



THIRTY-THIRD WORLD HEALTH ASSEMBLY

Provisional agenda item 29

INDEXED



MALARIA CONTROL STRATEGY

Progress report by the Director-General

In pursuance of resolution WHA31.45,¹ the Director-General submitted a progress report on malaria control strategy² to the Executive Board at its sixty-fifth session in January 1980. In accordance with that resolution, and the discussions that took place in the Board, the Director-General is now submitting a more detailed report to the Thirty-third World Health Assembly.

Although progress has been made in some countries, the epidemiological situation is still a cause of serious concern. The progress achieved has been in countries that have considerably increased their efforts to combat the disease since its resurgence, by house-spraying and distribution of antimalarial drugs. It is clear from the epidemiological situation, however, that many programmes will have to undertake epidemiological research activities, the results of which should lead to a technically sound reorientation of antimalaria activities.

The Director-General has taken specific steps, as called for in resolution WHA31.45, to strengthen the Organization's capacity for cooperation with Member States in malaria control by establishing the malaria action programme and a Malaria Advisory Committee at global level, and by providing funds for the establishment of a permanent secretariat on training, located in Kuala Lumpur, as a coordinating body for the malaria training programme for Asia. The Director-General has also provided funds for advanced training of national staff for a period of three years.

A global WHO medium-term programme on malaria control has been finalized through consultation with Member States and regional offices.

The Executive Board, at its sixty-fifth session, decided to undertake, through its Programme Committee, a more detailed study on the implementation of the malaria control strategy.³ In addition, the Director-General seeks the Health Assembly's advice on the extent to which the Organization's limited resources should be devoted to the control of malaria in the context of the overall priorities of Member States.

¹ WHO Handbook of Resolutions and Decisions, Vol. II (3rd ed.), 1979, p. 60.

² Document EB65/22.

³ Document EB65/1980/REC/1, decision (9).

CONTENTS

	<u>Page</u>
I. Introduction	2
II. Evolution of the epidemiological situation	3
III. Malaria situation by WHO region	5
Africa	5
The Americas	6
South-East Asia	8
Europe	10
Eastern Mediterranean	12
Western Pacific	13
IV. Programme development	15
V. Training	17
VI. Research	18
VII. Dissemination of information	19
VIII. Coordination with other international and bilateral agencies	20
IX. Meetings	20

I. Introduction

1. In pursuance of resolution WHA31.45, the Director-General is submitting to the Thirty-third World Health Assembly a progress report on the development of the malaria control programme. This report should be reviewed in conjunction with the Director-General's report on malaria control strategy to the Thirty-first World Health Assembly,¹ resolution WHA31.45,² and the Director-General's progress report on malaria control strategy to the Executive Board at its sixty-fifth session (January 1980).³

2. In response to the Board's request at its sixty-fifth session, additional information is being circulated separately on: training activities organized by WHO; research activities supported by the Organization; WHO publications on malaria; and available pesticides and antimalaria drugs, including their cost.⁴ A brief summary of scientific progress made in the field of malaria, as published in scientific journals in the past five years, and a document on monitoring of Plasmodium falciparum resistance to antimalarial drugs, have also been prepared and are available to delegates on request.

3. As an immediate response to resolution WHA31.45, the Director-General established a global malaria action programme which has been defined as a "cooperative effort of Member States affected or threatened by malaria, the World Health Organization and international and bilateral agencies to implement antimalaria activities with the goal of reducing, as far as feasible, the impact of malaria on the health and productivity of the population". The

¹ Document A31/19.

² WHO Handbook of Resolutions and Decisions, Vol. II (3rd ed.), 1979, p. 60.

³ Document EB65/22.

⁴ See document A33/INF.DOC./1.

objectives of this programme have been formulated as follows: elaboration of realistic plans based on the level of endemo-epidemicity of malaria and the manpower and financial resources available in affected countries, with the aim of preventing or reducing mortality; shortening the duration of the disease; reducing its morbidity and prevalence; and eradicating it whenever possible.

4. To facilitate the permanent and independent review of the implementation and progress of the malaria control strategy, the Director-General, in consultation with Regional Directors, established a Malaria Advisory Committee composed of 12 members, two from each WHO region, mainly health administrators. With the exception of two members whose particular field is malaria, they hold posts of director-general in national ministries of health or similar positions. The Committee has already had two meetings and the reports of these meetings have been submitted to the Director-General.

5. The resurgence of malaria in the period 1972-1976 in many countries that had undertaken malaria eradication programmes in the late 1950s and early 1960s, the geographical extension and intensity of technical problems, and the shortage of trained and experienced national personnel necessitated priority action aimed at combating malaria epidemics, preventing the further spread of the disease, and developing national expertise. These and other aspects of malaria and its control will be dealt with in the following sections, with the object of obtaining further guidance from the Health Assembly on the extent to which the Organization should devote its limited resources to the control of malaria in the context of the overall priorities of Member States.

II. Evolution of the epidemiological situation

6. The global epidemiological situation has not changed significantly and is still a matter of serious concern, although progress has been made in some countries. In others, a worsening of the epidemiological situation has been reported. Data on malaria cases (or infections) reported by Member States to WHO are presented in Table I.

TABLE I. NUMBER OF MALARIA CASES¹ (IN THOUSANDS)
REPORTED DURING THE PERIOD 1972-1978,
BY REGION

Region	1972	1973	1974	1975	1976	1977	1978	1979
Africa ²	3 995	6 662	5 120	4 136	5 212	4 353	5 330	
Americas ³	285	280	269	357	379	399	465	Information not yet available
South-East Asia ³	1 816	2 686	4 162	6 059	7 296	5 552	4 264	
Europe ³	13	9	7	13	41	119	93	
Eastern Mediterranean ³	830	746	480	424	347	227	126	
Western Pacific ³	171 ⁴	201 ⁴	179 ⁴	188 ⁴	211 ⁴	4 464	3 422	
Total (excluding Africa)	3 115	3 922	5 097	7 041	8 274	10 761	8 370	

¹ The information provided does not cover the total population at risk in some instances.

² Mainly clinically diagnosed cases.

³ Microscopically confirmed cases.

⁴ Excluding China.

7. The figures in the above table in all probability represent less than the true parasite reservoir in affected countries, for the following reasons: (1) countries do not send reports on all their malarious areas and some do not send any reports, so that their figures are, of necessity, incomplete; (2) case detection activities have been reduced drastically in some countries because of the high cost of maintaining a full surveillance system giving total coverage; (3) in countries other than those in the African Region only microscopically confirmed cases are reported. Countries in the African Region mostly report clinically diagnosed cases (i.e., those attending health institutions, which cover 10-20% of the total population) without microscopic confirmation of the malaria parasite in the blood. The data for this Region have not, therefore, been added to the total in Table I. It is reasonable to believe, however, that there has been no significant difference in methods of detection in individual countries during the past five years, and therefore the figures represent the overall trend in the evolution of the epidemiological situation. In fact, the positive political reaction to the resurgence of malaria, and the efforts made by many countries to combat it, have brought down the incidence of the disease and this is also reflected in Table I.

8. The potential of malaria endemo-epidemicity can be conveniently classified according to areas with low, moderate or high risk. On the basis of the malariogenic potential, the population of affected countries and areas has been divided according to whether the risk is nil, minimal or moderate to high (Table II).

TABLE II. SUMMARY OF MALARIA SITUATION ACCORDING TO LEVEL OF MALARIA RISK (AS AT MID-YEAR 1978), BY REGION (population in millions)

Region	Total No. of countries or areas	Estimated population ²	Countries or areas where malaria was endemic ¹							
			Total No. of countries or areas	Population originally at risk	Risk nil		Risk minimum		Risk moderate to high	
					Countries or areas	Population	Countries or areas	Population	Countries or areas	Population
Africa	47	336.18	43	292.65	2	1.37	3	9.73	38	281.55
Americas	49	586.50	34	220.17	12	73.21	4	15.44	18	131.52
South-East Asia	10	992.02	8	918.72	0	-	0	-	8	918.72
Europe	38	822.57	17	376.22	14	309.67	2	23.34	1	43.21
Eastern Mediterranean	24	249.20	23	224.14	4	5.72	4	48.95	15	169.47
Western Pacific ³	38	303.57	18	98.03	5	10.79	2	13.33	11	73.91
Total	206	3290.04	143	2129.93	37	400.76	15	110.79	91	1618.38

¹ Taking 1947 as reference year.

² Based on United Nations monthly Bulletin of Statistics, Vol. XXXIII, No. 7, 1979.

³ Excluding China.

9. Many countries have experienced great financial difficulties in providing the necessary support to antimalaria activities because of the number of priorities to be met within the health sector. However, if any progress is to be made in controlling the disease the particular features of malaria epidemiology will require permanent monitoring. It is clear that malaria will remain a problem for many years to come, and the countries affected will have to prepare long-term programmes accordingly.

III. Malaria situation by WHO region

Africa

10. Countries in Africa south of the Sahara have the highest level of endemo-epidemicity in the world. According to available estimates, the bulk of malaria infections each year throughout the world are in the African Region. It was for this reason that this part of Africa was excluded from WHO's global malaria eradication programme. However, Africa south of the Sahara is not ecologically homogeneous and has levels of endemicity ranging from hypo- to holoendemicity.

11. Based on the above considerations the Regional Office for Africa submitted a report¹ on the development of the antimalaria programme, which included a set of recommendations on the subject, to the twenty-fifth session of the Regional Committee in 1975. After discussing the report, the Regional Committee adopted a resolution² urging Member States to re-examine their health priorities, bearing in mind the malaria situation, and inviting them to undertake subsequently a detailed analysis of the epidemiological situation and arrange their antimalaria activities in accordance with available manpower and financial resources. In 1978, the Regional Director submitted to the twenty-eighth session of the Regional Committee a report entitled "Evaluation of long-term plans: disease control"³ which included the subject of malaria control.

12. In many countries the coverage of the population by any health services is uneven and does not reach more than 20% of the rural areas. It is therefore understandable that, in most of these areas, the level of endemicity has not materially changed. In other countries, however, efforts have been undertaken with success to reduce the mortality caused by malaria among children. Antimalaria activities are also being carried out in some urban areas, and plans are being made to include vector control activities as an integral part of environmental sanitation programmes. The malaria situation in island countries and territories lends itself to control aiming at eradicating the disease, and such programmes are being carried out in Sao Tome and Principe and in Cape Verde. In Réunion and Mauritius, malaria has been successfully eradicated, although in Mauritius, in late 1979, in the wake of three successive cyclones, a flare-up of autochthonous malaria occurred. In Madagascar the central plateau has a low level of endemicity, while the coastal area remains hyperendemic.

13. Under these circumstances, the principal objective of most countries in the tropical belt of continental Africa remains the reduction of mortality and the shortening of the duration of the disease by making available antimalarial drugs to all suspected and confirmed cases. This activity is to be carried out by the primary health care system as part of an integrated approach to disease control. To do this efficiently, it will be necessary in many countries to develop national expertise as part of the epidemiological services, which would be capable of planning, implementing and evaluating these activities. However, wherever feasible, countries would also secondarily aim at reducing the morbidity in vulnerable groups and at reducing the prevalence in communities of economic importance (urban and development zones).

¹ Document AFR/RC25/7.

² Resolution AFR/RC25/R5.

³ Document AFR/RC28/13.

14. The Regional Office has been cooperating with Member States in line with the above policy. In this connexion, nine countries in 1978 and 10 in 1979 received assistance in the form of supplies and equipment. During the past two years four intercountry teams have cooperated with a number of governments in the development of their national malaria control activities or in evaluating antimalaria programmes, more particularly those of Angola, Cape Verde, Congo, Guinea, Kenya, Malawi, Mozambique, Sao Tome and Principe, Sierra Leone, Swaziland, United Republic of Tanzania and Zaire. The Regional Office continues to support the development of national expertise by providing fellowships for the academic course in public health which is held in Cotonou (Benin) and the courses being held for health personnel at training centres in Lomé (Togo) and Lagos (Nigeria). The Regional Office continues to collaborate with USAID in the development of a strategy for assisting malaria control programmes in Africa. It has participated in a malaria study in seven African countries and in two workshops organized for that purpose (see also paragraphs 78 and 103). In collaboration with the national authorities, a three-week course on the assessment of P. falciparum sensitivity to 4-aminoquinolines was held at the University of Dar-es-Salaam, United Republic of Tanzania, with the participation of 12 participants from 10 English-speaking African countries. A seminar was organized by the Government of Mauritius with the participation of the other islands in the Indian Ocean (Madagascar, Réunion and Seychelles) with the aim of preventing the reintroduction of malaria in the countries which are freed of the disease.

The Americas

15. The estimated population of the Americas is 586.5 million, of which 220.2 million (37.5%) live in originally malarious areas. Of the latter figure, 107.0 million (48.6%) live in areas in which the disease has been eradicated (maintenance phase); 59.0 million (26.8%) in areas in which transmission has been interrupted, although the reservoir of parasites has not yet been depleted (consolidation phase); and 54.2 million (24.6%) in areas of persisting transmission.

16. The epidemiological situation has remained stagnant in most countries, although in some slow progress has continued to be made. On the basis of the present appraisal, as well as on the magnitude of the problems and the resources available, the 34 countries or territories of the originally malarious areas have been classified in four groups.

Group I

17. This group consists of 12 countries or territories in which malaria eradication has been achieved: Chile, Cuba, Dominica, Grenada, Guadeloupe, Jamaica, Martinique, Puerto Rico, St Lucia, Trinidad and Tobago, United States of America (continental), and United States Virgin Islands. The population in the originally malarious areas of this group amounts to 73.2 million inhabitants, or 33.2% of the total population of the malarious areas of the Americas. Since eradication was achieved in the countries concerned, transmission has not been re-established in any of them, although there were two Plasmodium malariae outbreaks, one in Tobago in 1966 with 39 cases and one in Grenada in 1978 with 58 cases. Both outbreaks were confined to small areas and were considered to be local in origin.

18. In these countries or areas, where receptivity and vulnerability are generally low, imported or introduced cases have been diagnosed quickly and treated effectively. The total number of malaria cases reported from these countries in 1978 was 840, as compared to 655 in 1977.

Group II

19. This group comprises nine countries or territories in which transmission has been reduced to negligible levels. However, the regular importation of cases from neighbouring areas and the high degree of receptivity existing within these countries has made it necessary for the national malaria eradication services to maintain costly epidemiological surveillance and to continue DDT spraying as a preventive measure in the most vulnerable regions. Those belonging to this group are: Argentina, Belize, Canal Zone, Costa Rica, Dominican Republic, French Guiana, Guyana, Panama and Paraguay.

20. The total numbers of cases reported in 1978, as compared to 1977 figures (shown in brackets), were as follows: Argentina, 325 (463); Belize, 1218 (894); Canal Zone, 5 (4); Costa Rica, 313 (217); Dominican Republic, 1531 (745); French Guiana, 266 (488); Guyana, 927 (1563); Panama, 263 (674); and Paraguay, 156 (156).

21. The population in originally malarious areas of this group amounts to 14.2 million, or 6.4% of the total population of the originally malarious areas of the Region. Experience has shown that when epidemiological surveillance activities are reduced or suspended, or there is a delay in the application of emergency measures, transmission is quickly re-established and easily spreads to other receptive areas. In recent years there has been a setback in the epidemiological situation in Belize and Guyana owing to a reduction in surveillance activities. Attack measures have again been started in all the affected areas. In the Dominican Republic, the number of cases has increased in the last three years because of the rise in imported cases. Transmission is concentrated and no difficulties are foreseen in eliminating it.

Group III

22. This group includes five countries in which eradication is the aim and in which activities are continuing at the same level, if not at a higher level, as compared to previous years. Antimalaria activities are being carried out on a national scale, and the most appropriate methods are selected in the light of local epidemiological conditions. The countries in this group are: Brazil, Ecuador, Mexico, Suriname and Venezuela. The population of their malarious areas amounts to 94.8 million inhabitants, or 43.1% of the total population of the malarious areas of the Americas.

23. Since 1975, Brazil has reported a gradual increase in the number of cases. In 1978 there were 121 577 cases as against 104 436 in 1977. This increase has taken place in areas undergoing socioeconomic development and where there has been a rapid increase in the population. In the remaining part of the country, however, substantial progress has been made.

24. The epidemiological situation did not change significantly in the other four countries where the number of reported cases in 1978 and 1977 (shown in brackets) was as follows: Ecuador, 9815 (11 275); Mexico, 19 080 (18 851); Suriname, 876 (993); Venezuela, 5065 (5304). Malaria transmission has been interrupted over a large part of these countries and the foci are limited. There are technical problems such as vector resistance to DDT in southern Mexico, *P. falciparum* resistance to chloroquine in the countries of South America, elusive behaviour of vectors, and serious problems related to human ecology. Despite the difficulty encountered in solving some of these problems, slow progress has continued to be made, the programmes receiving adequate support and resources from the governments concerned.

Group IV

25. This group includes the remaining countries belonging to the malarious zone: Bolivia, Colombia, El Salvador, Guatemala, Haiti, Honduras, Nicaragua and Peru. Their population in originally malarious areas amounts to 38.0 million inhabitants (17.3% of the total living in the malarious area). In some countries the epidemiological situation has deteriorated because of serious technical, administrative, financial and operational problems.

26. The evolution of the epidemiological situation is summarized in the table below:

TABLE III. EVOLUTION OF THE EPIDEMIOLOGICAL SITUATION, AMERICAS, GROUP IV

Country	1977			1978		
	Slides examined	Slides positive	Slide positivity rate (%)	Slides examined	Slides positive	Slide positivity rate (%)
Bolivia	118 002	10 106	8.6	124 082	10 897	8.8
Colombia	401 621	63 888	15.9	381 978	53 412	14.0
El Salvador	471 109	32 243	6.8	460 313	52 521	11.4
Guatemala	472 297	34 907	7.4	463 794	59 755	12.9
Haiti	400 024	27 679	6.9	365 202	60 472	16.6
Honduras	264 233	39 414	14.9	236 650	34 554	14.6
Nicaragua	215 093	11 584	5.4	243 450	10 633	4.4
Peru	275 827	32 410	11.8	201 513	20 376	10.1
Total	2 618 206	252 231	9.6	2 476 982	302 620	12.2

27. Technical problems such as vector resistance to insecticides (Colombia, El Salvador, Guatemala, Haiti, Honduras and Nicaragua) or P. falciparum resistance to chloroquine (Colombia), administrative problems - lack or shortage of financial resources (Bolivia, Colombia, El Salvador, Guatemala, Honduras), high turnover of personnel, and lack of professional staff (Bolivia, Colombia), and problems connected with population movements associated with economic development projects and construction of highways and dams (El Salvador, Nicaragua and Peru) continue to be the most serious obstacles to the interruption of malaria transmission.

28. Some countries (El Salvador, Guatemala, Haiti) reported more cases in 1978 (172 748) than in 1977 (94 829). This is an increase of 82.2%, though the percentage may be higher in reality as the number of blood films examined in 1978 (1 289 309) was lower than in 1977 (1 343 430), a decrease of 4.0%.

South-East Asia

29. Malaria still remains a major problem in eight of the ten countries belonging to this Region. 919 million people live in areas where, either in certain parts or throughout, the malaria risk ranges from moderate to high.

30. Although the reported regional reduction in the number of cases in 1977 and 1978 seems to indicate an overall improvement in the malaria situation, no significant progress has been recorded in Indonesia and Nepal and a further deterioration of the epidemiological situation occurred in Bangladesh and Burma.

31. In Bangladesh, the disease spread from the highly endemic areas to the low malaria risk areas, where an outbreak flared up in early 1979 with over 100 reported deaths. In 1978, despite a very low annual blood examination rate (1.8%), the cases reported amounted to 33 326, an increase of 4471 as compared to 1977. Another indication of the deterioration of the malaria situation is the 2.6 times increase in the number of sectors where the yearly incidence of malaria cases is higher than one per 1000 population; in figures the number of such affected sectors increased from 675 to 1771, mainly in areas considered freed from the disease.

32. In Burma, 13 195 cases were reported in 1978 but this is only a fraction of the actual total, especially if it is considered that at least 3000 deaths were related to malaria during the same period (SEARO regional malaria global profile, 1979). Plasmodium falciparum, which is frequently and widely resistant to chloroquine, accounted for 50-70% of infections. The progress of the programme is hampered by administrative (financial constraints and loss of external aid), operational (lack of transport and access to many areas, inadequate numbers of qualified staff, population movements, reduced vigilance, delays in supplies of insecticides) and technical problems (vector behaviour and resistance to insecticides, P. falciparum resistance to 4-aminoquinolines).

33. In Indonesia, the number of cases reported from Java and Bali increased from 110 553 in 1977 to 127 354 in 1978; the increase was largely due to a higher number of cases in Central Java, where the vector Anopheles aconitus is resistant to DDT, and a slight increase in West Java. The number of cases continued to decline in 1978 in East Java and to a lesser extent in Bali. In the islands other than Java and Bali, 285 986 blood films were examined in 1978, of which 34 004 were positives. The relative prevalence of P. falciparum showed a declining trend.

34. In Nepal, the total number of cases reported in 1978 was 12 887, as compared to 12 002 in 1977. The increase in cases was mainly from the central and western regions, and marginally from the eastern region, whereas the far western region showed a slight reduction. The annual blood examination rate was satisfactory in four regions and, in fact, exceeded 15%, but in the integrated districts it was less than 9%. The proportion of P. falciparum infections further declined and was the lowest recorded after 1972; during the first semester of 1979 there has been a reduction of 1090 cases as compared to same period of 1978.

35. The situation has slightly deteriorated in the Maldives, where the number of cases has gradually increased from 266 recorded in 1977 to 391 reported in 1978 and 150 diagnosed during the first six months of 1979, as compared to 109 reported during the same period of 1978. Transmission appears to be confined to one southern and four northern atolls; the main vector, A. tessellatus, which had not been found in the islands for many years, was detected again in three atolls, and this prompted the resumption of DDT spraying and intensified surveillance.

36. A significant reduction in malaria incidence was reported in India and Sri Lanka, and this accounted for the overall improvement in the malaria situation in the Region.

37. In India, the number of confirmed cases of malaria in 1978 was 3.6 million, a 23% reduction as compared to 1977. During the first quarter of 1979, there was a 40% reduction as compared to the same period of 1978. Mortality from malaria was reduced mainly by means of prompt treatment through the increased network of drug distribution centres (more than 270 000 in villages throughout India by mid-1979, staffed by volunteers such as community leaders and school teachers) and fever treatment depots. The P. falciparum containment programme was reviewed quarterly throughout 1978 and 1979 in Zone 1 and commenced in July 1979 in Zone 2. National staff are in position in most districts; regarding international personnel, two were in position and three more are being recruited.

38. In Sri Lanka, the number of reported cases fell from 263 000 in 1977 to 69 700 in 1978 and 19 589 for the first six months of 1979 (a reduction by more than half over the corresponding period of 1978). P. falciparum infections represented 2.6% of positive slides in 1978 and 3.2% in the first six months of 1979. P. falciparum remained susceptible to 4-aminoquinolines and A. culicifacies continued to be sensitive to malathion, dieldrin and fenitrothion.

39. In Thailand, the epidemiological situation showed some signs of improvement. In 1978, 329 388 cases were reported as compared to 315 413 in 1977. The relative prevalence of P. falciparum and P. vivax was 53.5% and 46.1% in 1977 and 56.9% and 42.8% in 1978. During the first six months of 1979, however, 122 284 positives were reported (15 661 fewer than in the same period in 1978), of which 50.3% were P. falciparum and 49.3% P. vivax. Although the Thailand programme is still faced with some administrative and financial constraints, the recently approved United States Agency for International Development (USAID) assistance to

the project (US\$ 4 500 000 for three years) will help to enlarge training facilities, develop applied field research, intensify health education, and complete a network of malaria clinics, particularly in the areas under malaria control.

Europe

40. Out of the 376.2 million people living in originally malarious areas, 309.2 million are in countries where there is no malaria risk, 23.3 million in two countries exposed to a minimum risk, and 43.2 million in one country where the risk is from moderate to high.

41. According to official reports from Algeria and Morocco, where malaria control programmes are in progress, the epidemiological situation is satisfactory. In Algeria 58 cases were diagnosed and reported in 1977 (from 713 982 blood examinations) and 30 cases in 1978 (from 978 653 blood examinations). In Morocco, the number of cases reported was 159 in 1977 (from 1 701 739 blood examinations) and 64 in 1978 (from 1 744 391 blood examinations).

42. The favourable trend reported from both countries should be an incentive to increase the effort for a final drive against malaria. The principal malaria vector, A. labranchiae, is still responsive to DDT, although its tolerance to this insecticide is increasing in both countries. The continued responsiveness of this species to DDT cannot, however, be guaranteed, and efforts to eliminate malaria should be strengthened while DDT is still effective and before it has to be replaced with more toxic and expensive insecticides such as organophosphate or carbamate compounds.

43. A special surveillance mechanism or reinforced vigilance is needed in Algeria where, because of the construction of the Trans-Saharan highway, movement between North African and the intensely malarious regions of West Africa is increasing. This may well lead to the importation into North Africa of West African parasites, such as P. falciparum and P. malariae, where strains may find suitable conditions.

44. The situation is much improved in Turkey, where an epidemic flared up in 1976. The total number of cases reported from the whole country decreased from 115 509 in 1977 to 88 603 in 1978 and 25 686 up to September 1979. The epidemic affected three southern provinces of Turkey (Cukurova/Amikova areas) and to a minor extent the south-east Anatolia region. The evolution of the situation in these two main areas is summarized in Table IV.

TABLE IV. NUMBER OF REPORTED CASES OF MALARIA IN TWO AREAS OF TURKEY, 1977-1979

Epidemic area	Year	Number of reported cases
Cukurova/Amikova	1977	101 867
	1978	71 204
	1979*	17 353
South-east Anatolia	1977	11 130
	1978	14 207
	1979*	7 114

* Up to 30 September 1979.

45. Small foci of transmission are reported, however, in some parts of the country where malaria was previously eradicated, thus indicating that the disease has spread into other receptive areas of Turkey. In order to promote and implement the vigilance system required to prevent the reintroduction of malaria in the bordering countries, i.e. Bulgaria, Greece and Yugoslavia, UNDP is sponsoring an intercountry project which was established in 1979.

46. The encouraging results outlined above were obtained through the efforts of the Turkish Government and the technical cooperation provided by Member States in the European Region. The persistence of focal transmission and the danger of new outbreaks occurring in receptive areas within and outside Turkey, however, emphasizes the need for increasing efforts and particularly for the continuation of Europe's involvement in the eradication of the disease from this continent.

TABLE V. IMPORTED MALARIA CASES REPORTED, EUROPE, 1971-1978¹

Country	1971	1972	1973	1974	1975	1976	1977	1978
Albania	2	1	0 ²	0	0	1	3	0 ²
Austria	6	13	7	6	11	31	33	...
Belgium	12	3	22	3	1	1	3	0
Bulgaria	9	8	13	32	45	60	90	101
Czechoslovakia	10	7	2	8	9	6	4 ²	...
Denmark	13	28	38	59	62	46	49	54
Finland	8	4	4	16	4	22	2 ²	12 ³
France	13	8	22	39	119	165	199	494
German Democratic Republic	3	6	11	4	17	18
Germany, Federal Republic of ⁴	100	134	146	105	175	218	337	534
Greece	25	37	20	21	27	33	39	64
Hungary	4	4	6	5	8	2	4	8
Ireland	0	1	2	2	1	6	58 ⁵	11 ⁶
Italy	39	62	56	60	56	103	205	101 ²
Malta	...	0	0	0	2	0	0	0 ²
Netherlands	26	19	30	27	54	76	107	108
Norway	2	...	13	0 ²	25	56	12 ⁶	20
Poland	2	3	8	12	18	19	27	35
Portugal	473	584	594	903	971	482	133	52
Romania	1	8	3	3	10	7	17	17
Spain	23	19	34	20	30	39	57	32
Sweden	25	27	49	52	59	62	78	79
Switzerland	4	5	11	37	85	49	48	112
USSR	307	211	226	272	275	310	350	408
United Kingdom	269	336	539	660	765	1 217	1 528	1 909
Yugoslavia	13	14	13	16	13	41	41	48
Total	1 386	1 536	1 861	2 364	2 836	3 054	3 441	4 217
Deaths	34	34	42	19	25	13	28	26

¹ The total number of cases may be higher than reported as in some countries imported cases are not subject to compulsory notification.

² First semester.

³ Including second semester 1977.

⁴ Including relapses.

⁵ Including first semester 1978.

⁶ Second semester.

47. European countries are well aware of the possibility of reintroduction of malaria and have taken concrete steps (e.g., Working Group on Receptivity to Malaria and Other Parasitic Diseases, Izmir, Turkey, 11-15 September 1978; Coordination Meeting for the Prevention of Malaria Reintroduction in the Western Mediterranean Basin, Erice, Italy, 22-28 October 1979) to reinforce malaria services for surveillance and to maintain the awareness of health personnel and the public concerning malaria.

Eastern Mediterranean

48. The Region comprises 24 countries or areas with an estimated population of 249.2 million. Of the 224.1 million people originally at risk, 169.5 million live in areas where the malaria risk is moderate to high, including 20 million living in areas where no specific antimalaria measures are being carried out, while for 48.95 million the risk is minimal. 5.7 million people live in areas where malaria eradication has been achieved.

49. On the basis of the present status of the antimalaria campaign in the Region, the 24 countries or areas have been classified into three groups as follows.

Group I

50. This group consists of six countries with malaria but without a countrywide malaria control programme, i.e., Democratic Yemen, Djibouti, Oman, Somalia, Sudan and Yemen. The progress is relatively slow because of limited human resources (Democratic Yemen, Oman), financial resources (Yemen), or both (Somalia). A new project for the prevention and control of water-associated diseases in the Gezira area of Sudan was launched in 1979 and will last for 10 years. In Sudan, control operations were successful in the areas of Gezira and Rahad but the disease was on the increase in New Halfa and Khartoum provinces. A field research project to study the antimalaria effect of the dissemination of larvivorous Tilapia fish in the man-made cisterns in northern Somalia was approved for WHO assistance (Special Programme for Research and Training in Tropical Diseases) in 1979.

51. The number of cases reported from these countries in 1978 as compared to 1977 (figures in brackets) was as follows: Democratic Yemen, 8317 (9563); Djibouti - no reports; Oman (6840) (2632); Somalia, 14 785 (13 684); Sudan, 4833 (11 290); Yemen - no data for 1978 (1337).

Group II

52. This group comprises eight countries with nationwide malaria control programmes: Afghanistan, Bahrain, Egypt, Iraq, Pakistan, Syrian Arab Republic, Saudi Arabia, and United Arab Emirates. According to available information it seems that the disease is showing a downward trend in Afghanistan, Bahrain, Egypt, Iraq and Pakistan, where the number of cases reported in 1978 and 1977 (in brackets) was as follows: Afghanistan, 44 311 (59 637); Bahrain, 460 (592); Egypt, 832 (1038); Iraq, 3570 (5069); and Pakistan, 15 366 (47 668). However, due to prevailing conditions, surveillance activities were not regularly carried out in some areas of Afghanistan during 1978 and in Pakistan antimalaria activities continue to be carried out in many areas without adequate supervision and without taking due account of available epidemiological information. No significant improvement was noted in Saudi Arabia, with 3344 cases reported in 1978 as compared to 2987 in 1977. The relatively high increase in the number of cases reported in 1978 from the United Arab Emirates (22 662, against 14 737 in 1977) is probably due to improved case detection activities.

53. The epidemiological situation continued to deteriorate in the Syrian Arab Republic: 3388 cases in 1978 as compared to 2145 in 1977.

Group III

54. This group includes 10 countries or areas with either advanced malaria eradication programmes or in which malaria has been eradicated: Cyprus, Gaza Strip, Iran, Israel, Jordan, Libyan Arab Jamahiriya, Kuwait, Lebanon, Tunisia and Qatar. According to available information, the epidemiological situation continues to remain satisfactory in the Gaza Strip, Israel, Jordan, Lebanon, Tunisia and Qatar, where the number of cases discovered in 1978 and 1977 (in brackets) was as follows: Gaza Strip, 1 (4); Israel, 17 (28); Jordan, 400 (360); Lebanon, 8 (17); Tunisia, 16 (9); and Qatar, 168 (97).

55. The whole of Kuwait remains naturally free of malaria transmission; no autochthonous transmission has been reported from Cyprus and the Libyan Arab Jamahiriya. As regards Iran, no recent information has been received.

Western Pacific

56. Of the 98.03 million people originally at malaria risk, 10.8 million live in areas where the disease has been eradicated, 13.3 million are exposed to a minimum risk, and for the remaining 73.9 million the risk is still moderate to high.

57. Australia, Brunei, Hong Kong, Japan and Macao remained malaria-free, although the number of imported cases was on the increase in all these countries. In Australia, the number of imported cases in 1978 was 309 as compared to 281 in 1977: the major source of the imported cases was Papua New Guinea, followed by India and Indonesia. In Brunei, the situation has been kept under control by strengthened vigilance and parasite surveys at six-month intervals in receptive areas, also partially covered by six-monthly DDT spraying. In 1978 the number of reported cases was 11, against 10 cases in 1977.

58. In Hong Kong, 47 cases were detected in 1978; of these, 44 were classified as imported (50% from India) and the other three as induced (2) or congenital (1) malaria; 36 imported cases, out of a total of 39, were reported in 1977. The number of imported cases reported from Japan was 23 in 1978; figures referring to 1977 are not available. No malaria case was detected in Macao in 1978.

59. The epidemiological situation continued to remain satisfactory in Singapore: against 184 cases reported in 1977 (174 imported, 9 introduced and one cryptic case) there were 166 cases (159 imported and 7 introduced) in 1978.

60. The antimalaria programme made considerable progress in Peninsular Malaysia, where the total number of cases reported in 1978 was 10 365 as compared to 13 649 cases in 1977. Major challenges are still presented by population movements and land development schemes.

61. The malaria situation in Sabah, which had deteriorated since 1974, seems finally to have improved in 1978. Although the situation is still not satisfactory in several areas, an obvious reversal of the trend was observed in the Interior Residency where, in different districts, the malaria incidence showed a 25-30% reduction compared to 1977. Strengthened supervision and management and increased public cooperation, supported by a switch from DDT water-dispersible powder to emulsion, led to markedly improved field operations and coverage. Widespread chloroquine resistance of P. falciparum was confirmed by in vivo and in vitro tests carried out in 1978. The total number of cases reported in 1978 was 43 399 as compared to 44 789 in 1977.

62. The gradual decline in the malaria incidence in Sarawak (1664 cases in 1975, 1402 in 1976, 1133 in 1977) was not sustained in 1978 (1548 cases) owing to an outbreak of partly chloroquine-resistant P. falciparum among the (semi-) nomadic Punans, and a growing number of imported cases which caused some secondary transmission. However, the overall prospects for the programme, assisted by increasing coordination of operations along the border with Indonesia, where the majority of cases occur, are good. The rapid development of the rural health infrastructure will provide additional support.

63. Progress was noted in the New Hebrides: the number of cases reported was 4782 in 1978 as compared to 5285 in 1977. This was the result of active community participation in all sprayed areas, where villagers spray their own villages on a voluntary basis with the central authority providing supplies, equipment and supervisory assistance and training. Despite some technical imperfections due to insufficient instruction of spraymen, the approach resulted in an improvement of acceptance and coverage by the population. The reduction in malaria incidence must also be related to favourable climatic conditions during the second half of 1977 and 1978. Cooperation of the general health services in malaria case detection was further promoted and continued most satisfactorily.

64. In the Solomon Islands, antimalaria activities are faced with a series of technical, operational and administrative problems which require a re-examination of the strategy. Despite all efforts taken during 1977 to stem an imminent epidemic, the situation deteriorated further in 1978 as indicated by the total number of cases reported, which was 20 237 as compared to 10 840 in 1977. The possibility of introducing more permanent measures of control through water management in northern Guadalcanal and additional external support made available by the United Kingdom Overseas Development Administration may improve the situation in the near future.

65. The situation further deteriorated in 1978 in the Philippines where, out of 14.4 million people living in originally malarious areas, 6.0 million (42%) live in malaria-freed areas, 2.5 million (17%) in areas where the disease has ceased to be a public health problem, and 5.9 million (41%) in areas where malaria still persists despite antimalaria operations. The number of cases reported in 1978 was 104 826 as compared to 86 553 in 1977. Apart from the inaccessibility of some operational areas, the programme is faced with growing financial constraints and shortage of qualified personnel. The occurrence of chloroquine resistance, which is rather widespread in the endemic areas, has been an additional difficulty.

66. In 1978, the number of cases reported from Viet Nam was 5040 from the northern part of the country (5783 in 1977) and 29 390 from the southern part (23 669 in 1977). In the north, malaria has been confined to small foci with 3.9 million people still covered by yearly DDT-spraying. Progress was made in the south with the expansion and intensification of the programme; six-monthly DDT spray cycles covered 6.5 million people in 1978 compared to 4 million in 1977. Chemotherapy and chemoprophylaxis were made available in 1978 to an additional 4 million people.

67. Despite considerable operational and administrative constraints reported by the anti-malaria programme of the Lao People's Democratic Republic, the DDT indoor spraying campaign, interrupted in 1976, was resumed in 1977 and expanded in 1978 in the province of Vientiane. The number of cases diagnosed and reported in 1977 was 3047; figures for 1978 are not available. The occurrence of chloroquine-resistant P. falciparum - mainly RII and RIII types of resistance - was confirmed by in vivo tests in Vientiane province.

68. Information is not available from Democratic Kampuchea.

69. In Papua New Guinea, there has been no appreciable change in the malaria situation in 1977 and 1978; although the number of cases increased from 68 609 in 1977 to 106 138 in 1978, the slide positivity rate was 31% in 1977 and 33% in 1978. The objectives of the programme were redefined recently and reflected in a five-year plan. According to this plan, there will be an increased involvement of general health services and others engaged in rural development, greater flexibility of operations, and development of field applied research. In vitro tests have confirmed the occurrence of P. falciparum chloroquine resistance in the Kiunga area, Western Province, and near the Sepik border.

70. Malaria was once rampant in China but it has been brought under control in most former endemic areas, and in some areas it has been eradicated. Studies are still required to find alternative measures for the control of major vectors - A. sinensis and A. balabacensis - as well as for the radical treatment of P. vivax infections. Another technical problem is the presence of P. falciparum resistant to 4-aminoquinolines in Hai-Nan island.

IV. Programme development

71. The review of the malaria situation by the Regional Committee for Africa in 1975, the discussions and recommendations of the Consultative Meeting on Malaria in the South-East Asia Region (April 1976),¹ the meetings of the Study Group on Malaria Control in the Americas, (April 1977),² the resolution adopted by the XXV Directing Council of PAHO (October 1977),³ and the endorsement of the regional malaria programme at the twenty-seventh session of the Regional Committee for Africa (1977),⁴ all served in the elaboration of lines of action for the malaria control strategy, which was endorsed by the Health Assembly in 1978 in resolution WHA31.45.⁵

72. The Member States, in close cooperation with WHO, have since taken a series of coordinated actions aimed at the development of national and regional control programmes and resulting in the conceptualization of a global programme which, according to the WHO Expert Committee on Malaria, can be defined as "an organized effort to institute, carry out and evaluate such antimalaria measures as are appropriate to the prevailing epidemiological and socioeconomic conditions, in order to achieve the greatest possible improvement in the health situation of a population subjected to the burden of the disease or exposed to the risk of its resurgence".⁶ This programme, in accordance with resolution WHA31.45, and in the context of the objectives of "Health for all by the year 2000", retains as its ultimate objective the eradication of the disease. In order to achieve this goal, and taking into consideration the technical, operational and administrative difficulties countries are facing, the medium-term objectives have been laid down as follows:

- (1) reduction of endemicity to levels not hampering socioeconomic development;
- (2) reduction of mortality and morbidity due to malaria to negligible levels.

73. However, since programme objectives for individual areas very much depend on national commitment, the prevailing epidemiology of malaria, the effectiveness of technological tools, and the financial resources available, four main goals have been defined as illustrative of the major possibilities of malaria control:

- (1) the reduction and prevention of mortality due to malaria;
- (2) the reduction and prevention of mortality and morbidity, with special attention to reduction of morbidity in high-risk groups;
- (3) same as goal (2), plus reduction of malaria prevalence;
- (4) countrywide control with the ultimate objective of eradication.⁷

74. The planning process varies from country to country and from region to region, but in general it follows a similar pattern all over the world. At country level, national programmes are often updated on the basis of evaluation carried out in cooperation with WHO

¹ Document SEA/MAL/111, 1976.

² Study Group on Malaria Control in the Americas. Report to the Director, PAHO/WHO (1977).

³ XXV Meeting of the PAHO Directing Council/Twenty-ninth session of the WHO Regional Committee for the Americas, resolution XXV, on "Control vs. eradication in malaria programs" (PAHO Official Document No. 152, 1978, p. 67).

⁴ Proposals for a regional antimalaria programme, document AFR/MAL/154, 1977.

⁵ WHO Handbook of Resolutions and Decisions, Vol. II (3rd ed.), 1979, p. 60.

⁶ WHO Technical Report Series, No. 640, 1979, p. 13.

⁷ WHO Technical Report Series, No. 640, 1979, pp. 14-17.

and other international or bilateral collaborating agencies. Thus, the Bangladesh programme was assessed in late 1978 by a group of national experts, together with technicians from WHO, Netherlands, United Kingdom and United States of America. In 1979, the programmes in Colombia, Haiti, Pakistan, Sudan and Thailand were reviewed by independent assessment teams. Antimalaria activities were also reviewed, in collaboration with WHO intercountry advisory teams, in Madagascar, Mozambique, Sao Tome and Principe, Sierra Leone, Swaziland, United Republic of Tanzania and Zaire. In early 1980 the P. falciparum containment programme in India and the antimalaria programme in Sri Lanka were assessed and revised, in cooperation between national authorities and international agencies.

75. At regional level, the programmes have been revised at intercountry meetings held for directors of national malaria eradication services in the Americas (Mexico, March 1979), for directors of antimalaria programmes at a regional workshop for countries of the Western Pacific Region (Kuala Lumpur, September 1979), and for countries in the Eastern Mediterranean Region at a scientific working group on malaria (Cyprus, November 1979).

76. At the Mexico meeting, countries of the Americas reaffirmed the ultimate aim of achieving and maintaining malaria eradication, and thus the intention to continue the antimalaria programme. They recognized that malaria eradication programmes had to be reviewed on the basis of the physical, ecological, epidemiological, sociocultural and economic characteristics of different areas, together with an evaluation of the administrative and operational aspects of control programmes. This analysis should be used for the stratification of different areas in order to determine priorities and select the most appropriate attack measures. The revised strategy should be implemented in close cooperation with primary health services and with the full involvement of the communities concerned in various facets of the campaign. While many countries are engaged in such stratification, a continental plan for programme implementation is being developed and has been discussed at planning meetings held between PAHO/WHO and representatives of the countries concerned.

77. At the Kuala Lumpur meeting, it was stressed that antimalaria programmes have often failed because of the absence of a sufficiently developed health infrastructure into which certain vital antimalaria activities could be effectively integrated. However, administrative integration at the intermediate level and functional integration at the peripheral level may improve programme efficiency. To achieve this, the meeting particularly recommended that the participating directors of antimalaria programmes: (i) define the functions and workload of all those involved in antimalaria activities; (ii) provide training in malaria for general health services personnel and in public health for malaria personnel; (iii) provide for the necessary supervision of field operations; (iv) assign the necessary priority to the anti-malaria activities; and (v) instil in general health services personnel the required sense of urgency and motivation.

78. In Africa, many countries are making great efforts to implement their programmes, in collaboration with WHO, in accordance with the guidelines approved in 1977 by the Regional Committee, particularly by making drugs available for the treatment of the sick in rural areas. However, in view of the limited resources available, and in the spirit of operative paragraph 1(2) of resolution WHA32.35,¹ WHO is actively cooperating with USAID in developing the Agency's strategy for collaboration in antimalaria activities in countries of tropical Africa in the WHO African and Eastern Mediterranean Regions. Joint USAID/WHO meetings and fact-finding missions late in 1979 and during the first quarter of 1980 have helped to identify possibilities for strengthening antimalaria activities in countries of Africa and to define ways of stimulating the cooperation of other agencies in such programmes.

79. In the South-East Asia Region, the regional programme is mainly directed towards the containment of epidemics, stimulation of research and coordination training.

80. In the Eastern Mediterranean Region, the programme is being reoriented in the light of the overall possibilities of the countries involved, taking into account the epidemiological

¹ Document WHA32/1979/REC/1, p. 33.

situation of neighbouring countries of other regions (Syrian Arab Republic-Turkey). A coordinated antimalaria programme is being implemented in seven Arab States in the Gulf.

81. At the WHO central level, a global medium-term programme document has been prepared, covering the period 1979-1983, taking into account national and regional programme priorities and objectives, in close cooperation with regional offices and with other WHO programmes closely associated with the implementation of the antimalaria programme. The medium-term programme is oriented towards four main activities: disease control; control and forecasting of epidemics; training; and research.

82. Estimating that the cost of malaria control is about US\$ 1 per year per inhabitant under risk, the global cost of antimalaria activities would amount to about US\$ 1500 million per year, or US\$ 7500 million for the period 1979-1983. Of this, international support required for the five-year period should amount to some US\$ 300 million, of which almost 15% would be met by existing WHO resources, from either the regular budget (technical cooperation, fellowships, supplies and equipment, etc.) or funds available in the Special Programme for Research and Training in Tropical Diseases or the malaria special account.

83. However, additional resources would be required from international and bilateral cooperating agencies for different activities of the programme, but more particularly to meet the African Region's requirements for chloroquine for the treatment of suspected malaria cases, which are estimated to amount to US\$ 10 million per year, for support to the Asian training programme, which would require US\$ 3 million per year, and a similar amount for countries of the Americas and Africa from 1982 onwards.

V. Training

84. In his report to the sixty-fifth session of the Executive Board on malaria control strategy,¹ the Director-General underlined the importance of training and informed the Board of action taken in the development of the malaria training programme for Asia and for the general accelerated development of national expertise. It is expected that similar training programmes will be developed for the Americas and Africa.

85. There is no doubt that the courses provided by the various training institutions throughout the world provide ample possibilities in training, particularly for the theoretical aspects of tropical medicine, public health, or even malaria and its control. However, further effort is required from both Member States and WHO in the development of training activities in malaria-affected countries. In this context, the initiative of the Ministry of Health of Iraq in establishing a training centre with courses on malaria and malaria control for Arabic-speaking nations is a very welcome contribution.

86. In addition to the operational, administrative and financial difficulties encountered, technical problems in the form of resistance of vectors to insecticides and of P. falciparum to 4-aminoquinolines have considerably preoccupied the technical services of Member States. For this reason a number of training courses and seminars have been organized. A list of training activities organized in 1978 and 1979 can be found in document A33/INF.DOC./1. It will be seen from this list that, in addition to the training on in vitro cultivation and in vitro testing of the susceptibility of P. falciparum to chloroquine and mefloquine, workshops on research methodology, serology of malaria and other parasitic diseases, entomological aspects and pesticide toxicology have been carried out in a number of malaria-affected countries.

¹ Document EB65/22.

87. In view of the great importance of developing national expertise, not only for malaria and its control but for tropical medicine, general epidemiology of communicable diseases and their control, and public health services, it should again be mentioned that there are three levels of training for professional staff (medical officers, entomologists, sanitary engineers, medical zoologists) which should be further stimulated:

(1) Academic courses for degrees which facilitate recognition of the status of personnel within the health structure. Depending on the size of the country and its population, each Member State should have a certain number of this kind of trained personnel for whom a career structure should be secured;

(2) Training by "objectives" in respect of the function of operational personnel carrying out control activities;

(3) Training in certain techniques facilitating the monitoring of technical problems (insecticide resistance, drug resistance, research methodology).

88. It is realized that developing countries do not have sufficient manpower and therefore such countries will have to economize in this respect by clearly establishing the functions of health personnel within the structure.

89. As far as auxiliary personnel is concerned, training by "objectives" should also apply. This could be extended to include general health service staff as well as those of the specialized services whenever these exist.

VI. Research

90. In addition to the material on malaria research contained in the Director-General's progress report to the Executive Board,¹ the following information is provided for the Health Assembly.

91. Among all the communicable and parasitic diseases malaria is probably the one on which the greatest amount of literature on research has been published in scientific journals. Although the research being carried out has certainly significantly increased our comprehension of the phenomena involved in the parasitism of plasmodia and of the life cycle of plasmodia and their vectors, it has contributed substantially less in terms of development of new methods and tools for the control of the disease.

92. A list of research agreements concluded by WHO with various scientific institutions and services, reproduced in document A33/INF.DOC./1, indicates the wide scope of this research. It should be pointed out that, while the development of new tools (in chemotherapy, immunization and vector control) for the control of malaria and diagnostic methods for its detection remains the first priority, the "supportive" research in terms of general biology, membrane biology and biochemistry of both the parasite and the vector should receive equal attention.

93. Within this large research programme there are a few subjects which have received particular attention. Among these are clinical trials on mefloquine (phase I and II) which are being carried out in Brazil, Thailand and Zambia (Ndola). Considerable efforts are also being made in in vitro testing of P. falciparum susceptibility to chloroquine in countries of South-East Asia, the Western Pacific and the Americas. This should facilitate the monitoring of drug resistance so that the drugs and their use in chemotherapy and chemoprophylaxis can be changed when necessary. Simultaneously with the investigation of P. falciparum, studies on enzyme synthesis of different isolates of P. falciparum are being carried out with the object of characterizing strains, which also forms part of the research for monitoring drug resistance. An information document on monitoring of drug resistance has been prepared and is available on request.

¹ Document EB65/22, pp. 5-6.

94. Research on immunization has been given equal attention and some progress has been made, particularly in our understanding of immune phenomena related to malaria infection. It has been demonstrated, for example, in a P. berghei mouse model that, by using the hybridoma system and by combining plasmacytoma cells and splenocytes of immunized mice, monoclonal antibodies can be produced, from the resulting hybridoma cells, against sporozoites of the same species. It should be pointed out that these antibodies are stage-specific.

95. To provide a solution to technical problems and to select appropriate methods of control of malaria in areas where residual insecticides have failed to interrupt transmission, a strategic plan for field applied research has been prepared by the Special Programme for Research and Training in Tropical Diseases, FIELDMAL Scientific Working Group¹ and its Steering Committee on this type of research. Many research activities have been initiated in this field. A field research project in Nigeria has continued its activities to establish the baseline data necessary for intervention in areas with different ecology.

96. Many other research activities are in progress, relating to such topics as: clarifying the metabolism of plasmodia, the function of parasite membrane in the exchange of metabolites, and the mode of action of antimalaria drugs; possibilities of developing slow-release formulations of drugs or entrapping effective existing antimalarials (pyrimethamine and primaquine) in liposomes; adjuvants suitable for man to be used in immunizing agents; possible use of B. thuringiensis as a biological agent for the control of vectors; and accelerated testing of new insecticides. However, the result of all this research is unlikely to fulfil hopes for a miraculous solution to the problem of malaria. Indeed, no new drug, vaccine or insecticide would in itself represent a solution for all ecological conditions. It will be necessary, therefore, to pursue the epidemiological approach by using classical methods in combination with new methods and tools as they become available.

97. To enable the Health Assembly to evaluate and appreciate the results of research on malaria published over the past five years, a summary of scientific progress has been prepared and is available on request.

VII. Dissemination of information

98. One of the most important roles of the malaria action programme is to provide technical information to national technical services. A list of publications/information documents is reproduced in document A33/INF.DOC./1.

99. The reorientation of national malaria control programmes using the epidemiological approach necessitates the revision of some existing manuals and the preparation of new ones. A manuscript on environmental management for mosquito control has just been completed with a view to publication. A guideline on epidemiology and control of malaria is in preparation and the WHO manual on larviciding will also be revised. Preparation of other manuals, including works on training, research methodology, evaluation and other technical matters, has also been foreseen in the plan of publications for the period 1981-1983.

100. The unavailability and cost of insecticides, larvicides and antimalaria drugs are often a source of difficulty for national services. A cooperative effort has therefore been undertaken to collect information on actual consumption and needs in this respect and on the availability of raw materials, including possibilities for synthesis and formulation, in developing countries. Document A33/INF.DOC./1 contains a section indicating the price of insecticides and antimalaria drugs according to the latest information available. The Health Assembly will find more details on insecticide and drug requirements, estimated on

¹ Scientific Working Group on Applied Field Research in Malaria.

the basis of the epidemiological situation, in the Director-General's report to the Thirty-first World Health Assembly.¹ As soon as additional information is available it will be submitted to the Executive Board and the Health Assembly.

VIII. Coordination with other international and bilateral agencies

101. The Organization has taken part in the preparation of an international training programme agreed between the Government of the USSR and UNEP on the environmentally sound control of vectors of malaria and other communicable and parasitic diseases which will take place in the USSR from 1980.

102. Cooperation has continued with the Swedish International Development Authority (SIDA), which is providing assistance to India for a P. falciparum infection containment programme. WHO took part, with representatives of SIDA, in evaluating the progress of the project in February 1979 and 1980.

103. Consultations continued with USAID in the field of training, research and implementation of malaria control. The initiative taken by the African Bureau of USAID for the development of a strategy for malaria control in pursuance of resolution WHA32.35 has further progressed. Following a workshop held in Washington, DC, in December 1979, two teams of experts visited several countries in Africa and a meeting took place in Abidjan in late March 1980. The Organization has taken a very active part in this initiative, particularly with regard to the technical aspects.

IX. Meetings

104. As already mentioned above, the WHO Expert Committee on Malaria met in February 1979 and the report of this meeting has been published.²

105. Preparations for the Seventh Asian Malaria Conference have been initiated, including the drawing up of an agenda, objectives and other administrative details. This meeting, which is a joint effort of the South-East Asia, Eastern Mediterranean and Western Pacific Regions and headquarters, will take place in Manila from 3 to 7 November 1980.

106. Mention has already been made of the Malaria Advisory Committee meetings which have already taken place in Geneva in May 1979 and in Manila in February 1980.

107. On the initiative of the Regional Director for Europe, a meeting on surveillance and prevention of the reintroduction of malaria and importation of parasitic diseases was held in Izmir, Turkey, in September 1978. The report of the meeting was issued by the WHO Regional Office for Europe in 1979.³

108. The Government of Italy initiated the organization of a meeting on malaria surveillance for countries of the Western Mediterranean Basin which took place in Erice, Italy, in October 1979, with the participation of Algeria, Italy, Morocco, Portugal, Spain and Tunisia. The report, when published, will be distributed to all parties concerned.

109. The Organization continues to sponsor border meetings for the exchange of views between national participants. Such meetings have taken place between: the Syrian Arab Republic, Turkey and Iraq; India and Pakistan; and Malaysia and Thailand. They will continue in the future.

110. A number of meetings of scientific working groups and steering committees on chemotherapy, immunology, applied field research in malaria, and biology and control of vectors have been held under the aegis of the Special Programme for Research and Training in Tropical Diseases in which members of the secretariat have taken an active part. The reports of most of these meetings are available for consultation by Member States.

¹ Document A31/19.

² WHO Technical Report Series, No. 640, 1979.

³ WHO/EURO Technical Papers, No. 15, 1979.