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REPORT OF FAO/WHO WORKING GROUP ON EMERGENCY PREPAREDNESS FOR RIFT VALLEY FEVER OUTBREAK CONTROL IN WEST AFRICA

Bamako, Mali, 1 - 3 July 1988

1. Introduction

Dr F.-X. Meslin, VPH, WHO/Headquarters, welcomed the participants in the name of the Director-General of the World Health Organization. He reminded the participants of the main conclusions and recommendations of the FAO/OIE working group on Rift Valley Fever (RVF) held in Dakar 10 - 11 March 1988, and reviewed the main points of the Joint FAO/WHO Technical Cooperation Project on Emergency Preparedness for RVF which emerged from the recommendations of that meeting.

He stated that the objectives of this working group were:

1. To elaborate a definition and select parameters for recognition of an emergency situation caused by RVF warranting FAO and WHO intervention.

2. To identify the zones at high risk within the West African region.

3. To advise West African countries on strategies for RVF prevention and control that are most appropriate to the epidemiological situation, the human health and veterinary infrastructure, and the available manpower resources. These strategies should cover: disease surveillance in man and animals, arthropod populations monitoring, preparedness for a RVF outbreak, and control of the disease in animals and man. All strategies should be applicable without delay in the countries at highest risk.

Dr S. Daouda, welcomed the participants on behalf of the Food and Agriculture Organization of the United Nations. After briefly reviewing the RVF situation in the Senegal River Basin, he outlined the FAO Technical Cooperation Project on RVF in West Africa. This mainly aims at strengthening cooperation between the various national and international teams for an effective surveillance and control of this disease.

Dr J. Meegan was elected Chairman and Dr M. Guillaud, Rapporteur, for the plenary sessions. The list of participants and the agenda are attached as Annexes 1 and 2.

2. Review of the current knowledge on Rift Valley Fever

The group reviewed the main findings on RVF made during the last 20 years in West African countries, and the results of a retrospective serological survey on RVF in West Africa performed in 1986. This survey led to the identification of a focus of active virus circulation located in southern Mauritania. In addition, a serological survey made in the Manantali area of southern Mali during December 1986 strongly suggests that animals and humans in this zone might be at high risk.

Recent multinational serological studies in The Gambia were reviewed. More than 5000 stored animal sera collected from 1982 to 1987 were tested for antibodies to RVF virus. Antibodies were detected in less than 10% of all sera, indicating low-level, endemic virus circulation extending back to 1982. Most sera were from western regions, but 200 sera from eastern Gambia also contained low levels of antibody.

The findings suggest that RVF is probably endemic (circulating at a low, inapparent level) in most West African countries.

The results of epidemiological studies conducted during the Senegal River Basin outbreak of RVF in October-November 1987 were presented by Dr Digoutte. This was the first extensive RVF epizootic described in West Africa.

In summary, RVF virus has been isolated from arthropod or vertebrate samples collected in Mauritania, Senegal, Guinea, Burkina Faso, and the Central African Republic. Serological evidence of RVF activity shows that a range of countries are endemic for the virus, extending from The Gambia through Mali. This virus has probably been endemic in Western Africa for 50 years or more. These observations suggest that recent changes in the environment may have caused RVF virus to emerge from its enzootic cycle and enter an epizootic cycle.

3. Risk factors and surveillance methods

3.1 Factors important in determining the risk of a RVF epizootic

a) Ecological factors

Changes in RVF virus circulation may be correlated with climatic and ecological factors. Very heavy rainfall and flooding from overflow of rivers may precipitate RVF epizootics. Radical environmental alterations which follow the development of dams and extensive irrigation systems appear to play a significant role in RVF epidemiology. These are thought to lead to an increase in the number of vectors through quantitative and qualitative changes in arthropod populations. The area in the semi-desert sahelian zone - the Ecotone between the "wallo" and the "Diehri" - appears to be an area favourable for RVF virus circulation.

b) Factors related to animals and man

In other parts of Africa, ruminant species are considered to be the most important hosts for amplification of RVF virus. Epizootics of RVF are associated with widespread apparent and inapparent infections in sheep, goats, cattle and camels. There is evidence to support a conclusion that this is also the case in West Africa. Therefore, the presence of a high density of susceptible ruminants is one risk factor for a RVF epizootic. The level of herd and flock immunity is clearly important. The nomadic movement of infected or susceptible ruminants could influence the level of risk.

A close association with small ruminants was considered a risk to man in the 1987 Mauritania outbreak. Slaughtering of infected animals is a known source of infection. Infection of humans is also most likely caused by exposure to infected, blood-sucking arthropods, notably mosquitoes.

Studies indicate that other factors such as family habits may operate to determine the risk of human infection. The prevalence of haematophagous insects other than mosquitoes, may be important.

3.2 Surveillance systems

a) Surveillance of ecological and entomological factors

Ecological changes predisposing to large changes in arthropod populations must be studied and identified as posing a risk. In these areas, serological studies should be undertaken to detect if the virus is present. If RVF activity is detected, monitoring of arthropods in these endemic situations should be instituted.

b) Surveillance in man and animals

The serological data collected from human and animal populations in Western Africa provides baseline information. Any change in antibody incidence suggests greater risk and should promote increased surveillance and mobilization of control measures.

All clinical diseases resembling RVF in ruminants, particularly storms of abortions must be investigated by virus isolation. Ideally, a sentinel herd system should be established in enzootic and at-risk areas.

In man, an increased incidence of acute fevers with a small number of icterus and/or haemorrhagic, optical, or neurological signs, must be investigated. If RVF is suspected, attempts to isolate the virus and/or confirm RVF by serological methods should be undertaken (see also section 5).

3.3 Collection and flow of information and samples

Field data from ecological, veterinary and medical sources should be continuously gathered and jointly reviewed by national medical and veterinary authorities.

If national or regional laboratories do not have the means to safely diagnose RVF, samples should be sent for diagnosis to the WHO Collaborating Centre for Arbovirus Reference and Research in Dakar.

Results of surveillance of clinical disease and serology will determine if an emergency situation exists.

4. Potential high risk areas in West Africa

Based upon the above outline of risk factors and considering that:

- The epizootic of RVF in Senegal and Mauritania occurred soon after the Diama dam on the Senegal River was placed in operation, and in the second wet year following three dry years.

- An endemic focus of RVF virus transmission had been observed before the ecological changes occurred.

- Serological surveys indicate that many areas of West Africa are apparently endemic for RVF, with antibody prevalence in man and animals at 2-10%.

The areas listed below are examples of some high risk areas in West Africa:

- Manantali dam area in Mali;
- Senegal Basin area, up-river of where the 1987 outbreak occurred;
- Kaedi area in Senegal;
- Rkiz and Guiers lakes in Mauritania and Senegal.

5. Establishment of an emergency situation

5.1 Definition

An emergency epidemic/epizootic situation is defined as a significant increase in the number of cases of animal and human disease, during a limited period of time, in a defined area, caused by a single, identified etiological agent. The potential for further spread characterizes an emergency situation. A RVF emergency situation would typically include a marked increase in abortions in domestic ruminants, particularly sheep, a high density of potential vectors, environmental conditions favouring spread of the disease, and a high density of susceptible hosts to amplify the virus and extend the outbreak.

It is often difficult to objectively establish a significant increase in cases, but when figures are available for animal abortion rates, a doubling of these should be considered significant. For humans, even one confirmed case, if in conjunction with a large number of unconfirmed abortions in ruminants, would be significant.

5.2 Establishing the magnitude of an emergency situation

The magnitude of the emergency caused by a RVF outbreak can be estimated for animals by applying previously observed mortality and abortion rates to the estimated number of susceptible (RVF antibody negative) animals in the area at risk. In RVF endemic areas of West Africa, generally less than 10% of animal populations have protective antibodies, and thus most animals could be infected.

Some breeds of sheep are very susceptible to RVF, with high mortality rates in young lambs (60-100%). Abortion rates in pregnant ewes range from 60 to 100% depending on the particular breed. Adult animals are generally less sensitive to RVF, and mortality in adult sheep varies from 10 to 30%. Cattle and goats are often infected by RVF virus, and total losses caused by mortality in young animals and abortion in pregnant animals varies from 10 to 40%. The latter rates may also vary substantially with the breed or strain. During the 1987 outbreak in the Senegal River basin, goats appeared to be as susceptible as sheep. Camels can be infected during an RVF outbreak, but rates of abortion and mortality have not been established, although they are believed to be relatively low compared to other ruminants.

5.3 Delivery of international aid during emergency situations

Prior to the delivery of any international, emergency aid, the magnitude of the emergency will be reviewed by a multi-disciplinary, national/international advisory team preferably recruited on a regional basis. This will ensure optimal coordination of the monetary and vaccine resources available to combat RVF.

6. Plan of action at the national level

6.1 Emergency preparedness - immediate action prior to epidemic emergency

The recommendations outlined below are intended to be implemented as soon as possible to prepare for RVF emergency.

Expanding education of RVF is the quickest feasible method to intensify surveillance during the endemic period. International training programmes have begun for public health officials (WHO Workshop on Emergency Preparedness, Response and Prevention and Control of Viral Haemorrhagic Fevers Outbreaks in West Africa, Bamako, 4-9 July 1988) and veterinary workers (WHO/FAO Seminar on RVF Prevention and Control, Bamako, Mali, 12 to 15 July 1988) for veterinary officers. However, to be practical, the education programme should include the health care or veterinary worker who will first see the suspect RVF patient or animal.

Education should therefore be expanded at a national level. To facilitate this training, brief RVF information sheets should be prepared immediately, then distributed widely within each country to personnel at all levels of the human/animal health care delivery systems. This concise information sheet should emphasize a clinical case definition of RVF for human beings and for animals. Additional information should include a brief general description of RVF, typical characteristics of an endemic/epizootic, and instructions to report suspected cases to superiors at the district level of the appropriate reporting system.

An intermediate training goal should include a national training course where human and veterinary health district officials, responsible for investigation of suspected cases, should be fully informed on all aspects of RVF. A long-term educational goal should be the incorporation of training on RVF in curricula of all students who are involved in human and animal health.

All countries should establish or strengthen existing investigative teams responsible for investigation of reports of potential RVF outbreaks. In addition to education, plans ensuring appropriate logistical support, and programmes to accurately report and record abortion rates in animals should be given high priority.

An intermediate goal is to train national laboratory personnel in safe diagnostic practices for RVF.

6.2 Emergency preparedness - feasible action as the emergency develops

Upon receiving a report of a suspect haemorrhagic fever case, a cluster of cases similar to that expected with RVF, or a storm of animal abortions, the district level authority must investigate the report.

As guidelines for the district physician, it is suggested that two cases of sudden onset, acute fever with either jaundice or haemorrhagic signs (to exclude common epistaxis) should be considered as the threshold for reporting a suspected outbreak. This physician should also be vigilant for any doubling of the incidence of reported malaria, influenza-like or unknown febrile diseases during a one week period, since in the past this has been associated with RVF outbreaks.

As guidelines for the district veterinary officer high abortion rates and level of mortality in newborn animals should be considered as suspect. A doubling of the figures available for abortion rates should be considered as a significant increase

At this time, specimens for virus isolation and serology should be obtained.

When RVF is suspected, and awaiting laboratory results, surveillance in man and animals should be increased Monitoring of sentinel herds should be intensified. An assessment of the size of the susceptible at-risk population should be undertaken to allow prediction of the possible spread of the disease and to determine the magnitude of the potential emergency. The feasibility of restricting local movements of animals should be considered.

If an emergency develops, a national, multi-disciplinary steering committee should be formed to coordinate human health and veterinary actions. This group should also interact with other steering committees in countries bordering the outbreak area to ensure dissemination of information and coordination of control programmes. This committee also will be the focal point for establishing liaison with regional and international agencies, as well as neighbouring countries.

A limited bank of live-attenuated veterinary vaccine has been purchased by WHO, and countries should include organized plans for rapid vaccine delivery in their emergency programmes.

National human health and veterinary services should recognize that if a RVF emergency were to develop, manpower and transportation resources would have to be diverted to emergency control programmes. An animal immunization campaign should receive highest priority in this regard.

6.3 Emergency preparedness - specific actions for humans after the emergency is confirmed

a) Applicability and availability of vaccine for man

A formalin killed, cell culture produced RVF vaccine is available from the USAMRIID and has been donated during past epizootics to provide protection of laboratory workers and field investigators. Requests for

vaccine can be directed through the WHO or FAO. The vaccine is in limited supply. It appears to be safe and immunogenic, but has been used in only a limited population. Thus, it is classified as an experimental vaccine until larger populations are studied.

Listed below are the immunization recommendations for groups of at-risk individuals.

- Physicians/nurses/primary health care providers: this group appears to be at low risk if precautions are observed with potentially infectious needles or specimens. Nosocomial infections or hospital-associated outbreaks have not been observed during previous RVF epizootics. It is generally not recommended that this group be immunized. In an emergency situation, certain members of this group might be exposed to a higher risk and at that time the need for immunization should be re-evaluated.

- laboratory staff: laboratory workers working with live virus for diagnostic or research purposes are at-risk and should be immunized.

- Veterinary field workers: This group is probably at low risk during an endemic period, but during an outbreak, field veterinarians studying RVF should strongly consider immunization.

- Slaughterhouse personnel: It is difficult to determine the risk to those involved in the slaughter of animals during the endemic period of a low incidence of RVF. Further studies are needed before immunization could be recommended.

b) Non-specific measures to prevent disease in humans

During an outbreak, humans could reduce the risk of infection by avoiding contact with infected animals, and especially with aborted tissues. If possible, a reduction in exposure to mosquitoes is recommended by the use of nets or coils. Human and animal health workers should realize that samples from infected hosts might contain high concentrations of virus. Risk of infection can be lowered by careful use of sterile techniques, needle precautions, and disinfectants (0.1-0.01% sodium hypochlorite = a 1/50 to 1/100 dilution of commercially available liquid bleach).

c) Case management

At present, no specific treatment is available and supportive care is recommended.

6.4 Emergency preparedness - specific actions for animals after the emergency is confirmed

Because of a lack of knowledge on RVF vectors, and the high cost of large scale vector control programmes, vector control of RVF epidemics is not considered feasible at this time. Therefore, measures to control the spread of disease in the animal hosts are of paramount importance.

Veterinary measures will be coordinated by the national emergency steering committee (section 6.2.). The geographical limits of the outbreak area (or areas) as defined by clinical disease should be quickly determined by an investigation team. At the periphery of this infected area, an

uninfected zone should be defined. Its size will be dependent on ecological and geographical factors, but for practical reasons, this peripheral zone should be kept as small as possible, preferably 30 to 50 km in width. In the peripheral zone, strict control of animal movement should be imposed, especially to stop movement out of the central, infected area.

A vaccination campaign should be initiated from the peripheral zone inward towards the infected area. Compulsory vaccination of all sheep, goats, cattle and camels in the peripheral zone should be carried out. Multidose syringes can be used but needles should be changed, at a minimum, between individual herds or between village herds. Not more than 50 animals should be vaccinated with any one needle.

For practical and economical reasons, use of the killed vaccine is not feasible in West Africa. Therefore, the use of attenuated (Smithburn) vaccine is recommended. However, this could possibly lead to losses due to abortion, but these losses seem justified in view of the much heavier losses caused by RVF infection. Owners of animals must be informed of this risk. It is recognized that with the development of a safe, cost-effective vaccine, preventive vaccination would be the best choice in high risk areas.

Other preventive vaccination programmes planned for the infected area should be postponed.

For future planning, it is important to collect clinical and epidemiological data on RVF in the domestic animal species of West Africa. This should be done during the outbreak by a multidisciplinary research team.

7. Currently funded international programmes on RVF in Western Africa

These programmes are listed below. In some cases, they represent resources to aid local development of RVF control programmes.

a) WHO Collaborating Centre for Arbovirus Reference and Research at Institute Pasteur, Dakar:

- Performs virus isolation and diagnosis for all suspected RVF and other viral haemorrhagic fever cases in the West Africa subregion;

- undertakes regional serological surveys in man and animals;

- provides field teams for investigation of RVF outbreaks

b) Office de Recherche scientifique et technique d'Outre-Mer (ORSTOM)

- carries out studies on vector ecology

c) Institut d'Elevage et de Médecine Vétérinaires des Pays Tropicaux (IEMVT)

-implements a collaborative programme with Institute Pasteur of Dakar and the US Army Medical Research Institute of Infectious Diseases, Fort Detrick, on epidemiological and serological studies, and on a new live-attenuated virus strain as a potential candidate for the preparation of a safe veterinary vaccine.

d) FAO:

- organizes in collaboration with WHO a seminar on control of RVF for veterinary officers from six West African countries.

- collaborates with authorities of Mauritania, Senegal, The Gambia, and Mali in the development of national policy on RVF.

- advises West African governments on the use of currently available RVF veterinary vaccines.

e) WHO

- organizes seminars at international level for both human health and veterinary officials.

- purchases and stores live attenuated veterinary vaccine. This will be delivered in emergency situations (as defined in this document) when officially requested by Member States.

8. Future RVF research requirements

The working group encourages local and regional researchers to consider for study the research objectives listed below:

8.1 Disease epidemiology

Studies are required to define all aspects of the West African RVF endemic cycle. Special attention should be given to those factors which, when changed, predispose to a RVF epizootic. Comparative virus virulence experiments should be undertaken. Observations on clinical disease syndromes and pathogenesis of RVF in humans must be carefully documented.

8.2 Disease surveillance and predictive system

Vector studies must be performed, and alterations in vector populations resulting from environmental change must be documented. Results of these field investigations should be correlated with satellite remote sensing data to possibly develop a predictive model. The time course of decay of IgM antibody should be established to allow interpretation of the length of time the presence of IgM indicates recent infection. The sensitivity of local breeds of ruminants to RVF must be documented.

8.3 Vaccine development

This working group strongly encourages the development and testing of a safer effective veterinary vaccine. In particular, the MV-P12 attenuated strain should be given a high priority for further study.

8.4 Vector identification and control

Entomological studies should focus on establishing the important vectors in both the enzootic and epizootic/endemic cycles of RVF in Western Africa.

9. Final conclusions and recommendations

This document contains many specific suggestions to help prevent and control an emergency situation caused by an outbreak of RVF. The Working Group suggests that of all the recommendations in the plan of action, the following be implemented as soon as possible:

a) To convene in each country, a multidisciplinary group in charge of reviewing the RVF situation and develop an appropriate national policy on RVF.

b) To develop an educational programme on RVF for health and veterinary personnel working at district and subdistrict levels.

c) To establish especially in the high risk zones mentioned in this document, a system for early detection of a RVF outbreak.

d) In addition, the group, recognizing that rapid transport of specimens for virus isolation and serology to the WHO Collaborating Centre in Dakar is currently difficult, recommends that WHO take a leading role in developing a system for effective specimen transport. The expansion of express package delivery into many parts of West Africa might be combined with packaging help from the WHO country representative to develop an efficient regional system.

Finally, the group recommends that additional funds be sought in order to facilitate the implementation of the selected national policies and to further support the regional projects dealing with diagnosis and surveillance.

ANNEX 1

FAO/WHO WORKING GROUP ON EMERGENCY PREPAREDNESS FOR RIFT VALLEY FEVER CONTROL IN WEST AFRICA

Bamako, 1-3 July 1988

LIST OF PARTICIPANTS

Dr R. Cordellier, ORSTOM, Centre Universitaire de Formation en Entomologie Médicale et Vétérinaire, 01 BP 2597, Bouaké, République de Côte d'Ivoire

Dr J.-P. Digoutte, Director, WHO Collaborating Centre for Arbovirus Reference and Research, Institut Pasteur de Sénégal, B.P. 220, Dakar, Sénégal (Chairman)

Dr M. Guillaud, IEMVT Field Coordinator, c/o Institut Pasteur de Sénégal, B.P. 220, Dakar, Sénégal (Rapporteur)

Dr A. Jouan, Institut Pasteur de Sénégal, B.P. 220, Dakar, Sénégal

Dr P. C. Lefèvre, IEMVT, 10, rue P.-Curie, 94704 Maisons-Alfort, France

Dr J. Meegan, Head, Rapid Diagnosis Section, Department of Epidemiology Disease Assessment Division, US Army Medical Research Institute of Infectious Diseases, (AMRIID), Fort Detrick, MD 21701-5011, USA

Secretariat

Dr G. Davies, Veterinary Research Institute, P.O. Kabete, (Nairobi), Kenya (FAO consultant)

Dr P. Jacobsen (FAO Consultant)

Dr D. Sylla, Centre FAO de Contrôle de Qualité des Vaccins, B.P. 154, Dakar, Sénégal

Dr F.-X. Meslin, Scientifique, Santé publique vétérinaire, Division des Maladies transmissibles, OMS, Genève

Dr M. Rey, Division des Maladies transmissibles, OMS, Genève

ANNEX 2

FAO/WHO WORKING GROUP ON EMERGENCY
PREPAREDNESS FOR RIFT VALLEY FEVER
OUTBREAK CONTROL IN WEST AFRICA

Bamako, 1-3 July 1988

AGENDA

1. Opening session

2. Knowledge of present situation:

   - at the Senegal River Basin;
   - in The Gambia;
   - in other West African countries.

3. Pre-requisites for emergency recognition:

3.1 Base line data:

   - vectors;
   - mammalian hosts (man, animals)
   - animal movement.

3.2 Surveillance systems in man & animals:

   - collection and flow of specimens;
   - flow of information
   - role of epidemiological investigation centres, including laboratory services.

4. Definition of areas at high risk (in West Africa):

   - availability of vectors;
   - susceptibility of animals;
   - movement of animals;
   - location of existing foci of infection.

5. Definition of emergency situation:

5.1 Criteria for spread of the virus:

   - prevalence of virus or IgM in animals;
   - proportion and density of animals at risk of infection;
   - incidence of human cases.

5.2 Magnitude of the problem:

   - number of animals at risk of exposure (total) and infection (susceptible);
   - population densities and geographical size of areas affected or exposed.

5.3 Establishment of advisory team for data collection and emergency recognition.

6. Feasibility of emergency interventions:

- Intensification of surveillance in animals and man;
- accessibility of animals;
- availability of vaccine for animals and man
- applicability of vaccine in animals and man
- movement restrictions for animals;
- vector control measures;
- primary health care, including information of people for non-specific measures of prevention;
- management of human cases
- manpower
- transportation.

7. Plan of action for emergency preparedness and disease control at national level.

8. Funding of emergency preparedness operations.

9. Future research requirements:

- disease epidemiology;
- disease surveillance and prediction systems;
- vaccine developments;
- vector identification and control.

10. Final conclusions and recommendations.

11. Closing session.