

Pan American Health Organization

PAHO/ACMR/10/S2.2

TENTH MEETING OF THE
ADVISORY COMMITTEE ON MEDICAL RESEARCH

Symposium on
Vector Control and the
Recrudescence of Vector-borne Diseases

15 June 1971

RECENT EPIDEMICS OF YELLOW FEVER
IN AFRICA

PAN AMERICAN HEALTH ORGANIZATION
Pan American Sanitary Bureau, Regional Office of the

WORLD HEALTH ORGANIZATION

Washington, D.C.

RECENT EPIDEMICS OF YELLOW FEVER
IN AFRICA

P. Brès
Virus Diseases
World Health Organization
Geneva, Switzerland

Though the first epidemic which could be reasonably attributed to yellow fever in Africa was described in Senegal in 1778, it is certain that the disease was established on this continent well before. Numerous outbreaks of the urban yellow fever type have been studied only on clinical grounds up to 1927 when a large epidemic occurred in most of the cities of the Western coast from Senegal to Angola. The isolation of the virus at that time and the availability of serological investigations with the sero-protection test in mice made it possible to obtain in the thirties a more accurate picture of yellow fever in Africa for which Findlay (5) distinguished three epidemiological types: urban epidemicity (with typical urban outbreaks as in Lagos 1925-26, Accra 1926-27, Dakar 1927, Bathurst 1934-35, Dakar and Accra 1937), rural epidemicity (as in Ghana in 1933, 1937) and rural endemicity (occurrence of isolated cases as in the Democratic Republic of Congo in 1937, 1940, in Mali in 1938 and finding of low frequency of immunity in the human population in the absence of known cases). Extensive sero-protection test surveys permitted to delimit the endemicity zone approximately between 15°N and 10°S parallels.

Period 1940-1957

Another period began in 1940 with a severe epidemic which appeared in Sudan, in the Nuba Mountains, Kodofan Province, where 15 641 cases and 1627 deaths were reported in 230 000 inhabitants. Estimations on serological grounds reached the figure of approximately 40 000 infections and the death rate was about 10%. This epidemic was one of rural yellow fever transmitted by Aedes aegypti, but Aedes vittatus, which breeds in rock-pools was very abundant and may also have played a rôle in transmission (6).

In 1940 also, a mass vaccination campaign was initiated in French speaking countries of Western Africa (Senegal, Guinea, Ivory Coast, Upper Volta, Dahomey, Togo) and Equatorial Africa (Cameroon, Gabon, People's Republic of the Congo, Chad) where 25 million people were vaccinated about every four years. As a consequence, yellow fever disappeared gradually in these countries, while rural epidemicity and endemicity went on in non-vaccinated countries (3, 4). This decreasing number of cases led to a lack of interest in yellow fever and to progressive neglect of its surveillance and control up to around the early 1960's.

Period 1958-1966, Central and East Africa

In 1958 the virus began a period of activity in Central and East Africa with an outbreak in the Equator and Eastern Provinces of the Democratic Republic of Congo. Sixty cases were notified with 23 deaths in rural areas where the disease was possibly transmitted by Ae. aegypti and Ae. simpsoni and this was considered merely as a recrudescence of endemicity (7).

The following year the virus appeared northwards in Kurmuk, Blue Nile Province, Sudan where 120 cases with 88 deaths were notified in a population of 160 000. It was thought there were probably 200-300 cases with 190 deaths. Aedes vittatus, as in the Nuba Mountains in 1940, was believed to have begun the epidemic and then participated with Ae. aegypti in man-to-man transmission (8). At the same time 237 cases and 98 deaths in 9 villages surveyed were reported in Ethiopia along the border with Kurmuk (2).

In 1960-62, the most dramatic epidemic in Africa raged in South Western Ethiopia: 3000 deaths were notified, but estimations reached 100 000 cases and 30 000 deaths in a population of one million. Aedes aegypti was absent, and transmission of the disease was of two types: monkey to man by Ae. africanus in the Disessa valley with a low incidence of cases and man to

man by Ae. simpsoni with a high and rapidly increasing incidence in the Omo valley where there were numerous plantations of false banana trees which harbour the larvae of Ae. simpsoni (9).

In 1966, a further outbreak occurred in Ethiopia in the Rift Valley, near Lake Abaya, with about 350 deaths, and was probably transmitted by Ae. aegypti, which was abundant in the area (11).

Period 1964-1970, West Africa

In 1964, yellow fever unexpectedly reappeared in West Africa in the formerly vaccinated francophone area. Six cases with six deaths were recorded in 1964 in Portuguese Guinea, near Senegal and Guinea (10). This was followed in 1965 by a large epidemic in the Diourbel Department of Senegal, 120 km East of Dakar. Two hundred and forty-three cases with 216 deaths were notified but it is estimated that between 2000 to 20 000 cases may have occurred and that the case fatality rate may have been 10%. Ae. aegypti was the suspected vector. Ninety per cent of the victims were children less than ten years of age - the unprotected fraction of the population since regular vaccination was stopped in 1960.

In 1967, two jungle yellow fever cases were diagnosed in Liberia and 1968 was apparently a quiet year in Africa. In 1969 however yellow fever was reported more or less simultaneously in five different parts of West Africa. One case, one death in Togo and 21 cases with 12 deaths in Mali may be considered as jungle yellow fever. The number of victims was larger in Ghana in a rural epidemic where five cases and two deaths were proved to be yellow fever in September in the Northern Region, and where 73 deaths were recorded in hospitals among 250 jaundiced in-patients admitted at that time. Ae. aegypti may have been the vector, as it was the most abundant species.

On the opposite side of the common border with Ghana, 87 cases with 44 deaths were notified at the same time in Upper Volta, but estimates were that about 3000 cases with 100 deaths had occurred. As in Senegal, adults were protected by previous vaccinations and children were principally affected. Man to man transmission in this rural epidemic was probably ensured both by Ae. aegypti and non-domestic vectors as Ae. africanus Ae. luteocephalus and Aedes of the taylori-furcifer group which were abundant in forest galleries (1).

The most severe manifestation of yellow fever in 1969 occurred in Nigeria where 208 cases and 60 deaths were recorded in November and December in Benue-Plateau, North-Central and North-Eastern States, around Jos (12). Post-epidemic serological surveys in the Plateau Province (1 625 000 inhabitants) indicated that approximately 50 000 persons may have had contact with the virus. Investigations on the vector were undertaken too late in the epidemic, but after an all-the-year-round survey it was thought that Ae. vittatus, Ae. africanus and Ae. luteocephalus could have participated to the transmission as well as Ae. aegypti which were not particularly numerous.

In 1970, eighteen cases and 12 deaths were notified in Ghana, four cases and one death in Nigeria and two cases and two deaths in Togo. These cases can be considered as sequelae of 1969. One fatal case in Cameroon seemed to be an isolated manifestation of jungle yellow fever.

Comments

As it may be seen, the notified cases during outbreaks of yellow fever in Africa are frequently far below the actual number. It is also very probable that many isolated cases of jungle yellow fever remain undetected. This comes from insufficient surveillance and particularly from the absence of a scheme for

the use of viscerotomy for tracing the circulation of the virus (which has been so successful in the Americas). This would be particularly the case in these "silent areas" where one finds up to 20-30% of positive neutralization tests without any cases over a number of years, but the origin of which is proved when the virus becomes epidemic as in Nuba Mountains in 1940 or in Kurmuk in 1959.

It appears that in Africa a permanent unrecognized endemic activity of yellow fever in forests tends to produce episodically large outbreaks principally in savannah areas during the rainy seasons. Characteristic also is the large size of these epidemics as in the Nuba Mountains (1940) or more recently in Ethiopia (1960-62, 1966) Senegal (1965), Upper Volta, Ghana and Nigeria (1969). The reasons for this recrudescence are unknown - it may be the mysterious ten years cycle of activity which has been evoked from time to time - but so many factors are so rapidly changing nowadays in human ecology that yellow fever activity could continue unless an increase in surveillance and control follows. Threats of a spread of yellow fever to the East coast of Africa and towards the Indian Ocean became more precise with the invasion of the Rift Valley in Ethiopia in 1966.

As in the Americas, the increasing abundance of Ae. aegypti in and around the cities is an important factor in the possible spread of yellow fever in Africa. Ae. aegypti is now widely distributed in urban areas throughout the continent but it is found also far from habitation. Characteristically also in Africa, the rôle played in man to man transmission by several other vectors appears more and more of importance. These are new problems with which the control of vectors is faced and which influences also vaccination policies.

REFERENCES

1. Balay, G. and J. Hamon. Les Aedes anthropophiles du Sud et de l'est de la Haute-Volta et du sud-ouest Niger. Rapp. final 8e Conf. techn. OCCGE roneotyped document OCCGE, Bobo Dioulasso 2: 563-568, 1968.
2. Berdonneau, R., C. Sérié, R. Panthier and C. Hannoun. Sur l'épidémie de fièvre jaune de l'année 1959 en Ethiopie (frontière Soudan-Ethiopie). Bull Soc Path exot 54: 276-283, 1963.
3. Bonnel, P.H. and Z. Deutschman. La fièvre jaune en Afrique au cours des années recentes. Bull Wld Hlth Org 11: 325-389, 1954.
4. Durieux, C. Mass yellow fever vaccination in French Africa south of the Sahara, in Yellow fever vaccination, Wld Hlth Org Monograph series No.30 115-121, Geneva 1956.
5. Findlay, G.M. The present position of yellow fever in Africa. Trans roy soc trop Med Hyg 35: 51-72, 1941.
6. Kirk, R. An epidemic of yellow fever in the Nuba Mountains, Anglo-Egyptian Sudan. Ann trop Med Par. 35: 67-108, 1941.
7. Lebrun, A. J. Jungle Yellow Fever and its control in Gemena, Belgian Congo. Amer J trop Med Hyg 12: 398-407, 1963.
8. Satti, M.H. and M. A. Haseeb. An outbreak of yellow fever in the Southern Fung and Upper Nile Province, Republic of the Sudan. J trop Med Hyg 69: 36-44, 1966.
9. Sérié, C., A. Lindrec, A. Poirier, L. Andral and P. Neri. Etudes sur la fièvre jaune en Ethiopie. Bull Wld Hlth Org 38: 835-884, 1968
10. WHO Wkly epidem Rec. 40: 248-251, 1965
11. WHO Wkly epidem Rec. 44: 633-637, 1969
12. WHO Wkly epidem Rec. 45: 529-533, 1970