs, cats, ruminants and foxes) in 12 regions of the country in 1996.

CYPRUS: Rabies has never occurred. Imported dogs are vaccinated upon arrival with an inactive vaccine, and kept at home quarantine for 6 months.

EGYPT: 52 deaths in humans were recorded in 1997. The control policy of rabies for animals is based on the annual registration and vaccination of owned dogs and cats, besides the destruction of stray animals.

ITALY: Cases infecting humans and domestic animals are absent in Italy for over 30 years. The only cases of wild animals which sporadically are proved to be test-positive, are found in the woody areas of the Alps, in the Northern part of the country and are epidemiologically linked to the sylvatic rabies occurring in Austria and Slovenia.

LEBANON: No cases in humans were reported in 1997

SPAIN: One horse and four dogs in Melilla (North Africa) in 1997.

TURKEY: One case of human rabies was reported in 1996. With respect to rabies in animals, 172 and 125 cases were reported in 1995 and 1996, respectively.

11.17 Rift Valley Fever

EGYPT: The control policy consist on vaccinating the sensitive animals every six months and spraying insecticides before summer months.

11.18 Salmonellosis

CYPRUS: The most common serotypes recovered between 1990 and 1996 are: *S. enteritidis*, *S. hadar*, *S. typhi-murium* and *S. infantis*. In humans, 50 to 110 *Salmonella* cases are identified

annually. However, the disease is under-reported since the private practitioners do not report all cases.

GREECE: 3487 isolations of *Salmonellae* in humans were reported in a study performed during 1985-1990.

LEBANON: There were 76 isolations in food of animal origin in 1997.

ITALY There were reported 15.560 cases in humans, 40 cases in bovines, 1.000 in swine, 409 in ovines/caprines and 105 in other species in 1996.

SPAIN: The rate of infection from *Salmonella* is 32,85 per 100.000 population. *S. enteritidis* was isolated in 47% of the cases.

11.19 Toxoplasmosis

CYPRUS: Is a relatively serious problem in sheep and goats but there is not accurate information on human infection. However, in women toxoplasmosis is a serious disease during pregnancy.

11.20 Transmissible Spongiform Encephalitis (TSE)

GREECE: All measures established by the EU have been implemented.

SPAIN: All measures established by the EU have been implemented.

11.21 Trichinellosis

BULGARIA: In 1997 there were 6 outbreaks in 6 regions

SPAIN: The rate of human trichinellosis recorded is 0,04 per 100.000 population.

11.22 Tuberculosis

BULGARIA: Six farms were found positive in 3 regions during the last two years. Tuberculin tests are performed in all cattle above 3 months of age. All positive and suspicious animals are slaughtered. Laboratory tests for confirmation are performed.

CYPRUS: Since 1971 periodic tuberculin test has been carried out every three and now four years. Abattoir surveillance is another monitoring measure. All results proved that Cyprus today remains free from bovine tuberculosis.

EGYPT: It is endemic in the country. It is considered the second most important zoonotic disease. The reported cases of human tuberculosis during 1997 were 6.042 cases. In animals, the control policy consists of tuberculin tests, isolation of positives, slaughter and compensation.

ITALY: 1.490 cases of extra-lung tuberculosis, 4.022 cases of lung tuberculosis and 60 cases of extra-lung and lung tuberculosis were reported in humans in 1996. The rate of infection in bovines is 0,35%.

SPAIN: The rate of bovine tuberculosis in herds was 5,25% in 1996.

TURKEY: 3600 cattle were tested with intradermal tuberculin in 1997 and all of them have been found negative.

11.23 Tularemia

ITALY: 10 cases of human tularemia were reported in 1996.

SPAIN: It is an emerging zoonotic disease.

12. CONCLUSIONS AND RECOMMENDATIONS

1. Human and animal health sectors need to co-operate closely in controlling zoonoses in the Mediterranean region. Moreover, considering the complexity of the problems encountered, Public Health veterinarians should be further involved.
2. Both human and animal health sectors should make best use of available epidemiological information to convince decision-makers of the need to establish or improve zoonotic diseases control programmes.
3. The continued exchange of zoonoses information between animal and human health sectors in neighbouring countries is of primary importance. The Information Exchange System of the MZCP should be recognised as a useful tool to create quick and simplified awareness among the MZCP countries and it is suggested to be strengthened by the Member States.
4. Laboratories should inform public health and veterinary services of zoonotic diseases laboratory results which in conjunction with relevant epidemiological surveillance data could be used to establish or evaluate control activities in progress and adapt or correct them accordingly.
5. Bovine Spongiform Encephalopathies (BSE) created important public health problems almost worldwide. Several aspects of its aetiopathogenesis still remain unknown. Therefore, the veterinary services in all countries should establish an *ad hoc* surveillance system in accordance with the Animal Health Code of the *Office International des Epizooties* (OIE).
6. Considering the complex epidemiological cycle pattern of zoonotic Leishmaniasis, its control can only be affected by a variety of measures against the vector, the animal host and humans. For Zoonotic Visceral Leishmaniasis, an effective vaccine would be an appropriate solution for the control of the disease. There are hopeful signs that such a vaccine is forthcoming.
7. Carcasses of dead animals, animal waste and leftovers of abattoirs cause particular risks for human health if not destroyed properly. Their safe disposal is essential for the control of zoonotic and other communicable diseases. The animal health services in all countries should establish guidelines and develop appropriate infrastructure for their effective collection and disposal.

8. Public Health Education

- a) Community health education and participation are fundamental to any public health development. Therefore, significant improvements are necessary in this field.
- b) In schools, health agencies and the health profession, there is a need for far better joint planning and co-ordination of their efforts for improving the current inadequate record.
- c) School children are the most sensitive agents of health education. Therefore, emphasis should be made by the responsible authorities to better organise and further strengthen activities in this field.
- d) Public health and veterinary professionals should be involved in appropriate programmes including training of facilitators. The MZCC should organise such trainings.

9. Intersectoral Co-operation

- a) Intersectoral co-operation between Health, Veterinary and other sectors related authorities is essential and should be adopted as the only strategy to which successful preventive and control programmes against zoonotic diseases could be based.
- b) The MZCC should suggest that all member countries establish intersectoral zoonoses committees and, through the respective MZCP National Coordinators, their members be notified.
- c) The MZCP should identify a certain procedure to describe the activities of these committees and follow up their progress by receiving a report from each country annually.

10. Emerging zoonoses in the Mediterranean Region have been reported to be Rickettsiosis, Bartonellosis, Ehrlichiosis, Lyme Borelliosis, Cryptosporidiosis, Old World Screw Worm and *E. coli* serotype 0157:H7. There is need for epidemiological investigation in order to assess their social and economic impact in the MZCP countries.

11. The MZCC should promote the application of modern methods of surveillance like Geographical Information Systems and risk analysis systems (HACCP) to all MZCP member countries. Training courses to attentively selected medical and veterinary professionals from the MZCP countries will contribute to the adaptation of these systems to the particular needs and conditions of each country.

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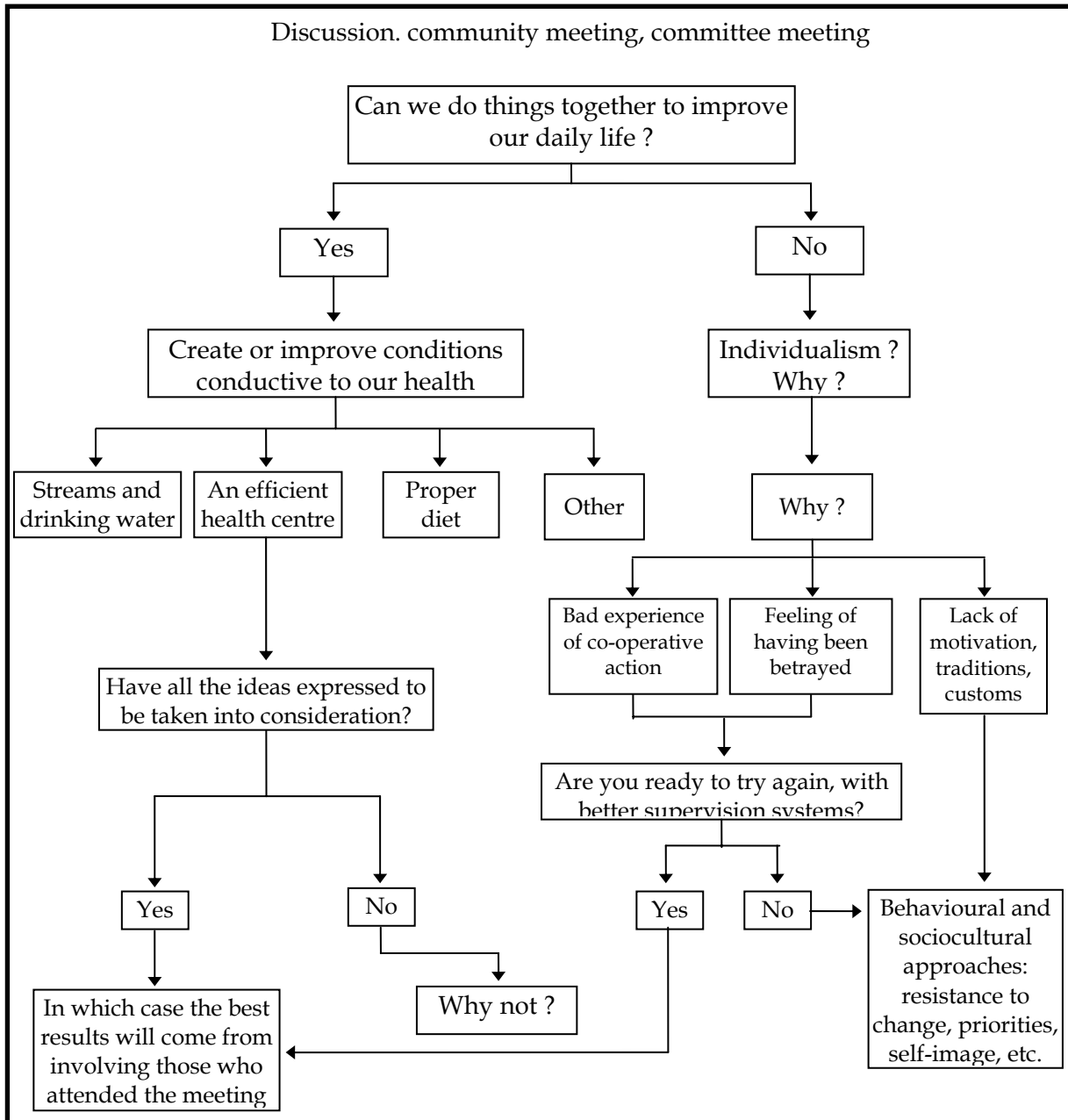
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LIST OF WORKING PAPERS

1. General epidemiological aspects of major zoonoses in the MR (*Dr A. Mantovani, FAO/WHO-CC, ISS, Rome, Italy*)
2. Emerging and re-emerging zoonoses in the MR (*Dr Y. Tselentis, WHO-CC, Crete, Greece*)
3. Country Reports
 - Bulgaria
 - Cyprus
 - Egypt
 - Greece
 - Lebanon
 - Spain
 - Syria
 - Turkey
4. Prevention and control of major zoonoses : surveillance and reporting; epidemiological investigation; data analysis and interpretation, reporting and disseminating information; use of sampling in surveillance activities (*Dr D. Morelli, WHO-CC, Teramo, Italy*)
5. Control of major zoonoses: definition of priorities; methodology; analysis of resources available, evaluation of the results (*Dr P. Economides, Ministry of Agriculture, Cyprus*)
6. The contribution of public health and veterinary laboratories in prevention and control of major zoonoses (*Dr Y. Tselentis, WHO-CC, Crete, Greece & Dr D. Morelli, WHO-CC, Teramo, Italy*)
7. Epidemiological surveillance and control of Leishmaniases (*Dr B. Chaniotis, WHO-CC, Crete, Greece*)
8. Importance of Geographical Information Systems in Zoonoses Epidemiological Surveillance and Control. (*Dr. Chr. Hadjichristodoulou, Ministry of Health, Athens, Greece*)
9. Intersectoral Cooperation - Public Health education as basic tools for the prevention and control of zoonoses (*Dr. A. Seimenis, WHO/MZCC, Athens*)

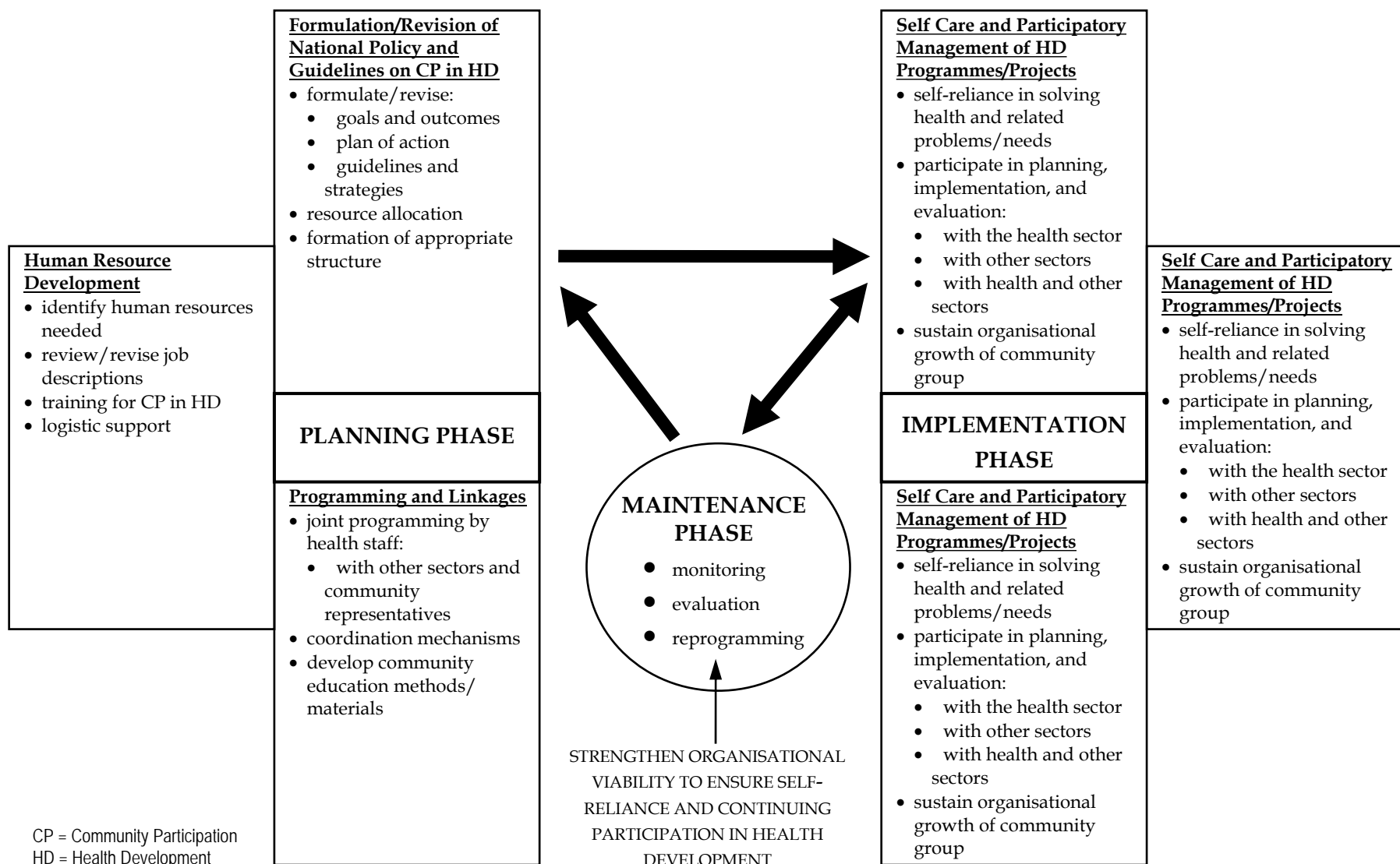
FIGURE I

STRATEGY FOR ACCEPTANCE AND STIMULATION OF COMMUNITY PARTICIPATION



FROM: Freyens P. *et al.* (1993): How do Health Workers see Community Participation?, World Health Forum, (14), 3, 253-7

SCHEMATIC DIAGRAM OF THE DEVELOPMENT OF COMMUNITY PARTICIPATION PROCESS IN HEALTH AND DEVELOPMENT*



* From: Report on Joint WHO/FAO Consultation on Veterinary Participation in Primary Health Care, Washington D.C., 13-15 April 1983 (Doc. WHO/VPH 83.47)