

Report on the

**Intercountry meeting on epidemiological and
laboratory surveillance and response to
outbreaks of viral haemorrhagic fevers in the
Eastern Mediterranean Region**

Damascus, Syrian Arab Republic
18–21 December 2006



Regional Office for the Eastern Mediterranean

© World Health Organization 2009

All rights reserved

The designations employed and the presentation of the material in this publication do not imply the expression of any opinion whatsoever on the part of the World Health Organization concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. Dotted lines on maps represent approximate border lines for which there may not yet be full agreement.

The mention of specific companies or of certain manufacturers' products does not imply that they are endorsed or recommended by the World Health Organization in preference to others of a similar nature that are not mentioned. Errors and omissions excepted, the names of proprietary products are distinguished by initial capital letters.

All reasonable precautions have been taken by the World Health Organization to verify the information contained in this publication. However, the published material is being distributed without warranty of any kind, either expressed or implied. The responsibility for the interpretation and use of the material lies with the reader. In no event shall the World Health Organization be liable for damages arising from its use.

Publications of the World Health Organization can be obtained from Distribution and Sales, World Health Organization, Regional Office for the Eastern Mediterranean, PO Box 7608, Nasr City, Cairo 11371, Egypt (tel +202 2670 2535, fax +202 2670 2492, email PAM@emro.who.int). Requests for permission to reproduce, in part or in whole, or to translate publications of WHO Regional Office for the Eastern Mediterranean – whether for sale or for noncommercial distribution – should be addressed to WHO Regional Office for the Eastern Mediterranean, at the above address email GAP@emro.who.int.

Document WHO-EM/CSR/025/E/01.10/169

CONTENTS

1	INTRODUCTION.....	1
2.	GLOBAL AND REGIONAL OVERVIEW OF VIRAL HAEMORRHAGIC FEVERS .2	
2.1	Global overview of VHFs.....	2
2.2	Regional overview of VHFs	4
3.	EPIDEMIOLOGICAL FEATURES, SURVEILLANCE AND LABORATORY ASPECTS OF VHF.....	4
3.1	Laboratory aspects of VHF.....	4
3.2	Epidemiological aspects of VHF	5
3.3	Surveillance of VHF in terms of the IHR 2005	5
3.4	The role of NAMRU-3 in VHF detection.....	6
3.5	Control measures for VHF.....	6
3.6	Recommended standard infection control practices for VHF.....	7
3.7	The role of vector control in the prevention and control of VHF.....	8
4.	COUNTRY PRESENTATIONS.....	9
4.1	Dengue fever in Saudi Arabia.....	9
4.2	Dengue fever in Pakistan	9
4.3	Dengue fever in Yemen.....	10
4.4	Yellow fever in Sudan.....	10
5.	DIRECTIONS FOR DEVELOPING REGIONAL/NATIONAL STRATEGIC PLAN FOR THE CONTROL OF VHF.....	11
5.1	Outcome of plenary discussions	11
6.	DIRECTIONS FOR DEVELOPING A REGIONAL/NATIONAL STRATEGIC PLAN FOR THE CONTROL OF CCHF	12
6.1	Overview of Crimean–Congo haemorrhagic fever.....	12
7.	GROUP WORK	13
8.	DIRECTIONS FOR DEVELOPING A REGIONAL/NATIONAL STRATEGIC PLAN FOR THE CONTROL OF YELLOW FEVER.....	13
8.1	Overview of yellow fever	13
8.2	Discussions	14
9.	SOCIAL MOBILIZATION.....	14
9.1	Social mobilization during outbreaks of VHF	14
10.	DIRECTIONS FOR DEVELOPING A REGIONAL/NATIONAL STRATEGIC PLAN FOR THE CONTROL OF EBOLA AND MARBURG INFECTIONS	15
10.1	Overview of Ebola and Marburg infections.....	15

11.	DIRECTIONS FOR DEVELOPING A REGIONAL/NATIONAL STRATEGIC PLAN FOR THE CONTROL OF DENGUE FEVER	16
11.1	Overview of dengue fever.....	16
11.2	Discussions	16
12.	DIRECTIONS FOR DEVELOPING A REGIONAL/NATIONAL STRATEGIC PLAN FOR THE CONTROL OF RIFT VALLEY FEVER.....	17
12.1	Alkhurma virus in Saudi Arabia	17
12.2	Overview of Rift Valley fever.....	17
12.3	Discussions	19
13.	CONCLUSIONS.....	19
14.	RECOMMENDATIONS.....	20
	Annexes	
1.	PROGRAMME	23
2.	LIST OF PARTICIPANTS	27

1. INTRODUCTION

The World Health Organization (WHO) Regional Office for the Eastern Mediterranean (EMRO) organized an intercountry meeting on epidemiological and laboratory surveillance and response to outbreaks of haemorrhagic fevers in the Eastern Mediterranean Region, in Damascus, the Syrian Arab Republic, from 18 to 21 December 2006. Two representatives from each country in the Region, including the directors of communicable diseases and public health laboratories, in addition to representatives from WHO collaborating centres, attended the meeting. The objectives of the meeting were to:

- review and identify lessons learnt from the outbreaks of viral haemorrhagic fevers (VHF) that have occurred within the Eastern Mediterranean Region in recent years;
- further strengthen regional capacities in epidemic preparedness through strengthened national early warning, surveillance and response systems, public health mapping, improved laboratory capacity and training, field epidemiology training and operational research;
- promote establishment of reference laboratories for VHFs in the Region.

Dr Hussein A. Gezairy, WHO Regional Director for the Eastern Mediterranean, highlighted the resurgence of infectious diseases, which was noted in the first half of the 1990s, and stressed the importance of the new International Health Regulations (IHR 2005), adopted by the World Health Assembly in May 2005. The changes to the IHR 2005 represented a major development in the use of international law for public health purposes. In the IHR 2005, VHFs were listed as diseases for which a single case required the decision instrument to be used to assess whether or not the event qualified to be considered as a public health emergency of international concern.

Dr Gezairy emphasized the need to increase transparency in reporting, to raise the awareness of populations at risk and medical personnel, especially those working where these diseases occurred. He said it was necessary to seek and promote intersectoral collaboration in surveillance and response activities and that it was time that adequate laboratory capacity and epidemiological training in outbreak investigation and management was ensured. Biosafety and biosecurity should always be observed. National strategies for VHFs needed to be updated.

The meeting was chaired by Dr Zuhair Hallaj (Egypt), and Dr Atika Berri (Lebanon) was elected as Rapporteur. The programme and list of participants are included as Annexes 1 and 2, respectively.

2. GLOBAL AND REGIONAL OVERVIEW OF VIRAL HAEMORRHAGIC FEVERS

2.1 Global overview of VHFs

Dr P. Formenty, WHO/HQ

Acute haemorrhagic fever syndrome can be attributed to: (1) infectious diseases such as dengue haemorrhagic fever, Ebola–Marburg VHF, Lassa fever, yellow fever, Rift Valley fever, hantavirus infections, Crimean–Congo haemorrhagic fever and other viral, bacterial or rickettsial diseases; and (2) noncommunicable diseases (toxic, chemical, adulterated or contaminated medicine, etc.), both with a potential to produce epidemics. All cases of acute haemorrhagic fever syndrome, whether single or in clusters, should therefore be notified early, without waiting for the causal agent to be identified, according to a syndromic approach.

The term VHF (VHF) refers to various diseases all producing a similar severe clinical syndrome associated with fever and a bleeding diathesis; these diseases having different etiologies and epidemiological characteristics. Some VHFs, such as yellow fever, have been known for centuries, whereas the majority have emerged more recently, either because of new potential for spreading or as newly recognized diseases. They may cause special problems for public health services because of their epidemic potential, the often high case–fatality rate and difficulties in their treatment and prevention.

The agents causing VHF are a taxonomically diverse group of viruses classified in four different families of RNA (ribonucleic acid) viruses: *Arenaviridae* (Lassa fever, Junin and Machupo haemorrhagic fevers), *Bunyaviridae* (Crimean–Congo haemorrhagic fever, Rift Valley fever, Hantaan haemorrhagic fevers), *Filoviridae* (Ebola and Marburg VHFs) and *Flaviviridae* (yellow fever, dengue haemorrhagic fever, Omsk haemorrhagic fever, Kyasanur Forest disease).

Modes of transmission depend on the agent involved. Viral haemorrhagic fevers can be transmitted by: (1) mosquitoes (dengue, yellow and Rift Valley fevers); (2) by ticks (Crimean–Congo, Kyasanur Forest and Omsk haemorrhagic fevers); by rodents (Lassa, Junin, Marburg and Hantaan haemorrhagic fevers). Natural reservoirs of Ebola and Marburg viruses are still unknown but in Africa, Ebola infections of human index cases were linked to contact with gorillas, chimpanzees, monkeys, forest duikers and porcupines found dead or killed in the rainforest. Transmission through direct contact with infected animals has been documented for Rift Valley fever, Crimean–Congo haemorrhagic fever, Omsk haemorrhagic fever, Kyasanur Forest disease, Junin haemorrhagic fever, Marburg haemorrhagic fever and Lassa fever when animals play an amplification role in the natural cycle of the virus.

Person-to-person transmission has been documented for Crimean–Congo haemorrhagic fever, Junin haemorrhagic fever, Marburg haemorrhagic fever, Lassa, Ebola and Marburg fevers. Person-to-person transmission occurs through direct contact with infected blood, secretions, organs or semen. Risk is highest during funerals with unprotected body

preparation. Risk during the incubation period is low. Nosocomial infections have been frequent; most patients who acquired infection from contaminated syringes and needles died.

VHFs are all of special regional concern and as such should be considered for notification to WHO under the new IHR 2005. Criteria for notification of VHF's outbreak and/or cases to WHO should be based on the four questions provided in Annex 2 of the IHR 2005.

A strategy for controlling VHF's outbreaks should take into consideration the nature of the disease (the kind of transmission of the virus and possible treatment or vaccine) and its epidemiology (potential for family or nosocomial transmission, exposure to arthropod vectors, or direct contact with virus-infected animals). During epidemics strategies to control VHF outbreaks are based on the following interventions.

- Establish a coordination mechanism for a response recognized by all partners.
- Develop a social mobilization and health education programme that will inform the public and restrict practices that promote transmission in the community.
- Implement standard infection control practices to ensure safe case management of patients with respect for patient dignity.
- Establish a powerful active surveillance system that allows the identification of new cases and the follow-up of their contacts during the maximum estimated incubation period (isolate if ill) to stop transmission chains.
- Implement integrated vector control activities to decrease human exposure.
- Ensure organized logistic support which guarantees the safety conditions needed for the correct deployment of operations.

Viral haemorrhagic fevers form a very heterogeneous group of diseases. For the last 10 years, national and international surveillance of VHF's has improved in many countries but progress remains to be made through intensified collaboration with animal health surveillance programmes and improved forecasting models based on meteorological phenomena. This collaboration should be intensified through the Global Early Warning and Response System with the Food and Agriculture Organization of the United Nations (FAO) and the World Organization for Animal Health (OIE), to forge more formal links with wildlife disease experts/networks, and partnership with the different laboratory networks (animal and human). The WHO Global Alert and Response Network (GOARN) provides a framework for rapid and efficient interventions during VHF outbreaks of international importance. Local epidemic preparedness remains the key for the success of control activities. Controlling outbreaks requires not only medical expertise but also adherence to control measures by the concerned populations. The acceptance of control measures, an essential element of response operations, remains the fruit of an intense social mobilization based on a technique called Communication-for-Behavioural-Impact (COMBI), which focuses on influencing behavioural change at both individual and community levels. Taking into account the local socio-anthropological background also seems necessary.

The absence of effective therapies or vaccines for most VHF's severely limits monitoring activities. The possible availability in the near future of post-exposure vaccines and new

“treatments” could change the situation and improve the perception of the medical profession in areas of the world where modern medicine is often lacking.

2.2 Regional overview of VHF

Dr H. El Bushra, WHO/EMRO

VHFs have been reported from at least 12 countries in the Eastern Mediterranean Region, especially from remote areas with limited or non-existent medical services. Emerging VHFs include yellow fever, Rift Valley fever, dengue haemorrhagic fever and Ebola. The risk increases during the *hajj* season due to the large number of slaughter houses operating. Inadequate infection control is another important factor for the emergence of VHF.

VHFs are notifiable diseases according to the IHR 2005. Transparency in communication and sharing information is essential. Inadequate transparency can be attributed to: delayed diagnosis, under-reporting: confirmed versus suspected, fear of over-reaction affecting the economy and creating panic, the site of reporting and over-confidence.

Effective surveillance systems for VHF must be put in place. EWARN and DEWS will stay valuable in geographical areas which are difficult to reach, conflict zones or refugees, areas with weak infrastructure, cross-border committees and other hard-to-reach geographical areas. Member States need to share experiences between countries through global and regional networking, published bulletins and periodic scientific meetings.

The main challenges for VHF in the Region are lack of: adequate awareness; adequate training on infection control; intersectoral collaboration (response); laboratory capacities (biosafety level 3 and 4); adequate transparency; strategies (e.g., vaccination against yellow fever); research; and the need for training in outbreak investigation/management.

3. EPIDEMIOLOGICAL FEATURES, SURVEILLANCE AND LABORATORY ASPECTS OF VHF

3.1 Laboratory aspects of VHF

Dr S. Zaidi, Pakistan

Laboratories play an important role in VHF surveillance and control by providing accurate diagnosis, assisting in epidemiological investigations Available laboratory tests for VHF include serology, detection of viral nucleic acids and virus isolation using cell culture and animal. Although a biosafety level 3/4 laboratory is required, a biosafety level 2 laboratory with restricted entry can be used for serological analysis and for the detection of viral nucleic acid by polymerase chain reaction. A number of ELISA kits with different principles/methodology are available with high sensitivity and specificity and the equipment for ELISA is available in a number of laboratories in the Region and a few laboratories have the capability of PCR. These laboratories can be used for the diagnosis of VHF after strengthening and training of available staff. This will be cost effective and make them sustainable for a longer period of time.

Crimean–Congo haemorrhagic fever was first reported in Pakistan in the 1970s. A dramatic increase in the number of reported cases and deaths has been observed since 2000 but during 2006 only 123 cases of Crimean–Congo haemorrhagic fever were reported and 17 were confirmed by the National Institute of Health. A large outbreak of dengue fever began in October 2006 in Karachi which spread rapidly to other parts of the country. More than 6500 cases were reported and more than 1300 sample were analysed for dengue virus in the Institute; 503 cases were found to be positive for dengue fever.

The Department of Virology, National Institute of Health is fully equipped and has the capability to diagnose VHF and has been serving as a WHO collaborating centre for research and viral diagnostic for a long time. The Department has good cell culture, virus isolation and characterization, serology, electron microscopy and molecular virology and sequencing laboratories.

3.2 Epidemiological aspects of VHF

Dr S. Chinikar, Islamic Republic of Iran

An arboviruses and VHF laboratory (national reference laboratory) was established in October 2000 at the Pasteur Institute in the Islamic Republic of Iran. This laboratory has two sections: serological and molecular. The list of molecular tests that are performed include: Crimean–Congo haemorrhagic fever detection (RTPCR); West Nile fever (RTPCR); Rift Valley fever (RTPCR) dengue fever (RTPCR). The list of serological tests conducted includes: (ELISA): CCHF IgM IgG, West Nile, Rift Valley fever, dengue fever, yellow fever, Chikangunia.

From 2000 to October 2006 in the Islamic Republic of Iran, among 873 suspected cases of Crimean–Congo haemorrhagic fever, 341 cases were confirmed with 57 deaths. 4181 animal samples were taken; 1759 of these animal samples were IgG positive.

The most infected province is Sistan and Baluchistan province (south east of the country). The surveillance programme of Crimean–Congo haemorrhagic fever was planned by three collaborating organizations including: the Centers for Disease Control (MOH), the Pasteur Institute and the Veterinary Organization.

3.3 Surveillance of VHF in terms of the IHR 2005

Dr J. Jabbour, WHO/EMRO

The whole world is changing, the way we live, populations are becoming more urbanized, more microbes are evolving and accordingly new threats emerge. There are some limitations of the old IHR (1969), including that the notification was very narrow and these regulations focused on three diseases which are outdated.

The revised IHR (2005) is a legally-binding document which aims to prevent, protect against, control and provide a public health response to the international spread of disease in ways that are commensurate with, and restricted to, public health risks, and which avoid unnecessary interference with international traffic and trade.

Surveillance is a crucial component for the effective implementation of the IHR (2005). Article 5 of the Regulations states that: “Each State Party shall develop, strengthen and maintain, as soon as possible but no later than five years from the entry into force of these Regulations for that State Party, the capacity to detect, assess, notify and report events in accordance with these Regulations, as specified in Annex 1”. Notification is further elaborated in Article 6, which says: “Each State Party shall assess events occurring within its territory by using the decision instrument in Annex 2 of the Regulations. Each State Party shall notify WHO, by the most efficient means of communication available, by way of the National IHR Focal Point, and within 24 hours of assessment of public health information, of all events which may constitute a public health emergency of international concern within its territory in accordance with the decision instrument, as well as any health measure implemented in response to those events. If the notification received by WHO involves the competency of the International Atomic Energy Agency (IAEA), WHO shall immediately notify the IAEA”.

3.4 The role of NAMRU-3 in VHF detection

Dr A. Soliman, NAMRU-3

The Viral and Zoonotic Diseases Research Programme (VZDRP) is one of four research programmes at NAMRU-3. NAMRU-3 is the WHO collaborating centre for AIDS/influenza surveillance and other emerging diseases. Moreover, it provides support for laboratory and field outbreak for the World Organization for Animal Health (OIE) and the Food and Agriculture Organization of the United Nations (FAO). The centre has highly sophisticated laboratory facilities for isolation of class III and IV viruses (VHF viruses fall under class III/IV) and well-trained qualified staff, in addition to strict biosafety measures required for these classes of viruses. The serology conducted is mainly ELISA (antigen capture and antibody detection) using highly purified specific reagents prepared in the programme. Moreover, advanced molecular technology up to full genome characterization is available at NAMRU-3. Providing training for collaborative countries is one of the major objectives at NAMRU-3 for technology transfer and strengthening laboratory diagnostic capacity of central laboratories in collaborating countries. Specimens or suspected isolates can be sent to NAMRU-3 for verification and further investigation required. The programme is conducting more than 38 ongoing research projects in Europe, Asia and Africa for a diversity of viral diseases. NAMRU-3 has been involved in several outbreak investigations in the Region, including Rift Valley fever outbreaks in Egypt, Saudi Arabia and Yemen, dengue fever in Yemen and Sudan and yellow fever in Sudan. Lately, the programme is heavily involved in avian influenza outbreaks investigations. NAMRU-3 has an efficient communication system with WHO and the ministry of health in several countries of the Region for quick response, particularly during outbreaks.

3.5 Control measures for VHF

Dr T. Madani, Saudi Arabia

Rift Valley fever is one of four VHF identified in Saudi Arabia; the other three are Crimean–Congo haemorrhagic fever, dengue fever, and Al Khamra virus. Rift Valley fever

caused a major epidemic in 2000–2001 in three different areas in the southwest of Saudi Arabia, namely Jizan, Asir and Alqunfuda. From 26 August, 2000, until 22 September, 2001, 886 RVF cases were diagnosed, 85% of the cases were Saudi, 13% were Yemeni, and 3% were non-identified nationalities. All age groups were affected, except the very young and very old, who were rarely affected. Males were more likely to be affected than females at a ratio of 9:1. Risk factors included exposure to both mosquitoes and animals (75.8%) of cases, exposure to mosquitoes only (23.0%), and exposure to animals only (0.4%).

The Ministries of Interior, Health, Agriculture and Water, Transportation and Municipality undertook community-control measures. Community-control measures included intensification of insecticide spraying, safe disposal of dead animals and personal protective measures. A limited supply of the vaccine was made available in Saudi Arabia and was used for persons at high risk of acquiring the disease (veterinarians, Rift Valley fever virus-laboratory workers). In conclusion, the Saudi/Yemen Rift Valley fever outbreak is the first occurrence of the disease outside Africa, which may herald the spread of the disease to other parts of the world, and even though the Saudi outbreak was controlled, there is a potential for recurrence and/or endemicity of the disease in the affected areas.

3.6 Recommended standard infection control practices for VHF

Dr G. Schenpf, WHO/HQ

WHO provides medical expertise and recommendations and various WHO training materials are regularly updated. Standard infection control precautions apply to all patients, health care workers and visitors. These procedures are meant to reduce the risk of transmission of pathogens in the hospital setting. The major components include hand hygiene, personal protection equipment, respiratory hygiene with cough etiquette and the promotion of an institutional safety climate.

The use of gloves, gowns and facial protection for eyes, nose and the mouth should be based on a risk assessment for the transmission of the infection. Alcohol-based hand rubs are the gold standard for hand hygiene in health unless hands are visibly soiled. Hand hygiene needs to be undertaken before patient contact, before an aseptic task, after body fluid exposure task, after patient contact and after contact with the patient's surroundings. People should avoid needle stick injuries from bloodborne pathogens by proper handling of needles and other sharp medical instruments.

It is important to have good respiratory hygiene and cough etiquette; control measures need to occur at the source by covering the mouth and nose with a handkerchief or tissue and to spit. Household bleach in the proper conservation for the specific task is an effective and economical disinfectant. Leadership at all levels should promote a safety climate by developing policies to facilitate infection control measures. Use of standard infection control practices can provide a safe health care environment and reduce the risk of infection and transmission of VHFs.

3.7 The role of vector control in the prevention and control of VHF

Dr A. Mnzava, WHO/EMRO

VHF due to vectors contributes significantly to the total vector-borne disease burden in the Region. These include dengue fever (*Aedes* species), Rift Valley fever (*Aedes* and *Culex* spp.), yellow fever (*Aedes* spp.) and Crimean–Congo haemorrhagic fever (*Hyalomma* spp. of ticks). As a result of their geographical and seasonal expansion in recent years, WHO Regional Office for the Eastern Mediterranean and Member States are addressing them through a holistic approach of the integrated vector management strategy (IVM).

This is an approach that aims at strengthening national capacities in entomology and vector control, as well as the promotion of functional national mechanisms for intersectoral coordination for cost-effective and sustainable vector control interventions. After the IVM strategy was endorsed by Member States in 2005, WHO Regional Office developed tools and guidelines for carrying out comprehensive national vector control needs assessment in the areas of policy, institutional framework, vector control operations, intersectoral coordination and community mobilization. Reports from these assessments in nine countries (Afghanistan, Djibouti, Egypt, Islamic Republic of Iran, Jordan, Morocco, Sudan, Syrian Arab Republic and Yemen) have been analysed and used to develop national plans of IVM addressing all vector-borne diseases, including VHF. A similar process is planned in remaining countries.

Implementation of vector control interventions require adequate preparation and planning and most are costly. Moreover, a good understanding of the vectors and where they breed, bite and rest and the duration of transmission, is crucial in determining which intervention is appropriate and cost effective. For example, whereas the use of indoor residual spraying, space spraying, and to a greater extent, insecticide-treated nets (ITNs) or long-lasting insecticide nets (LLINs) may be theoretically attractive, they may not be generally appropriate in VHF control. The duration of transmission is short and some vectors bite during the day and by the time the above interventions are mobilized and implemented the transmission may be over. A successful operation must therefore rely on the use of repellents (personal protection against adult mosquitoes or ticks) and on larval control (chemical, biological and source reduction) through intersectoral collaboration and coordination with other relevant sectors, including the involvement of communities. Table 1 represents a guideline summarizing the appropriateness of interventions in relation to VHF, depending on local settings.

As most VHF occur as outbreaks, surveillance, including entomological surveillance is necessary to guide the prediction, preparedness and timely response. Whereas capacity in entomology and vector control is generally weak, while strengthening this capacity in the Region it is essential that routine entomological surveillance be carried out through representative sentinel sites. The frequency of sampling will depend on available local resources, the epidemiology of the diseases and local settings. The following are some of the entomological indicators that may be considered: the number of mosquitoes per room or ticks per animal; number of mosquito larvae per dip; number of potential breeding sites/containers positive for larvae; proportion of mosquitoes/ticks that have taken a human blood meal,

Table 1. Appropriateness of vector control interventions for VHF

	IRS	ITNs	Repellents	Larval control ¹	Source reduction	Space spraying
Rift Valley fever	+ -	+	+++	+++	++	+ -
Dengue haemorrhagic fever	+ -	+	+++	+++	++++	+ -
Crimean–Congo haemorrhagic fever	-	-	++	+ ²	-	-
Yellow fever	+ -	+	+++	++	++	+ -

¹ including chemical and biological control

² de-ticking measures

especially where there are alternative hosts; and insecticide resistance monitoring and management strategies where insecticides are being used.

In conclusion, vector-borne VHFs are a major public health problem in the Region. The role of vector control is limited and indeed specific, relying heavily on personal protection and larval control requiring strengthened intra/intersectoral coordination and community mobilization through the implementation of IVM.

4. COUNTRY PRESENTATIONS

4.1 Dengue fever in Saudi Arabia

Dr N. Akbar, SAA

Two outbreaks of dengue fever have occurred in Jeddah, the last one in 2006, as 1304 cases were confirmed by DF IgM or RT PCR, with predominance of serotype 1. Young male adults were the most affected age group. The epidemic started in January, peaked during May and terminated in July 2006. Similar trends have been observed over the last 2 years, but the disease has terminated at an earlier time than previous years due to intervention. Control measures were undertaken by the Ministry of Agriculture, Ministry of Municipality and Ministry of Health. The role of the Ministry of Agriculture was limited to anti-mosquito action outside residential areas. The main bulk of vector control action inside the city was the role of the Ministry of Municipality. The Ministry of Health was responsible for vector control in relation to patients, early case detection and management, training and health education.

4.2 Dengue fever in Pakistan

Dr N. Dura

The national strategy developed for the control of dengue fever and dengue haemorrhagic fever includes: a national cell for the control of dengue and dengue haemorrhagic fever, a nationwide vector control strategy, production of technical guidelines,

standardized hospital case management protocols, personal protection strategy, social mobilization, solid waste management, disease and vector surveillance and capacity-building at all levels.

The disease started in Karachi, the southern part of the country in June this year and there was a second spike after its first appearance in December 2005. Later, it subsided in severity but some cases continued to appear and in late August 2006, it assumed the form of a big epidemic. The diagnostic tests conducted were ELISA, the enzyme-linked immunoabsorbant assay, together with immunochromatography assay technique. Dengue type III was confirmed in NAMRU-3. A number of workshops were held all over the country in different hospitals where a large number of cases were reported. Case management guidelines, both written and video-filmed, have been prepared and sent to all the hospitals through operational officers.

Key interventions have included: vector control efforts instituted as media campaigns have been started in print and electronic formats; spraying at the right time, i.e. before sunrise and around sunset; spray only at ground level; garbage and solid waste removal; home visits with educational messages; and fumigation during hours at which mosquitoes are active (dawn and dusk).

4.3 Dengue fever in Yemen

Dr S. Al Maqtari, MOH/Yemen

Between December 2004 and September 2005 there were a total of 421 cases of illness meeting the case definition; peak incidence was between December and June 2005. Out of 421 cases 172 tested positive for IgM & IgG test (ELISA). Clinically, the illness presented as classic dengue fever with the majority of reported patients. The disease is more likely to affect males (n=266, 63%) than females (n=155, 37%). Out of 15 cases, 8 tested positive for IgG IgM and the rest were not tested.

4.4 Yellow fever in Sudan

Dr B. Magboul/FMOH/Sudan

Sudan is a vast country with an area of 2.4 million square km and a total population of 35 million. Yellow fever outbreaks have been reported four times in Sudan. The first outbreak was reported in 1940 with more than 15 000 cases in South Kordofan with a case fatality of 10%. The second was in Blue Nile Governorate with 114 cases and 88 deaths giving a case fatality of 77%. The third occurred in East Equatoria during 2003 with 178 cases and 27 deaths (case fatality rate 17%). The fourth outbreak was reported in South Kordofan in 2005. The total reported cases were 613 with 184 deaths and a case fatality rate of 30%. Cases were reported from all localities. NAMRU-3 assisted in confirming the cases during the outbreak.

The measures taken to contain the outbreak included: strengthened surveillance system; case management; state-wide vector control operations; mass immunization campaign. 1 645

883 individuals were vaccinated against yellow fever; and a health education campaign was conducted.

There is an urgent need to strengthen the surveillance system in Sudan. The integrated interventions carried out by the epidemiological unit, the Expanded Programme on Immunization and the malaria control programme had led to successful containment. The capacity of national public health needs to be upgraded. Community participation and partnership have provided appreciable support to the Ministry of Health.

5. DIRECTIONS FOR DEVELOPING A REGIONAL/NATIONAL STRATEGIC PLAN FOR THE CONTROL OF VHF

5.1 Outcome of plenary discussions

Dr Z. Hallaj, WHO/EMRO

Surveillance is the most important factor in the fight against VHF. So, in this concern, every country should review its surveillance system, which is by definition “a systematic ongoing collection, analysis and interpretation of data (regarding any health event) in order to take action”. Member States have to consider the magnitude and importance of VHF and increase the sensitivity of existing surveillance systems. The diagnosis of such cases remains a crucial issue. It is more important to transfer a sample than to transfer a case.

The major challenge facing surveillance systems is centralization. Staff at the periphery are not fully aware of the problem and are not very well trained. Suggested solutions have included: availability of written guidelines for suspected VHF cases; rapid exchange of information to increase transparency; transportation for samples should be easily available; rapid response is needed for better control and containment.

Some of these diseases are zoonotic by origin. So, if outbreaks occur in animals, the human health sector should be rapidly informed in order to take specific measures to avoid outbreaks in humans. This is why collaboration between human and animal sectors is of high importance, something unfortunately missing in most Member States. In order to avoid this missing communication, a national committee regrouping all involved sectors and partners has been suggested. Avian influenza committees in all countries could be helpful. Furthermore, these committees should be well recognized and have the authority to act. Legislation related to VHF should be looked at. Each Member State should develop a national plan for the prevention and control of VHF. The plan includes standard case definitions, a system for efficient reporting and rapid response (early warning systems), epidemic investigation capabilities, information sharing, methods for increasing transparency, leadership, communication and social mobilization.

6. DIRECTIONS FOR DEVELOPING A REGIONAL/NATIONAL STRATEGIC PLAN FOR THE CONTROL OF CCHF

6.1 Overview of Crimean–Congo haemorrhagic fever

Dr P. Formenty, WHO/HQ

Crimean–Congo haemorrhagic fever virus (CCHFV) is a zoonosis transmitted by ticks that causes severe outbreaks in humans but which is not pathogenic for ruminants, their amplifier host. Although the virus is non pathogenic in animals, the disease is known as one of the most important VHF because of its high case fatality rate (10%–40%) and its potential for nosocomial transmission. The virus is endemic in all Africa, the Balkans, the Middle East and Asia, south of the 50 ° parallel north, the limit of its tick reservoir the genus *Hyalomma*. The virus is a biosafety class 4 agent for laboratory procedures.

For several years, sporadic human cases and limited outbreaks are increasingly reported every year. Recently outbreaks of the virus in Afghanistan (2001 to 2006), Islamic Republic of Iran (2001), Kazakhstan (2005), Kosovo (2001), Mauritania (2002 to 2003), Pakistan (2001 to 2006), Russia (2006) Saudi Arabia (1990), Senegal (2004 with a human imported case in France) South Africa (1996), Tajikistan (2002, 2004) and Turkey (from 2003 to 2006) have directed the international community's attention to this emerging problem.

In these endemic areas, ecological changes, poverty and social instability, insufficient medical equipment, absence of infection control standards precautions contributed to increase the transmission of the virus in its natural environment, in the community or in hospital settings. These outbreaks constitute a threat for public health services because of their epidemic potential, of their high case–fatality rate and difficulties in their treatment and prevention.

Crimean–Congo haemorrhagic fever is a VHF of special regional concern and as such should be considered for notification to WHO under the new IHR adopted in May 2005. Although the virus is non pathogenic for animals they play a role as amplifactory hosts. Therefore, animal health specialists consider that Crimean–Congo haemorrhagic fever has adverse effects on livestock production and trade in animals and animal products. This is why the virus is a notifiable disease to the OIE.

The magnitude of the public health problem will continue to grow unless more effective measures are taken to reduce viral transmission. Given the worsening epidemiological trends, there is an evident need to renew or intensify efforts for the prevention and control of the disease. WHO and its partners have identified four main priorities.

- Strengthening epidemiological surveillance (including laboratory diagnosis) for planning and response;
- Reducing the disease burden through: WHO standard case management training for Crimean–Congo haemorrhagic fever; improving emergency preparedness and response; and strengthening of national tick-control programmes;

- Promoting behavioural change for sustainable prevention and control of tick populations at individual, household, community, institutional and political levels;
- Accelerating the research programme, notably for treatment and vaccines but also for forecasting models. Cooperation in the field of research on tick-transmitted diseases should be enhanced.

7. GROUP WORK

Participants discussed the general panic during the occurrence of outbreaks. Health educational programmes on television and other media communication means are helpful in reducing such panic. In Member States where decentralized systems exist, networking between laboratories is essential for better and quick diagnosis and confirmation. Health facilities should report immediately any fever with haemorrhage to national authorities and should adapt standard case definitions for VHF. Participants concluded this discussion with the fact that vector control is the most important measure to control such diseases.

8. DIRECTIONS FOR DEVELOPING A REGIONAL/NATIONAL STRATEGIC PLAN FOR THE CONTROL OF YELLOW FEVER

8.1 Overview of yellow fever

Dr H. El Bushra, WHO/EMRO

Fifty-two (52) countries are at risk of yellow fever outbreaks in the world, 35 in Africa and 17 in South America. 897 million people are exposed, 20% of them in urban areas (178 million). The last epidemic occurred in New Orleans in North America, in 1905 with more than 3000 cases and 452 deaths. The annual average of occurrence of yellow fever cases in South America is 100 cases for the last 25 years peaking from January to March each year. More cases are found among males aged 15–45 years who work outdoors in agriculture and forestry. The last outbreak in the western hemisphere occurred in 1954 in Trinidad.

Yellow fever transmission predominately occurs in areas of sub-Saharan Africa and South America 15° North and 10° south of the Equator. From 1986 to 1991, a total 20 000 cases were confirmed with 6000 deaths. Epidemics commonly included 30 to 1000 cases with a case fatality rate of 20% to 50%. Such cases have never been documented in Asia. In the Eastern Mediterranean Region, Sudan has reported yellow fever cases from the Nuba Mountains in 1940 (16 632 cases; 1627 deaths), Alfung, Blue Nile in 1959 (114 cases; 88 deaths), Imatong, East Equatoria, in 2003 (178 cases; 27 deaths) and South Kordofan in 2005 (613 cases; 184 deaths).

WHO and UNICEF recommended a strategy to control outbreaks as follows: 1) inclusion of the yellow fever vaccine in routine infant immunization programmes for infants aged 9 months; 2) implementation of preventive mass vaccination campaigns to rapidly increase population immunity in high-risk areas and to protect susceptible older age groups; 3) rapid response to outbreaks; and 4) surveillance.

Mass vaccination campaigns are crucial while responding to outbreaks. The national authorities should define how many people should be vaccinated, how far from the index case and seek the available technical support to define the most appropriate strategy. During campaigns, implementing bodies should avoid shortage of vaccines during mass immunization campaigns through forecasting, and information sharing with manufacturers and adequate stockpiling.

In big urban cities, preventive integrated vector management should take place while implementing vector control measures. In small town or villages, epidemic intervention would be possible. In the forest, vector control measures are not recommended.

8.2 Discussions

The discussions started with differentiating between the two types of yellow fever infections: jungle, where human infection is accidental, and urban, which is most frequent because man is the host. Routine vaccination for some high-risk countries is proposed. Sudan has already proposed joining the 22 out of 35 (63%) countries in Africa which have included the yellow fever vaccine in their routine vaccination programmes taking into consideration that this vaccine is one of the most effective vaccines.

The yellow fever vaccination certificate is recommended, especially during the season of *hajj*. If an individual is suspected of possessing a fake certificate he/she should be put under active surveillance. *Hajj* areas should be free from *Aedes*. A 15 km-free zone should be established around Mekkah.

In conclusion, Member States should be very well-prepared against yellow fever infection through effective vaccination, vector control measures, implementation of public health measures, considering any country receptive for yellow fever viruses and strengthening laboratory capacity to differentiate (at a national level) between viruses, as they are all *Flaviviruses*.

9. SOCIAL MOBILIZATION

9.1 Social mobilization during outbreaks of VHF

Ms A. Odugleh, WMC/Tunisia

The role of human behaviour in the control and prevention of infectious diseases has become increasingly significant. In cases where medical solutions e.g. medicines and vaccines exist and issues of accessibility and availability have been addressed—improving case detection and compliance continues to be a challenge. Where no current medical interventions exist (dengue, Crimean–Congo haemorrhagic fever, HIV/AIDS) human behaviour is critical in preventing and controlling outbreaks.

The WHO Mediterranean Centre for Vulnerability Reduction (WMC) has been supporting WHO Regional Offices, country offices and Member States in developing and

implementing social mobilization programmes in a wide range of communicable diseases. The Centre is based in Tunis but has an interregional mandate. Over the past 5 years, WHO/WMC has developed and refined a framework for planning social mobilization called Communication-for-Behavioural-Impact (COMBI).

This approach defines social mobilization as "the process of mobilizing all individual and societal influences on individuals and households to promote individual and family action". It recognizes that fact that knowing what to do is different from doing it and that people need to be engaged in a two-way communication in multiple settings using multiple channels. The following three principles underpin the planning process:

- Identify key, specific behavioural objectives linked to prevention and control objectives.
- Conduct a market situational analysis to define behavioural and communication objectives.
- Apply a strategic mix of communication interventions.

The critical first step is in defining one to three key behavioural interventions before designing and disseminating messages. The key behaviours should support control and prevention activities and be technically sound. Formative research through a "situational market analysis" helps in defining and refining the behavioural interventions and also informs what kind of behaviours are feasible, practical and appropriate so it is not rejected by households and builds on existing cultural values and norms. In dengue control this is more complicated as it involves an understanding of vector, ecology and breeding patterns.

The COMBI planning framework applies the five integrated communication action areas as a way to organize and coordinate social mobilization activities: 1) administrative mobilization/public relations/advocacy; 2) community mobilization; 3) personal selling/interpersonal communication; 4) advertising; and 5) point-of-service promotion.

An external evaluation of COMBI programmes in six countries showed that the planning framework was easily adaptable and that some countries were reinventing certain aspects of COMBI which boded well for sustainability. Countries were also expanding and applying the framework to other programmes. More work needed to be done on defining behavioural indicators that were appropriate for monitoring the impact of the behaviours on the vector.

10. DIRECTIONS FOR DEVELOPING A REGIONAL/NATIONAL STRATEGIC PLAN FOR THE CONTROL OF EBOLA AND MARBURG INFECTIONS

10.1 Overview of Ebola and Marburg infections

The first Ebola outbreak occurred in 1967. By this time, scientists were developing many new vaccines, especially against poliomyelitis. They were working on monkeys for vaccine production. They brought a large number of these monkeys to Germany and Yugoslavia, where several people got sick with high fever and haemorrhagic signs, especially people manipulating samples from monkeys. Among 31 reported cases, 7 died in intensive

care for which no treatment seemed to be effective. The etiology of the disease was completely unknown.

In 1976, another two outbreaks occurred in Africa: in southern Sudan and north Zaire where 80% of the affected people died. By that time, and as it was the end period of smallpox eradication, many people thought that the disease was emerging again. An international team was sent around at the end of the two outbreaks and, fortunately, the unknown virus was identified.

Between 1994 and 1995, the virus was seen again in a hospital where surgeons did not wear gloves or masks during their operations. Since 1995, several outbreaks have occurred as a result of people not following standard infection control practices.

The panic during the Ebola outbreaks was high. Overcoming panic requires the conducting of awareness programmes and a better understanding of the community about this disease. Although Ebola is a fatal disease, simple measures can control outbreaks. These measures are: infection control practices; a strong and effective surveillance system (early warning system); social mobilization and good communication, especially within the media, to decrease panic. In conclusion, for diseases such as Ebola and Marburg, infection control remains the most important factor to contain the disease.

11. DIRECTIONS FOR DEVELOPING A REGIONAL/NATIONAL STRATEGIC PLAN FOR THE CONTROL OF DENGUE FEVER

11.1 Overview of dengue fever

Dr G. Schenpf, WHO/HQ

The virus which causes dengue fever is from the *Flaviviridae* family. There are four distinct types of dengue fever: 1, 2, 3, and 4. During initial infection, classical dengue fever occurs while dengue haemorrhagic fever and dengue shock syndrome occur during the second infection with different serotypes. Dengue types 2, 3 and 4 are generally milder than dengue 1.

In the past 50 years the incidence of dengue fever has increased thirtyfold; 2.5 billion individuals are at risk in over 100 countries with 50 million infections annually, including 500 000 cases of dengue haemorrhagic fever; 22 000 of these deaths occur in children.

The challenges are mainly how to reverse the trend of increased dengue fever and dengue haemorrhagic fever and how to strengthen effective vector control.

11.2 Discussions

It is important to differentiate between dengue fever, dengue haemorrhagic fever and dengue shock syndrome. To control dengue fever using larvicides in potable water would

be very helpful. No vaccine or antiviral medicine is effective against dengue fever although intensive research activities are still ongoing (quadrivalent vaccine is not easily produced).

Social mobilization and community involvement are very important measures to control dengue fever. It is always the second infection with another strain which results in haemorrhage and more severe cases. It is very important to identify the first strain of infection. Dengue fever rapid test is highly sensitive and specific but depends on laboratory capacity. During outbreaks, PCR is used to diagnose the first cases, in addition to clinical symptoms.

Dengue fever is attacking big urban cities. Preparedness is essential even in non-affected areas. It is expected that dengue fever might replace malaria in the future because of its rapid spread. The case definition of the disease must be reconsidered for better detection and diagnosis.

12. DIRECTIONS FOR DEVELOPING A REGIONAL/NATIONAL STRATEGIC PLAN FOR THE CONTROL OF RIFT VALLEY FEVER

12.1 Alkhurma virus in Saudi Arabia

Dr N. Akbar, SAA

This new *Flavivirus* was originally isolated in Jeddah in 1995 from six patients with dengue-like haemorrhagic fever. These patients were from the Al Khumra area in Jeddah. 37 cases, out of which 20 were laboratory-confirmed, were diagnosed from February 2001 until January 2003. The majority of these cases were aged from 20 to 40 years and 90% were males. Twelve out of 20 were expatriates. The major risk factor for this disease was living in or visiting districts that have livestock marketplaces or slaughterhouses followed by mosquito bites. Mosquito bites with direct contact with sheep or goat, direct contact with sheep or goat only and contact with a patient with a similar illness were found to be minor risk factors for the transmission of Alkhurma virus. The clinical manifestations were fever, headache, malaise, myalgia, haemorrhagic manifestations, nausea and vomiting, arthralgia and central nervous system manifestations.

The control and preventive measures are summarized mainly through the application of vector control and conduction of more operational research to have clear ideas about the reservoir, the role of sheep, goat and other animals, what animals are susceptible and the features of the disease in the animals.

12.2 Overview of Rift Valley fever

Dr P. Formenty, WHO/HQ

Rift Valley fever is a zoonotic disease transmitted by mosquitoes (*Aedes caballus*, *A. theileri*, *A. circumluteolus*, *Culex pipiens*, *Eretmapodites spp.*) that causes very severe epizootics in domestic animals (especially young sheep, cattle, and goats). These animal epidemics always precede outbreaks in humans. Most human infections are due to direct or

indirect contact with infected animal blood (farmers, slaughtering house, veterinarians, etc.). For Rift Valley fever, no person-to-person transmission has ever been documented. Although human disease is mild in 98% of cases, sometimes patients may develop severe retinitis, meningoencephalitis, or haemorrhagic fever syndromes with a high case fatality rate. Epizootics and associated human epidemics usually follow heavy rainfall.

RVF is in the OIE is list of notifiable animal diseases, and as such, should be reported by the veterinary services. The Rift Valley fever virus is a biosafety class 3 agent for laboratory procedures. Rift Valley fever is endemic in sub-Saharan Africa. The emergence of Rift Valley fever in Yemen and in Saudi Arabia in September 2000, led to 1328 human cases, including 166 human deaths and 20 000 abortions in livestock in Yemen and 882 human cases, including 124 deaths in Saudi Arabia. This was the first time the disease had been reported outside Africa. The largest recorded outbreak of Rift Valley fever occurred in Somalia and Kenya in 1997–1998 following exceptionally heavy rains (60–100 times heavier than normal). Somalia and Kenya are also the main livestock trading partners of member countries of the Gulf Cooperation Council. This livestock trade between countries of the GCC and the Horn of Africa is about 3–4 million head of animals and is estimated to be worth over US\$ 150 million annually.

Rift Valley fever virus can be introduced into new areas, either through an infected viraemic host with the consequent feeding of a competent vector, or through the windborne spread of infected vectors. Once the virus is established in a suitable habitat, it can spread from there to other parts. When the ecological conditions become more favourable, e.g. increased rain and increased breeding of vectors, the endemic infection can become epidemic. Over the last 10 years, many millions of sheep and goats, the main amplification hosts of Rift Valley fever, were imported into the Region and this is considered to be the principle factor influencing the spread of the disease.

Recent Rift Valley fever epidemics and their spread out of Africa have illustrated the weaknesses of disease surveillance systems. The inability to control major diseases at their source, along with animal trade, has been held responsible for the emergence and spread of Rift Valley fever in Egypt in 1977, in Madagascar in 1992 and the Arabian peninsula in 2000.

Early warning and accurate outbreaks forecasting systems based on climatic forecasting data have been developed successfully for Rift Valley fever. Scientists reported that pronounced periods of Rift Valley fever virus activity in Africa have occurred during periods of heavy, widespread and persistent rainfall now associated as El Niño events triggered by large-scale changes in sea surface temperature in the Pacific Ocean with manifestations in climate anomalies at regional scale. This study helps to develop mathematical models using Normalized Difference Vegetation Index (NDVI) chronological series and forecasting climate data.

In Africa and in the Middle East, a collaboration between affected countries, space agencies, such as NASA, FAO and WHO helped to set up monthly maps with potential RVF

outbreak areas. To monitor RVF risk link to rainfall in Africa: <http://www.geis.fhp.osd.mil/GEIS/SurveillanceActivities/RVFWeb/indexRVF.asp>.

When risk areas for Rift Valley fever outbreak are detected, an alert message is sent to the countries to alert them of the possibility of Rift Valley fever emergence in the following weeks. Countries are asked to intensify Rift Valley fever surveillance (animal and human) and to enhance human and animal health collaboration. They have time to take appropriate measures, prepare an outbreak response team and vector control programme.

During October and November 2003, this system was able to predict a Rift Valley fever outbreak in Senegal, Mauritania and Gambia in animals. No cases in humans were reported. Several times, outbreaks of arboviruses (West Nile in Tunisia and Morocco in 2003, yellow fever in Sudan in 2005, dengue in Yemen in 2005) were reported in Rift Valley fever risk areas. This result shows that today models should be ameliorated for Rift Valley fever but can be in use already for forecasting arboviruses outbreaks.

In the framework of the new IHR and surveillance of Rift Valley fever, early warning and outbreak forecasting of Rift Valley fever emergence and the capacity to monitor the spread of such disease to new areas is an essential prerequisite to effective containment and control. New progress is necessary but the use of arboviruses forecasting models based on climate should be encouraged.

12.3 Discussions

Most human infections occur after contact with blood of infected animals. If an outbreak starts in animals, it should be rapidly recognized (because animals get ill) in order to develop preparedness plans for preventing human outbreaks. The resistance to insecticides must be considered through developing a continuous monitoring system.

In forecasting the disease, the time frame is very small in an outbreak. Vector ecology should be taken care of according to the climate forecasts. Effective communication means between professional field staff and national and international networks is crucial to assist the control of the disease in both animal and human sectors.

We can anticipate if we have good connection, effective entomology surveillance and internet access to predict climate changes. Only animals can be vaccinated. Infection control practices are essential to control the disease. In conclusion, forecasting is the most important factor in fighting RVF.

13. CONCLUSIONS

Most VHFs are associated with occurrence of major epidemics and high case-fatality rates. Outbreaks of VHFs tend to occur in remote areas with limited or non-existent medical and or public health services. However, outbreaks of dengue fever/dengue haemorrhagic fever occur in large metropolitan areas. Lack of timely laboratory diagnosis and functional

epidemiological surveillance, inadequate infection control practices at health care facilities and weak vector control programmes can result in prolonged outbreaks.

The emergence and re-emergence of VHFs is a growing concern worldwide, including the Eastern Mediterranean Region, as outbreaks of VHFs could result in public health emergencies of international concern. In the last two decades the Region has witnessed major outbreaks of different VHFs. To date, VHFs have been reported from more than 12 Member States of the Region; and some Member States report more than one type of VHF. With vast developments in modes of transport no country is immune; all countries are at risk.

The intercountry meeting on epidemiological and laboratory surveillance and response to outbreaks of VHFs in the Eastern Mediterranean Region was held in Damascus, Syrian Arab Republic from 18 to 21 December 2006. The meeting discussed the epidemiology of VHFs in the Region and different factors that could influence spread of the VHFs in the Region.

14. RECOMMENDATIONS

- 1. Establish a high level intersectoral technical committee for VHF to ensure:**
 - development of national preparedness plans for early detection and timely response to outbreaks of VHFs. National preparedness plans should define clear lines of responsibilities for all participating partners;
 - acceleration of implementation of the International Health Regulations 2005;
 - transparency and timely sharing of epidemiological and laboratory information related to VHFs;
 - identification of appropriate means of communication between the central and peripheral levels; especially in countries with decentralized health systems;
 - that sentinel early warning and response systems equipped with all necessary communication means and appropriate transport media can early detect and rapidly investigate and respond to VHFs.

- 2. Predict the occurrence of VHF through:**
 - inclusion of VHFs in the disease early warning system;
 - utilization of advanced technology in communication, close collaboration with veterinarians, appropriate entomological surveillance and cross-border sharing of information;
 - utilization of standard case definitions for active case-finding and clinicians and other related medical and health personnel;
 - training activities for implementation of IHR 2005.

- 3. Strengthen laboratory capacities in the Region by:**
 - strengthening national capacities for timely diagnosis of VHFs; especially in countries where outbreaks of VHFs have occurred;
 - establishing a regional network of laboratories for VHFs to ensure timely laboratory diagnosis and sharing of information among those who need to know;
 - building human capacities in addition to transfer of technology;

- establishment of central quality control programme and accreditation procedure in network laboratories.
4. Initiate, strengthen and/or promote implementation of adequate infection control practices in health settings in the Region through developing a climate of institutional safety, strong training programmes on infection control, with special emphasis on hand hygiene, as well as providing uninterrupted supplies of personal protective equipment.
 5. Strengthen national vector control programmes as a key strategy in the framework of integrated vector management (IVM) for VHF through:
 - establishing short- and long-term training programmes with WHO technical support;
 - establishing and strengthening entomological surveillance using appropriate indices and correlate to meteorological data;
 - establishing national standard operating procedures (SOPs) for procurement and use of insecticides;
 - promoting active implementation of safe and appropriate environmental measures to eliminate breeding sites for mosquitoes within the vicinity of residential areas in both urban and rural settings, especially where there is a risk for the occurrence of dengue fever. Metropolitan areas should be free from *Aedes aegypti*, especially at points of entry of countries and during major religious congregations.
 6. Develop and widely distribute detailed SOPs for case management of different types of VHF.
 7. Consider social mobilization as an integral component of containment of VHF by:
 - promoting intersectoral collaboration and coordination to develop a strategic approach for planning and implementing social mobilization interventions related to control and prevention of VHF in households, communities and health care settings;
 - supporting formative research to identify behavioural risk factors and practices that facilitates/amplify transmission of VHF in order to inform culturally appropriate behavioural interventions and messages;
 - allocating resources for capacity-building to develop a cadre of strategic social mobilization planners in the Regional Office and Member States;
 - advocating for resources to implement these strategic plans.
 8. Identify appropriate incentives to ensure maximum collaboration of people.
 9. Expand yellow fever vaccination in Sudan by: incorporating yellow fever vaccination in the Expanded Programme on Immunization (EPI) and conducting campaigns for yellow fever vaccination for all age groups.
 10. Undertake all measures to avoid issuance of falsified certificates of yellow fever vaccine.
 11. Report to the Regional Office the first draft of the national preparedness plan for VHF and other related national activities made by countries to improve preparedness for

outbreaks of VHFs within the next four months. Activities of Member States could include, but not be limited to, lectures, presentations, seminars, joint meetings, etc.

12. Provide technical support to countries by developing, updating and distributing different relevant case definitions, guidelines, manuals, SOPs for health personnel and medical schools.
13. Maintain regional and national preparedness by: monitoring national activities, and encouraging inter-regional, regional and subregional collaboration and joint activities with other international organizations through continuous collaboration with the Mediterranean Zoonoses Control Centre (MZCC), Athens, Greece.

Annex 1**PROGRAMME**

08:30–09:00	Registration	
09:00–09:40	Opening session	Moderated by Dr Z. Hallaj WHO/EMRO
	<ul style="list-style-type: none"> • Address by Dr Hussein A. Gezairy, Regional Director, WHO/EMRO • Address by H.E. Dr Maher Al Hossamy, Minister 	
09:40–10:00	Global overview of VHF	Dr P. Formenty WHO/ HQ
10:00–10:20	Regional overview of VHF	Dr H. El Bushra WHO/ EMRO

Epidemiological features, surveillance and laboratory issues on VHF

10:40–11:00	Laboratory aspects of VHF	Dr S. Zaidi Pakistan
11:00–11:20	Epidemiological aspects of VHF	Dr S. Chinikar Islamic Republic of Iran
11:20–11:40	Surveillance of VHF in terms of IHR 2005	Dr J. Jabbour WHO/EMRO
11:40–12:00	The role of NAMRU-3 in VHF detection	Dr A. Soliman NAMRU-3
12:00–12:20	Control measures of VHF	Dr T. Madani SAA
12:20–12:40	Recommended standard infection control practices for VHF	Dr G. Schnepf WHO/HQ
12:40–13:00	The role of vector control in the prevention and control of VHF	Dr A. Mnzava WHO/EMRO
14:00–14:20	Report of the Crimean–Congo haemorrhagic fever meeting, Ankara, Turkey	D P. Formenty

WHO/HQ

14:20–15:00	Discussion	Dr G. Scnepf WHO/HQ
-------------	------------	------------------------

Country experiences

15:00–15:20	Dengue fever in Saudi Arabia	MOH/Saudi Arabia
15:20–15:40	Dengue fever in Pakistan	MOH/Pakistan
16:00–16:20	Dengue fever in Yemen	MOH/Yemen
16:20–16:40	Yellow fever in Sudan	FMOH/ Sudan
16:40–17:00	Discussion	Dr P. Formenty WHO/HQ

Tuesday, 19 December 2006**Directions for developing regional/national strategic plan for the control of VHF**

9:00–11:00	Plenary Session	Dr Z. Hallaj WHO/EMRO
------------	-----------------	--------------------------

Directions for developing regional/national strategic plan for the control of CCHF

11:20–11:40	Overview of CCHF	Dr P. Formenty
11:40–13:00	Working groups	
14:00–14:40	Presentations of the working groups and recommendations	

Directions for developing regional/national strategic plan for the control of yellow fever

14:40–15:00	Overview of yellow fever	Dr H. El Bushra WHO/EMRO
15:00–16:20	Working groups	Working groups
16:40–17:20	Presentations of the working groups and recommendations	Working groups

Wednesday, 20 December 2006

9:00–9:30	Social mobilization during outbreaks of VHF	Dr A. Odugleh WMC/Tunisia
-----------	---	------------------------------

Directions for developing regional/national strategic plan for the control of Ebola and Marburg

9:30–10:30	Plenary session	Moderated by: Dr Z. Hall WHO/EMRO
------------	-----------------	--------------------------------------

Directions for developing regional/national strategic plan for the control of dengue fever

10:40–11:00	Overview of dengue fever	Dr G. Schnepf WHO/HQ
11:00–12:15	Working groups	Working groups
12:15–12:45	Presentations of the working groups and recommendations	

Directions for developing regional/national strategic plan for the control of Rift Valley fever

13:30–13:45	Overview of Rift Valley fever	Dr P. Forementy WHO/HQ
13:45–15:00	Working groups	Working groups
15:00–15:30	Presentations of the working groups and recommendations	

Thursday, 21 December 2006

Conclusions and recommendations

09:00–11:30

Recommendations by SRAG

Dr Z. Hallaj
WHO/EMRO

11:50–12:15

Closing session

Annex 2

LIST OF PARTICIPANTS

AFGHANISTAN

Dr Omid Entezar
Director of Disease Control and Prevention
Emergency Preparedness and Response
Ministry of Public Health
Kabul

Mr Ghulam Eshan Sharifi
Director of the CPH Laboratory
Central Laboratory
Ministry of Public Health
Kabul

BAHRAIN

Dr Mona Sayed Jawad Al Musawi
Head, Communicable Disease Control
Ministry of Health
Manama

Ms Jameela Jaffer Ghazawan
Head, Medical Technologist
Public Health Laboratory
Ministry of Health
Manama

DJIBOUTI

Dr Ammar Abdo Ahmed
Director of Prevention
and Public Hygiene
Ministry of Health
Djibouti

Mr Maoulid Mohamed Barkad
Chief of National Laboratory
Ministry of Health
Djibouti

EGYPT

Dr Ali Abdel-Sattar Gomaa
Head of Virology Department
Central Laboratories
Ministry of Health and Population
Cairo

Dr Shermine Samir Abu-Alazem
Epidemiologist
Communicable Disease Control Department
Ministry of Health and Population
Cairo

ISLAMIC REPUBLIC OF IRAN

Dr Mohammad Reza Shirzadi
National Zoonoses Control Programme Manager
Ministry of Health and Medical Education
Tehran

Dr Mohammad Zeinali
CCHF Expert
Ministry of Health and Medical Education
Tehran

IRAQ

Dr Muthana Anad Al Shamari
Manager of Central Public Health Laboratory
Ministry of Health
Baghdad

Dr Abdul Wadod M. Nseif
Communicable Disease Control Department
Ministry of Health
Baghdad

JORDAN

Dr Aktham Haddadin
Director of Laboratories
Ministry of Health
Amman

Dr Seif Al Deen Saleh
Assistant-Director of Disease Control
Ministry of Health
Amman

KUWAIT

Dr Ja far Sleman Dawood
Head, Manager Disease Control
Public Health Department
Ministry of Health
Kuwait

LEBANON

Dr Nabil Salam
Head, Preventive Medicine Services
Ministry of Health
Fouad Al-Awal Street, Musuem Sq.
Beirut

Dr Atika Berry
Head of the Communicable
Disease Programme
Ministry of Health
Beirut

LIBYAN ARAB JAMAHIRIYA

Dr Ismail Mustafa Ben-Khalil
Physician, Infectious Disease Unit
Tripoli Medical Center
Tripoli

Dr Bashir Mohamed El-Barany
Physician, Communicable Diseases Specialist
Unit at Tripoli Central Hospital
Tripoli

MOROCCO

Dr Ahmed Rguig
Epidemiologist, Epidemiological
Surveillance Service
Directorate of Epidemiology
and Disease Control
Ministry of Health
Rabat

Dr Amal Alla
Responsible of Virology Laboratory
National Institute of Hygiene
Rabat

OMAN

Dr Idris Bin Salah Al Abaidani
Medical Officer, Department of
Communicable Disease Control
Ministry of Health
Muscat

Dr Said Ali Saif Al Baqlani
Specialist Virologist
Head of Virology Laboratories
Ministry of Health
Muscat

PAKISTAN

Dr Nadeem Hassan
Assistant Director General
Federal Ministry of Health
Islamabad

PALESTINE

Dr Iyad Arafeh
Director General of Epidemiology
Ministry of Health
West Bank

QATAR

Dr Al Anoud Mohammed Al Thani
Resident at Community Medicine
Training Programme
Doha

Dr Mooza Al Khanji
Laboratory Supervisor, Virology and Molecular Biology
Doha

SAUDI ARABIA

Dr Naeema Abdulkhader Akbar
Dengue Fever Coordinator
Ministry of Health
Jeddah

SOMALIA

Dr Ali Abdi Issa
National Officer CDC,
in the North East Zone
Ministry of Health
Mogadishu

SUDAN

Dr Babiker Ahmed Ali Magboul
Director of Epidemiology Department
Federal Ministry of Health
Khartoum

Dr Mubarak El Saaed
Director, Public Health Laboratories
Federal Ministry of Health
Khartoum

SYRIAN ARAB REPUBLIC

Dr Jamil Owied
Deputy Minister
Ministry of Health
Damascus

Dr Mahmoud Karim
Director of Communicable
and Environmental Disease
Ministry of Health
Damascus

Dr Jameel Khabbaz
Laboratory Directorate
Ministry of Health
Damascus

TUNISIA

Dr Mounira Garbouj
Director of Primary Health Care
Ministry of Public Health
Tunis

Mr M'hamed Ali Memmi
General Director
Medical Biology Laboratories Unit
Ministry of Public Health
Tunis

UNITED ARAB EMIRATES

Dr Najat Rashid
Director of Federal Medical Laborats
Ministry of Health
Dubai

Mrs Sahar Bachir
Head of Epidemiology Department
Preventive Medicine Department
Ministry of Health
Dubai

YEMEN

Dr Saeed Al Shaibani
Director General for Central Public Laboratory
Ministry of Public Health and Population
Hodeidah

Dr Sultan Al Maqtary
A Hodeidah Health Office
Surveillance Department
Ministry of Public Health and Population
Hodeidah

SURVEILLANCE REGIONAL ADVISORY GROUP (SRAG) MEMBERS

TUNISIA

Dr Nouredine Achour
Professor of Preventive and
Social Medicine
Faculty of Medicine of Tunis, and
Director of the National Institute
of Public Health
Tunis-1005

ISLAMIC REPUBLIC OF IRAN

Dr Mohammad Esmail Akbar
Professor of Surgery Surgical Oncologist
Head of Cancer Research Center
and Cancer Congresses Coordinator
Shohada Teaching Hospital
Tehran

(apologized)

PAKISTAN

Professor Muhammad Akbar Chaudhry
Principle and Professor of Medicine
Fatima Jinnah Medical College
Lahore

JORDAN

H.E. Dr Saad Kharabsheh
Minister of Health
Ministry of Health
Amman

(apologized)

SAUDI ARABIA

Professor Waleed Milaat
Family and Community
Medicine Department
Medical College
King Abdel Aziz University
Jeddah

EGYPT

Dr Magda Aly Rakha
First Under –Secretary for Preventive
Affairs and Communicable Diseases
Ministry of Health and Population
Cairo

SUDAN

Professor Salih Yassin Salih
President, Sudan Medical
Specialization Board
Khartoum

(apologized)

OTHER ORGANIZATIONS

NAMRU-3

Dr Atef Kamal Soliman
Senior Research Scientist
Head, Virology Unit
US Naval Medical Research Unit No.3

OBSERVERS

Dr Taysseer Aly Youness
Professor of Parasitology
Faculty of Medicine
Ain Shams University
Cairo

WHO SECRETARIAT

Dr Hussein A. Gezairy, WHO Regional Director for the Eastern Mediterranean, WHO/EMRO
Dr Fouad H. Mujalled, WHO Representative, Syrian Arab Republic
Dr Zuhair Hallaj, Director, Communicable Disease Control, WHO/EMRO
Dr Khalif Bile Mohamud, WHO Representative, Pakistan
Dr Awad Abuzeid Mukhtar WHO Representative, Saudi Arabia
Dr Mohamed Abdur Rab WHO Representative, Sudan
Dr Hassan El Bushra, Regional Adviser, Communicable Disease Surveillance, Forecasting and Response, WHO/EMRO
Dr A. Seimenis, Director, WHO Mediterranean Zoonoses Control Centre, Athens, Greece
Dr Pierre Formenty, Bio-risk Reduction for Dangerous Pathogens, Department of Epidemic and Pandemic Alert and Response (CDS/EPR), WHO/HQ
Dr John Jabbour, Medical Officer, Communicable Disease Surveillance, Forecasting and Response, WHO/EMRO
Dr Abraham Mnzava, Scientist (Vector Control Specialist), Roll Back Malaria, WHO/EMRO
Dr Glenn Schnepf, Civil Military Liaison Medical Officer, WHO/HQ
Mrs Asiya Odugleh, Technical Officer, World Health Organization Mediterranean Centre for Vulnerability Reduction, Tunisia
Dr M. Najeeb Durrani, Epidemiologist, WHO Office, Islamabad, Pakistan
Dr Mohamed Fawzy Montasser, Temporary Adviser, Professor of Tropical Medicine and Hepatology, Dean, Faculty of Medicine, Ain Shams University Abbasia, Cairo
Dr Sadegh Chinikar, WHO Temporary Adviser. Head of Laboratory of Arboviruses and Viral Haemorrhagic Fevers (National Reference Center), Pasteur Institute of Iran, 69 Pasteur Ave, Tehran, Islamic Republic of Iran
Dr Sohail Zahoor Zaidi, WHO Temporary Adviser. National Institute of Health WHO Regional Reference Laboratory for Poliomyelitis, Islamabad 45500, Pakistan
Mr Kareem El Hadary, Help Desk Assistant, WHO/EMRO
Mrs Jehane Khadr, Senior Secretary, DCD, WHO/EMRO

Mrs Mervat Sheta, Senior Secretary, DCD, WHO/EMRO
Ms Zeinab Aboul Fadl, Secretary, DCD, WHO/EMRO