WORLD HEALTH ORGANIZATION

SEMINAR ON THE ROLE OF HEALTH SERVICES AND TRAINING INSTITUTES IN THE CONTROL OF VECTORS AND RESERVOIRS OF DISEASES

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VECTOR-BORNE DISEASES AND CONTROL PROGRAMMES IN THE AFRICAN REGION OF WHO

BY

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GENERAL REMARKS

1. Diseases which affect the large majority of populations living in tropical Africa are those transmitted by vectors. They are an important public health problem. The environment and socioeconomic situation of the Region favour reinfection and perpetuate epidemiological transmission cycles. The harmful effects of these diseases may take the form of a high mortality rate in the affected populations but they are mainly the causes of high morbidity rates, which lead to days of work lost and thereby hamper communities' socioeconomic development. Among these diseases are plague, lymphatic filarial disease, typhus fever, yellow fever and other arboviral diseases, the most formidable among them remain malaria, onchocerciasis, trypanosomiasis and schistosomiasis.

MALARIA

Situation in the Region

2. Malaria is endemic in 90% of the African Region and is one of the five most important causes of mortality and morbidity in infants and young children. This disease is responsible for between 15 and 20% of all hospital admissions and it is estimated that about 300 million people live in zones at risk from malaria. Apart from the fact that it causes high mortality rates in children the disease also reduces workers' productivity. In 1978 6.5 million cases, including 7854 deaths, were reported in 31 countries out of a total of 44. The highest rates of incidence at that time were in Ghana, Kenya, Nigeria, Senegal and Upper-Volta. Stable malaria was rife in the major part of the Region at hyper and holo-endemic levels. However, in several zones hypo- and meso-endemic levels were observed. Lesotho, St. Helena, Seychelles and the larger part of South Africa are natural malaria-free areas. The disease has been eradicated from Réunion Island but it reappeared in Mauritius following cyclones.

Antimalaria programme

3. The regional antimalaria programme in Africa is part of Primary Health Care activities which are aimed above all at the most deprived rural communities. Its objective is to reduce mortality and morbidity rates to the lowest possible levels. Control is carried out by administration of chloroquine both for preventive and curative purposes and by vector control. The prevalence of malaria is different from one country to another and sometimes in different parts of the same country. In mainland zones the traditional methods of malaria control are practised whereas eradication programmes in islands off the shores of the continent are carried out where these seem to be technically feasible. Eradication programmes are in progress in the islands of Sao Tome and Principe, Cape Verde and Mayotte.

4. Because of the shortage of qualified personnel and logistic and financial difficulties met with in implementing the programmes, very few countries are at present in a position to undertake control measures using their own resources. The cooperation of Member States with international or bilateral organizations has however enabled these constraints to be overcome. In 1979/1980, for example, 15 countries received technical cooperation from WHO in the form of supplies, drugs, insecticides, material and equipment. Advisory Missions contributed to the development of the malaria control programme in obtaining knowledge of the epidemiological status of malaria, the implementation of the control programme and manpower training. This training is also given at the Lagos Centre in Nigeria and at the Regional Health Development Centre at Cotonou, Benin. In 1982 the Arab Gulf Fund ("AGFUNDS") allocated 3 million US dollars for the purchase of chloroquine tablets for eight countries severely affected by the disease. The distribution of this drug is to be carried out as part of PHC for single dose treatment of suspected and confirmed cases.

5. A new obstacle could further hold up the antimalaria programme in the Region. Until recently all strains of the Plasmodium falciparum parasite were sensitive to chloroquine. Literature now reports that resistance R1 level to this drug has now appeared in some countries of East Africa. To enable Member States to be in a position to detect the extension of this phenomenon, courses on the sensibility in vitro of P. falciparum to the 4 amino quinoleins were organized for English-speaking and French-speaking countries in 1979 and 1980 respectively.

6. Vector control measures have been aimed essentially at adult anopheles mosquitoes. Larval control measures by environmental management are now recommended whenever possible. Depending on the country, house spraying with insecticide has been introduced into urban, sub-urban or even peripheral localities, while in island areas large-scale operations covering the entire territory have been undertaken. 75% WP DDT remains the most frequently used insecticide. In 1979, 15 countries consumed 452 tonnes of active ingredient of this product and it is planned to increase this quantity to more than 2000 tonnes in 1984. Insecticides of the organophosphorous, carbamate and pyrethroid categories have also been used when antimalaria measures are aimed at the same time at the destruction of pests. Most strains of the main vectors An. gambiae, An. arabiensis and An. funestus remain sensitive to organochlorine substances but a resistance to DDT and to dieldrine has been observed at certain places. The above-mentioned species have all proved sensitive to organophosphorous substances and carbamates.

7. To improve the way in which the basic needs of rural communities are met, a new reoriented regional antimalaria strategy was prepared in 1981. It is based on national strategies and emphasises the PHC approach. Health manpower training, education and information of the public, together with the involvement of communities, workers in other sectors and the international community now constitute the keystone of this regional malaria control strategy.

ONCHOCERCIASIS

Situation in the Region

8. Onchocerciasis has been reported from 28 countries of the African Region. This number is likely to increase as more remote areas are opened up for economic exploitation and as more epidemiological surveys are undertaken. It is estimated that about 20 million people are infected with onchocerciasis in the world and more than 90% of these live in the African Region. Geographically, the disease extends in an almost continuous belt between latitude 15°N and 2°N from Senegal in the west to Ethiopia in the east. South of this belt, the disease appears in scattered foci to latitude 17°S.

But this southern pattern may to some extent be the result of inadequate data because only few surveys have been carried out in some of these areas. The most serious result of the disease which is caused by the worm Onchocerca volvulus is blindness, which in turn has been found to lead to neglect and early death. Amongst the seven countries in the Volta River Basin area, it is estimated that there are 70 000 blind, mainly due to onchocerciasis. Reliable data on blindness rates in many other parts of the Region are lacking. Although involvement of the eye is undoubtedly the most important medical complication of onchocerciasis, recent studies have shown that the disease may also affect the regional lymph nodes, the genito-urinary tract and the lungs. On account of the blindness and general debility caused by the disease, onchocerciasis constitutes a serious social burden and a major obstacle to economic development in the hyperendemic areas.

Onchocerciasis control programme

9. The absence of suitable drugs for mass treatment in order to eliminate the reservoir of human infection limits the available methods of controlling the disease to the suppression of vector population. Owing to the long life span of the adult worm in the human host (about 15 to 18 years), control operations against the vector must be maintained for at least 20 years before the disease can be expected to die out in an affected community. The proven vectors of onchocerciasis in the African Region belong to the Simulium damosum complex and the S.neavei group. Adults of these flies disperse too far and too rapidly to make their control a practical proposal. The only way of controlling the vector is through the periodic application of larvicides upstream from the breeding places.

10. Onchocerciasis control programmes were undertaken in some African area after the Second World War but many of the attempts were short-lived and failed except in Kenya, where the vector of the disease is S. neavei. The huge Onchocerciasis Control Programme (OCP) involving seven countries (Benin, Ivory Coast, Mali, Niger, Togo and Upper Volta) in the Volta River Basin area started in 1974. WHO is the executing Agency and FAO, UNDP and the World Bank are co-sponsors. Its objective was to control the disease by interrupting transmission of the filarial parasite Onchocerca volvulus, through the control of blackfly vector S. damnosum s.l. Because of the size of the programme area (800 000 sq. Kilometers incorporating 18 000 Km of waterways) control operations have to be carried out using helicopters and fixedwing aircraft. The operations conducted with the organophosphorous larvicide temephos applied at the weekly intervals, are meeting with success. By the end of 1981 the objective is being achieved in more than 85% of the Programme area in which transmission had been interrupted and no new cases of onchocerciasis had occurred among children born since the programme was launched in 1974. A study on extending the programme to southern Benin, Ghana and Togo was completed whereas a costed plan to extend control in the Senegambia area involving Guinea, Guinea-Bissau, western Mali, Senegal, Sierra Leone is under preparation. Studies to collect base line data for planning the control of the disease have been initiated in Nigeria and Tanzania. In Uganda, DDT E.C. 25% was used in 1978 and in 1979 for Simulium control in Mount Ruwenzori and Mount Budongo foci.

11. There are some constraints to the development of onchocerciasis control programmes in the seriously affected countries of the Region. On account of the long flight range of the main vectors, control operations must cover a wide area to avoid reinvasion by Simulium from beyond the controlled area. Consequently, cost and logistic problems are increased. The recent appearance in Ivory Coast of resistance to temephos and chlorfoxim in the species pair of the S. damnosum complex

S.soubrense/S. sanctipauli constitutes an obstacle for achieving the control programme with chemical insecticide available. The biological insecticide Bacillus thurigiensis H-14 which is ecologically acceptable is effective under dry conditions to control black fly. It requires however further concentration to be effective in rainy season. Many of the countries of the Region lack information about the distribution, prevalence and severity of the disease which can be used in determining its priority rating in relation to the other prevalent health problems. Furthermore, the inadequacy of existing data for providing the socioeconomic justification of onchocerciasis control plans of many countries in the Region result in failure to attract financial support to control the disease.

TRYPANOSOMIASIS

Situation in the Region

12 African trypanosomiasis, affecting both man and animals, occurs throughout tropical Africa from Senegal to the southern part of Ethiopia and as far south as the north-east of Botswana.

13 The disease, also called sleeping sickness, is due to trypanosomes (protozoa) and transmitted by Glossina or tsetse fly. The chronic type of sleeping sickness is caused by Trypanosoma gambiense which is transmitted from man to man by reverine tsetse flies in West and Central Africa. The acute type of disease is caused by T.rhodesiense and transmitted by the species of tsetse flies predominant in East Africa. For this type of disease wild and domestic animals are the main reservoir of infection.

14. There are approximately 200 trypanosomiasis endemic foci scattered over 38 countries of the African Region. In 1978 and 1979, 14 911 and 12 218 cases were respectively reported, but these figures do not probably reflect the reality due to resurgence of cases found in residual foci, revival of former foci and the appearance of new ones. The serious resurgence of the disease at present in Kenya, Ivory Coast, United Republic of Cameroon and above all in Uganda is causing public health problems. Since January 1980, on the average between 50-100 new cases are diagnosed and treated at the newly created centres.

15 Human trypanosomiasis causes severe symptoms due to lesions of the central nervous system and is fatal if not treated. Outbreak may incite population to abandon village and fertile farmlands. According to the most recent estimate about 45 million people are exposed to the risk of this illness which hampers socioeconomic development in the Region.

Trypanosomiasis control

16 Control operations of trypanosomiasis are mainly performed by national health services in spite of many pressing health problems. Surveillance coverage for the population at risk by mobile or stationary services have been increased. As a result, regular surveillance has been maintained for about 10 million people in the face of high cost estimated in 1979 at a total yearly investment of US$5 million.

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17. For treatment, a number of well established compounds are in common use, including suramin, pentamidin, melarsoprol. Resistance to the latter drug has been encountered in recent years. Against T.gambiense, considerable reductions in incidence have been achieved with pentamidine but great care is needed in its use.

18 Reduction of man-fly contact is an important component of trypanosomiasis control. By far insecticide application is the method in regular use. Products can be applied either with ground equipment or from the air by using aircraft and helicopters. Insecticides of the organochlorine type are usually employed in persistent or non-persistent applications. Endosulfan, dieldrin and DDT being the most common. Results of applications in savanna zones are encouraging but difficulties are found in the forest zones. No resistance to the products used has so far been recorded in Glossina. Trapping methods for sampling and controlling tsetse have been developed in Central and West Africa and give hope that simple traps insecticide-impregnated screens can be used by villagers for their own protection. Genetical method using the sterile insect technique has been completed in Upper Volta and the results are being assessed.

19 Promotion of research and cooperation are another aspect of the control of trypanosomiasis in Africa. Since 1975, applied research is being carried out in the moist savane zone of West Africa by a WHO interregional programme that has concentrated on improved medical surveillance techniques on the development of standardized treatment procedures and on safer and better aerial spraying techniques against the vector combined with a community self-help approach for vector control. Similar activities for forest habitats are being developed through support to a research group in Congo and in East Africa for requirements to T.rhodesiense control. At the TDR research centre of Ndola (Zambia) a WHO team is working on in vivo drug tests, serological studies and studies on the response of parasite hosts. International or bilateral cooperation to develop trypanosomiasis control includes providing Member States with drugs, insecticides, materials and consultation to analyse trypanosomiasis, epidemiological situation and formulate appropriate recommendations accordingly.

SCHISTOSOMIASIS

Situation in the Region

20. Possibly 50 million people living in the African Region south of the Sahara are infected by schistosomiasis and about 100 million exposed to the threat of infection. Both forms of the disease in man occur. With S.haematobium widely distributed in, and S.mansoni limited to parts only of all the countries (except Lesotho) but including the islands. The parasite S.intercalatum has a more restricted distribution in Central and West Africa. There are a large number of aquatic intermediary snail hosts with varying susceptibility to different strains of schistosomes. Species responsible for schistosomiasis transmission in Africa belong to the two genera Biomphalaria and Bulinus.

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21 In many countries, the relying of agricultural practices on local irrigation techniques has increased both the prevalence, incidence and intensity of schistosomiasis. Moreover, the construction of man-made lakes for agricultural development has aggravated the situation. Because of its insidious and chronic nature, the disease is more often than not diagnosed incidentally in the course of investigations of other complaints. Although it carries a low mortality, it saps the energy, lowers resistance to other infections and therefore constitutes an important economic burden. The most severely affected countries are Angola, Central African Republic, Chad, Ghana, Madagascar, Malawi, Mozambique, Nigeria, Senegal, United Republic of Tanzania and Zambia.

Schistosomiasis control

22. The objective of the control of schistosomiasis is to reduce rates of morbidity, incapacity and mortality caused by the disease. For treatment of individual cases, relatively effective drugs are available, particularly against S.haematobium, but medical supervision is required in mass drug administration. Schistosomiasis control is also part of water resources development and research is being carried out in this field.

23 In Ghana, the interregional research project on the epidemiology and methodology of schistosomiasis control in man-made lakes was handed over to the Government after it had completed trials on anti-schistosomiasis drugs (Metrifonate and Miridazone) and molluscicides (Bayluscide and Frescon) and showed its effective operational strategy. The project is now a part of the Schistosomiasis Unit in the Ministry of Health.

24. In the Congo, a project on schistosomiasis control by integrated methods has been undertaken in the Niari Valley with the collaboration of the national Government, the Federal Republic of Germany and WHO. Activities include a feasibility study of schistosomiasis control (S.haematobium infection) in a pilot demonstration zone utilizing selective mass chemotherapy, focal and seasonal mollusciciding, repeated health education inputs and ultimately improved domestic water supplies. The drug of choice is Bilareil (metrifonate) and the molluscicide to be used is Bayluscide (Niclosamide). In agreement with the governments concerned, WHO is following up the results of epidemiological studies carried out in Botswana, Swaziland and Tanzania, and those conducted by the water development projects covering several groups of countries in the Region. In the framework of the promotion of self-responsibility, nationals from Ghana, United Republic of Tanzania, Zambia and Zimbabwe were trained in snail control measures at various specialized laboratories.

LYMPHATIC FILARIASIS

Situation in the Region

25. Lymphatic filariasis due to the worm Wuchereria bancroft is more widespread in the Region than recognized. It occurs in Madagascar, Mauritius, Reunion, Comoros, prevalent in humid coastal regions of East and Equatorial Africa and the mouth of the Congo. The vectors are the same as those of malaria i.e An gambiae s.l. and An.funestus In certain islands and along parts of the east coast of Africa Culex quinquefasciatus is one of the vectors and sometimes the only vector. In persons infected, obstruction of the lymph flow and pathological changes in the lymphatic system may lead to hydrocoele or to elephantiasis of the limbs, genitalia or breasts

Control of lymphatic filariasis

26 Diethylcarbamazine citrate (DEC-C) is the most effective drug currently available for the chemotherapy of lymphatic filariasis but there is no mass treatment campaign of the affected populations in the African Region. House spraying campaign carried out in the framework of malaria control had a positive impact for reducing prevalence of the disease Antilarval measures are the best methods to control the urban vector Cx.quinquefasciatus This species is resistant to organochlorine insecticides in all areas of the African Region. Resistance to organophosphorous chlorpyriphos, fenthion and temephos has now been recorded in Kenya and Tanzania

YELLOW FEVER

Situation in the Region

27. Yellow fever is endemic or potentially endemic in West and Central Africa with local and/or regional epidemics from time to time. This acute and often fatal disease for man is caused by an arbovirus with jungle monkeys as animal reservoirs. Vectors proven are Aedes africanus, Ae.simpsoni and Ae aegypti. Monkey to monkey transmission is assured by the forest mosquito Ae.africanus and from monkey to man typically by Ae simpsoni, man-Aedes-man cycle is maintained by Ae.aegypti in an urban environment. In 1979 three countries (Gabon, Ghana, Nigeria) notified 242 cases including 52 fatalities. Two fatal cases were observed in travellers to Senegal, including one the vital aspect of which was confirmed

Yellow fever control

28. In the absence of any specific drug, the treatment of yellow fever is based on general principles of medical care. Control of the vector in forest area is not feasible and that of the urban vector is often difficult in the African context The reliable weapon against the disease remains the freeze-dried vaccine. Yellow fever in man could be controlled by routine vaccination of

all children under 10. WHO cooperates with Member States in containing the epidemic and strengthening preventive measures. In 1978 and 1979 respectively 2 015 000 and 865 000 vaccinations were given by the countries as a whole.

LOUSE-BORNE TYPHUS

Situation in the Region

29. Louse-borne typhus (LBT) due to Rickettsia prowazeki continues to be an important cause of morbidity and mortality in certain ecological areas in Africa These are caracterized by a cold climate associated with a high altitude where the vector, the body louse, proliferates because inhabitants have little possibility of changing the clothing Burundi and Rwanda in the highland of Central Africa are the well-known foci In 1976, those two countries accounted for 7626 cases representing 94,6% of the world total. LBT has also been recorded in Botswana, Chad, Gabon, Niger, Nigeria, Uganda, Zambia and Ethiopia. In this latter country the disease was present in epidemic form in 1979 (17 476 cases), although no deaths were notified

Louse-borne typhus control

30. For treatment and prophylaxis, reliance may now be placed on the use of vibramycin. Any large-scale control campaign must nevertheless be based on delousing of the population and the use of insecticide is the method of choice. Ten percent DDT dust and one percent lindane (HCH) have been the usual insecticides employed. Due to widespread appearance of resistance to these insecticides in body-louse populations, it has been necessary to use malathion formulated at one percent dust. However, resistance to malathion has been reported in Burundi and Ethiopia.

PLAGUE

Situation in the Region

31. Human plague due to P.pestis is one of the diseases subject to the International Health Regulation Its distribution covers five main natural foci in the Region: on the mainland in western Mauritania, around lakes Albert and Edward in Zaire, northern Tanzania, south and southern Africa and on the island of Madagascar. The disease is a permanent threat for Madagascar and Zaire countries which have always been infected. In 1981, 41 of 50 cases and all the deaths (12) recorded in Africa occurred in Madagascar. Three cases of plague were reported for the first time from the Tanga Region, Tanzania. Six cases were reported from Angola.

Plague control

32. A surveillance system for the early diagnosis of the first human cases has been set up in some States. Laboratory diagnosis, isolation of hospitalized cases and early treatment with appropriate drugs constitute a normal activity

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during an outbreak. These measures are strengthened by the use of insecticide against the flea vectors. Ten percent DDT dust have been the product of choice. Resistance to DDT both of X.cheopis and X.braziliensis has been reported in Madagascar and Tanzania respectively

OTHER VECTOR-BORNE DISEASES

33. The above list of vector-borne diseases is far from exhaustive and Leishmaniasis, Dracunculiasis, Loasis, Lassa fever, Ebola and Marburg virus fevers, although localized, cause great concern where they occur

CONCLUSION

34. Vector-borne diseases are among the most severe health problems in many areas of the African Region. Main obstacles to achieving their control by national services remain the lack of financial resources and scarcity of expertise. Moreover, control methods presently developed are sometimes too sophisticated and expensive to guarantee their continuation by the nationals. There is a need to develop simpler and more cost-effective methods of control than can be integrated into the activities of the general health services, especially at PHC level Health for all by the year 2000 cannot become a reality until vector-borne diseases are effectively controlled.