WORLD MALARIA SITUATION IN 1993

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It has been estimated that the occurrence of malaria in the world may be in the order of 300-500 million clinical cases each year, with countries in tropical Africa accounting for more than 90%.

In 1993, some 90 countries or territories were considered malarious (Figure); almost half of them are situated in Africa south of the Sahara. For comparison, in the mid-1950s there were some 140 countries or territories where malaria was endemic.

The provisional total number of pathologically confirmed cases reported to the World Health Organization (WHO) for 1993 is 5.1 million. This excludes Africa where most cases are not pathologically confirmed.

Estimates of malaria mortality vary from 1.5 to 2.7 million malaria deaths worldwide per year, the great majority of them in Africa. Approximately 1 million deaths among children under 5 years of age can be attributed to malaria alone or in combination with other diseases.

Population at risk

The total world population of about 5,540 million persons may be classified according to the status of malaria risk in their area of residence (all figures are rounded):

(1) Malaria-free areas (3,500 million people, or 63%).

- Areas with 1,540 million people (28%), where malaria has never existed or has disappeared without specific antimalaria measures.
- Areas inhabited by 1,960 million people (35%), where the disease has disappeared or has been eliminated by antimalaria campaigns and the malaria-free status has been maintained (small areas with very low risk are also included in this category).

(2) Areas considered malarious (2,020 million people, or 36%).

- Areas where endemic malaria was considerably reduced or even eliminated but transmission was reinstated and the situation is unstable or deteriorating (1,620 million people, or 29%). These areas include zones with the most severe malaria problems which developed following major ecological or social changes, such as agricultural or other economic exploitation of jungle areas, sociopolitical unrest and population migration.
- Areas, situated mainly in tropical Africa, where endemic malaria remains basically unchanged and most control programmes are in a planning or an early implementation stage with very limited human and material resources (400 million people, or 7%).

Malaria reporting to WHO

Microscopically confirmed cases of malaria are reported by Member States to WHO through its Regional Offices. The provisional total number of cases reported for 1993 is 5.1 million (Table).

Inadequate and irregular reporting, particularly in areas known to be highly endemic and often out of reach of established health services, make it difficult to obtain accurate information on the incidence of malarial disease. The actual number of cases in the Regions is estimated to be about 4 to 5 times higher than shown in the Table.

In the great majority of countries in Africa south of the Sahara reporting is still very fragmentary. The numbers of cases registered are based principally on clinical signs and symptoms of malaria, and are not compara-

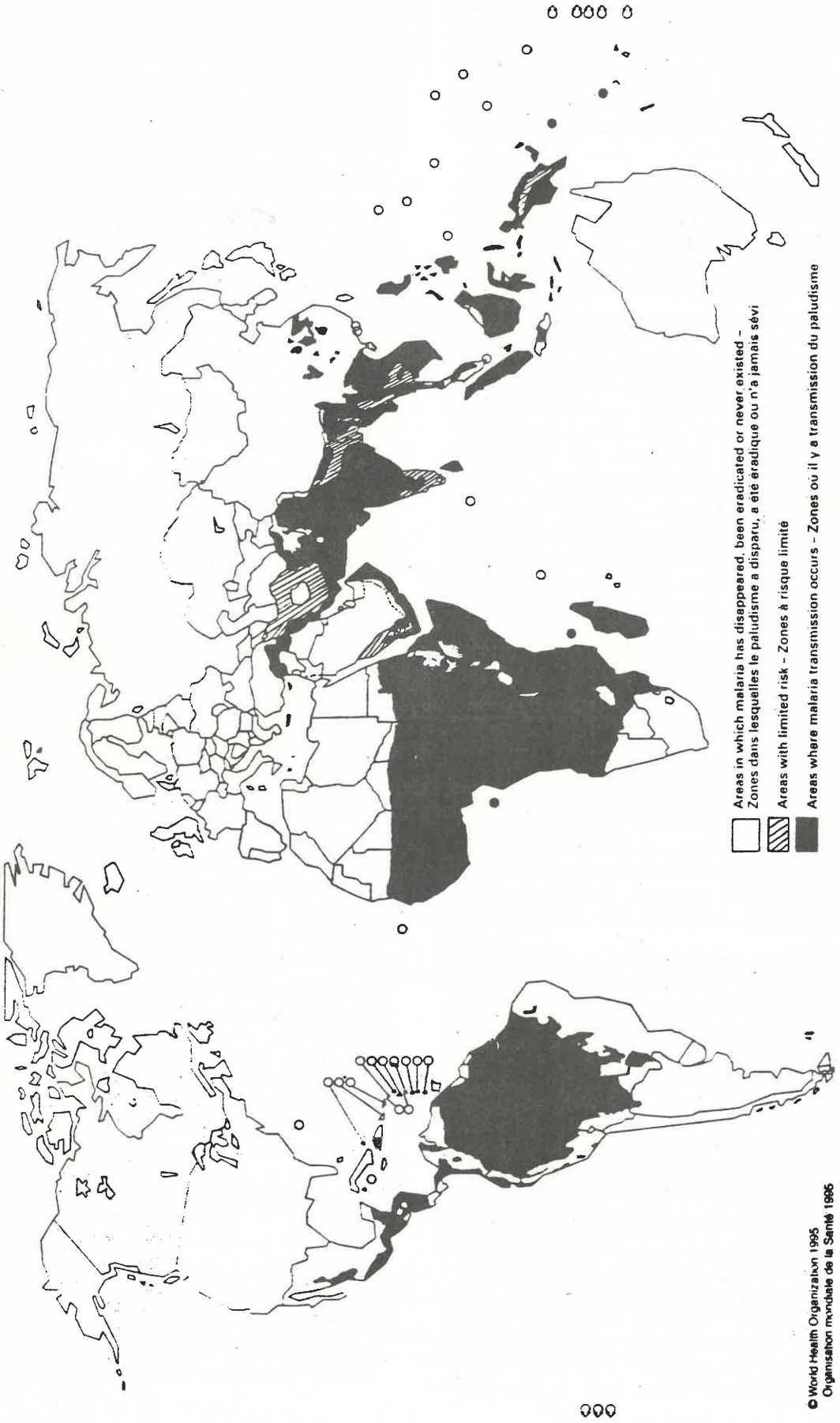
Table. Numbers of malaria cases reported, by WHO Region (thousands), 1984 to 1993[1]

WHO Region	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Africa[2, 3]	4422	13207	17927	20588	24712	29381	12302	8994	8384	2590
Americas	932	911	951	1018	1120	1114	1058	1231	1188	984
South-East Asia	3005	2502	2685	2834	2791	2942	2970	3087	3078	3077
Europe	64	57	47	28	25	21	14	16	22	50
Eastern Mediterranean	335	391	613	608	434	528	586	541	309	292
Western Pacific	1410	1177	1307	1145	1002	1071	1032	968	733	674
TOTAL[4] (excluding Africa)	5746	5038	5603	5633	5372	5676	5661	5843	5329	5077

Note: All figures are subject to change; they are updated whenever more recent data become available.

1. The information provided does not cover the total population at risk in some instances.
2. Mainly clinically diagnosed cases.
3. Incomplete figures.
4. Sums may not equal total because of rounding.

Figure. Global distribution of malaria, 1993



ble with those from other Regions. They are therefore not included in the total figures in Table.

Of the total number of cases reported to WHO in 1993 (excluding Africa south of the Sahara), more than two-thirds were concentrated in only six countries (in decreasing order): India, Brazil, Sri Lanka, Viet Nam, Colombia and the Solomon Islands. Within these and other countries, malaria was concentrated in certain areas.

In 1993, following the principles of the Global Malaria Control Strategy, the WHO Study Group on the Implementation of the Global Strategy stressed the importance of early diagnosis and adequate treatment as a basic element of all malaria control programmes.

Patients suspected of having malaria according to their clinical history, signs and symptoms must receive full treatment without delay. Laboratory diagnosis serves primarily as a support to clinical care and is desirable in the case of treatment failures and severe disease. Malaria cases must therefore be defined primarily in association with disease symptoms, and surveillance must give priority to severe and complicated cases, and malaria deaths.

Information systems need to be reoriented accordingly so that they can provide information on malaria disease trends and patterns in order to guide the deployment of scarce resources.

A Regional Working Group on Malaria Control in the African Region was convened in 1993 and developed a Practical Guide for the Evaluation of Control Programmes, providing guidance for case definition and reporting. Globally, a number of countries have already adopted changes in surveillance and reporting or are revising reporting criteria and procedures within the reorientation of their programmes. However, until a sufficient number of countries have introduced these changes, WHO will continue using the case definition based on microscopic confirmation.

Malaria mortality

Severe malaria and malaria mortality are caused by *Plasmodium falciparum*, which is the predominant species in tropical Africa, eastern Asia, Oceania and the Amazon area. In the rest of the world it is far less common. Registration and reporting of severe malaria and malaria mortality are very limited and irregular, particularly in 'frontier areas' of economic development and in areas burdened with armed conflicts, illegal trade and mass movements of refugees, where the problems may be most severe. The available figures are therefore gross underestimates.

The vast majority of malaria deaths occur among young children in Africa, especially in remote rural areas with poor access to health services. Outside of tropical Africa, deaths from malaria occur principally among non-immune people becoming infected with falciparum malaria in areas where appropriate diagnosis and treatment are not available. This is the case for newcomers to endemic areas, such as agricultural workers, labourers, gold and gem miners, refugees and settlers in new colonisation areas. Those most severely affected are young adults.

Estimates of malaria mortality vary from 1.5 to 2.7 million malaria deaths worldwide per year. Approximately 1 million deaths among children under 5 years of age can be attributed to malaria alone or in combination with other diseases.

Malaria resistance to drugs

Among the countries where falciparum malaria is endemic, only those of Central America have not recorded resistance of *P. falciparum* to chloroquine. Chloroquine resistance of various levels is now common in practically all endemic countries in Africa and in many of them, especially in eastern Africa, high levels of resistance pose increasing problems for the provision of adequate treatment. In western and middle South Asia, as well as in Malaysia, Indonesia, the Philippines and Oceania, levels of chloroquine resistance are variable.

Resistance to sulfadoxine/pyrimethamine is widespread in South-East Asia and South America but is focal and uncommon in other parts of the world. In Thailand, more than 50% of falciparum infections in certain areas bordering Cambodia and Myanmar no longer respond to mefloquine therapy.

Reduced susceptibility of *P. falciparum* to mefloquine has been detected by in vitro studies in Africa, but only rarely has this been reflected in in vivo studies. It has not been reported from the Americas.

There is commonly cross-resistance between halofantrine and mefloquine, although halofantrine has retained some efficacy in the areas with mefloquine resistance in Thailand.

In several countries of South-East Asia as well as in Brazil, where quinine plus tetracycline is now the standard treatment for uncomplicated malaria, the sensitivity to quinine is diminishing. Consequently, artemisinin and its derivatives are being deployed for first-line treatment in certain areas.

The resistance of vivax malaria strains to chloroquine, first documented in 1989 in infections from Papua New Guinea, has been confirmed in Indonesia, Myanmar and Vanuatu. In some localised foci in Indonesia and Papua New Guinea, 20% to 30% of patients infected with vivax malaria now have recurrences of parasitaemia one to three weeks after a course of 25 mg chloroquine base/kg.

Malaria situation by geographical area

Africa

In Africa south of the Sahara, malaria remains one of the most serious public health problems. It has been estimated that between 270 and 480 million clinical malaria cases may occur every year, based on the population exposed to malaria risk and the number of fever

episodes from which a person will suffer every year (<1 to more than 6, depending on the age group), half of which are typically due to malaria. About 140 to 280 million of these clinical malaria attacks will occur in children less than 5 years of age. Only a fraction of these malaria cases are reported.

Africa has the highest levels of endemicity in the world. Only about 7% of the population in the WHO African Region live in areas with no or negligible risk of getting malaria. In very large areas malaria transmission is intense and perennial. Some 74% of the population in the WHO African Region live in these highly endemic areas. At altitudes over 1,500 m and rainfall below 1,000 mm / year, endemicity decreases and the potential for epidemic outbreaks increases. Ecological, demographic and meteorological factors, including quasi cyclic occurrence of heavy rains, have led to malaria epidemics in countries such as Botswana and Ethiopia.

In highly malaria-endemic areas, *P. falciparum* is the commonest species. In such areas, about 30% of febrile illnesses among outpatients are attributable to malaria.

Mortality is concentrated in the younger age groups. Among children referred to hospital with severe malaria, case-fatality rates of 10% to 30% have been reported. In rural areas with little access to adequate treatment these rates might be even higher. Taking into account the above morbidity estimates, one could expect malaria mortality to be in the order of 1.4 to 2.6 million annually, of which about 1 million deaths will occur in children below the age of 5 years; malaria may not be the only cause of some of these deaths. Even in non-fatal cases malaria produces considerable impact on the health of young African children, leaving neurological sequelae, increasing susceptibility to other infections and hampering development. In endemic areas, malaria substantially increases the risk of maternal anaemia, abortion, stillbirth, prematurity and low birth weight during a woman's first pregnancy. With subsequent pregnancies this risk diminishes. The risks associated with malaria infection in non-immune pregnant women include spontaneous abortion in up to 60% of cases and a maternal mortality rate of up to 10%.

Chloroquine-resistant *P. falciparum* spread over almost all of tropical Africa in the 1980s. More recently, high levels of resistance to chloroquine have become common in some East African countries. Surveillance in some countries (e.g. Malawi and Zaire) has indicated that the evolution of resistance to chloroquine has been accompanied by increasing incidence of severe malaria. Research results from Kenya and Malawi suggest that the prevalence of anaemia in very young children may be increasing in areas where the routine treatment of malaria is often only partially effective. These problems will probably be among the major challenges to control programmes in Africa in the coming years.

In Africa north of the Sahara, where about 800 cases were reported in 1992, incidence decreased to 480 cases in 1993, less than one third of which were of local origin.

The Americas

During 1993, 982,000 confirmed malaria cases (*P. falciparum* and *P. vivax*) were reported compared with 1.19 million in 1992 and 1.23 million in 1991. This seems to mark a reversal in the rising trend of malaria cases observed between 1974 and 1991. The number of cases notified appears to be only a small fraction of the real number of persons suffering from malarial disease.

Data from 20 countries with malaria programmes have shown that 4.6 million complete malaria treatments were administered. This number is 4.7 times higher than the number of cases registered in these countries. Taking into account that the private sector and self-treatments are not included in this number, the 982,000 recorded cases might well represent only a small portion of the actual number of patients with malarial disease. This seems to indicate that immediate treatment of malarial disease, as stressed by the Global Malaria Control Strategy, is already a routine activity in the field, but that the treatments are not yet accompanied by a record of clinically diagnosed malarial disease.

Nearly half of all the cases (47%) were registered in Brazil; 32% originated from the Andean countries (Bolivia, Colombia, Ecuador, Peru, Venezuela) and 17% were from Central America and Mexico. The risk of becoming ill with malaria was highest in Belize (42 per 1,000 population), Guyana (41 per 1,000), French Guiana (29 per 1,000), the Amazon Region of Brazil (25 per 1,000) and Guatemala and Peru (12 per 1,000).

The overall proportion of falciparum infections declined from 34% in 1991 and 1992 to 29% in 1993, However, this proportion increased in Bolivia, Ecuador, French Guiana, Guatemala, Mexico, Peru and Venezuela; 61% of all falciparum infections detected in the Americas occurred in Brazil.

Asia west of India

Bahrain, Cyprus, Israel, Jordan, Kuwait, Lebanon and Qatar continued to be free from endemic malaria and malaria risk is very limited in the United Arab Emirates.

In the malarious countries, most of the confirmed cases were registered in Afghanistan (some 300,000 in 1991), Pakistan (93,000) and the Islamic Republic of Iran (65,000). Falciparum cases were most numerous in Pakistan (41,000) and the Islamic Republic of Iran (26,000).

Middle South Asia

During the last 3 years, the overall number of malaria cases remained stable with 2.6 to 2.7 million cases reported annually. These figures are strongly influenced by those from India which represent some 80% of all cases recorded. According to conservative estimates, the real malaria incidence in this region is about 6 to 7 times higher, representing between 16 and 19 million malaria cases annually.

Most of the malarious areas are situated in forests, forest-fringe areas, forested hills, development project areas and their surroundings. Forest-related malaria remains a serious problem causing nearly half of the total number of cases, of which more than 50% are falciparum malaria. Due to the exploitation of their natural resources, forests become more accessible and the movement of populations with low immunity into such areas result in malaria epidemics. Many of these areas are close to international borders, far away from the centres of development. Their population is very mobile and the peripheral health structure is lacking and inadequate for the early diagnosis and treatment of malaria.

In Bangladesh, the malaria situation has been deteriorating since 1988 when 33,000 cases were reported. Reports nearly doubled to 64,000 cases in 1991, increasing two-fold again to 125,000 cases in 1993. Nearly half of the cases are falciparum infections.

In India, between 2.1 and 2.2 million cases were recorded annually during the years 1991-1993, representing nearly 40% of the total number of cases reported outside Africa. The proportion of falciparum infections, which had not varied much during the years 1986-1990, ranging between 35% and 37%, decreased from 43% in 1991 to 39% in 1993. Urban malaria is a major problem in India.

Eastern Asia and Oceania

Australia, Brunei Darussalam, the Democratic People's Republic of Korea, Hong Kong, Japan, Macao, Mongolia, the Republic of Korea, Singapore, large areas of China and most of Oceania remained free from malaria. These countries notify only imported cases, although a few introduced cases secondary to imported malaria occur occasionally in some of them. These foci are promptly eliminated by appropriate control measures. For example, in Singapore, a localized outbreak occurred in 1993 involving 27 cases of local transmission. The source of infection seemed to have been two Singaporean tourists having acquired malaria in India. Prompt remedial measures controlled the outbreak.

Compared with 1992, the overall incidence in this region declined by some 20%, although some of the countries registered more cases than in the preceding years. About 60% of the confirmed cases occurred in Viet Nam (156,000), the Solomon Islands (126,000), Myanmar (113,000) and Thailand (115,000).

Malaria is a major cause of illness and death in Cambodia; 99,000 confirmed cases and 1,000 deaths due to malaria were recorded in 1993. The real figure is estimated to be about 600,000 clinical cases with 5,000 to 10,000 deaths annually. The most intense transmission occurs in the forested areas along the Thai border and in the north-eastern part of the country.

In China, malaria incidence continued to decline. In 1993, 69,000 confirmed malaria cases were recorded (74,000 cases in 1992 and 102,000 cases in 1991). For comparison, there were 904,000 cases in 1984. Less than 1% of the population resides in areas where incidence exceeds 1 per 1,000 population. Because many cases are likely to be missed among migrating populations, the actual number of cases was estimated to be not less than 100,000. In 1993, the overall proportion of falciparum infections was 9%, compared with 12% in 1992.

In Indonesia, 70% of the population resides in areas where transmission does not exist or occurs only occasionally with an annual malaria incidence below 1 per 1,000 population. The overall malaria situation is not well documented as only limited control activities are carried out in priority areas of social and economic importance. Between 1989 and 1992, 1.9, 1.6, 1.9 and 1.3 million clinical cases were treated annually at health centres.

In Papua New Guinea, malaria remains a serious health problem in coastal and island regions of 15 provinces with persistently high transmission throughout the year. In the other 5 highland provinces malaria is unstable with seasonal outbreaks. The most serious malaria occurs in East Sepik where it is truly holoendemic, very similar to the situation observed in parts of Africa. A total of 67,000 confirmed cases, 55,000 of them due to falciparum malaria, were reported in 1993. In the same year, about 510,000 uncomplicated malaria cases as well as 4,400 treatment failures were recorded.

In the Solomon Islands, where malaria reports more than doubled from 65,000 in 1989 to 153,000 in 1992, the number of cases declined for the first time since 1988, 126,000 cases being recorded in 1993.

Europe, including Turkey and the former USSR

Malaria (*P. vivax* only) continues to be endemic in the south-east and a few other areas in Turkey, and focally in Azerbaijan. A few local cases were reported in Turkmenistan and Uzbekistan.

With regard to the other countries in this region, with very few exceptions only imported malaria cases are being notified. During the period from 1985 to 1989, years for which most countries reported, the number of cases varied between 7,272 and 9,117 (nearly all imported). Surveys in France, Switzerland and the United States of America have shown that about 25% to 50% of all cases are notified to the health authorities. Assuming that only one out of two cases will be notified leads to an annual estimate of about 16,000 malaria cases.