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Programme Committee

Recommendation of the Executive Director for an Allocation

SUDAN

Malaria Eradication Pilot Project

1. The Executive Director recommends an allocation to Sudan of $57,000 to provide insecticides, transport, spraying pumps, laboratory equipment and a supply of anti-malaria drugs to assist in the continuation and expansion for the second year (1958) of a three-year pilot project to determine whether malaria eradication is possible in Sudan. This pilot project which became operative at the end of 1956 is now reported ready for its first planned expansion. For the first year of operations (1957), UNICEF provided aid totalling $34,000 including freight (E/ICEF/L.806). The total annual cost to the Government for malaria work is approximately £E.170,000 ($487,000), of which £E.35,000 (approximately US$100,000) is budgeted to meet the costs of the UNICEF-assisted pilot project during the second year of operation.

2. Total coverage spraying with dieldrin was accomplished this year throughout a first pilot area in the Northern Fung and Sennar District, affording protection to a total population of 225,000. The allocation now recommended would provide assistance for the second year (1958). Spraying of the first pilot area would be repeated in 1958 and operations would be extended southward to protect an additional area with a population of 250,000, bringing the total to be protected in 1958 to 475,000 persons.

(11p.)

Although the principal method of protection would continue to be residual spraying with dieldrin, conditions in certain districts, especially in the South, may warrant that spraying be supplemented with other prophylactic measures, for which the Fund would provide a limited supply of anti-malaria drugs.

3. Evaluation work is continuous in the pilot areas. Investigations will be made in 1958 to establish whether other insecticides (DDT and BHC) could effectively be used in areas into which the project will later expand. The present plan for the third year of this project (1959) includes further total coverage in the White Nile area to extend protection to another half million population. The extent of the expansion in 1959 will depend upon surveys to be completed subsequent to the 1957 operation and upon the success of the 1958 operation.

4. In urban centres and in populous areas in all provinces of the country the Government uses larvicidal and residual spraying techniques to control malaria in continuation of a programme started some years ago, and will continue this action pending the eventual conversion into a co-ordinated eradication operation when sufficient data and experience have been gained from the pilot project. Meanwhile, malaria technicians are being trained during the pilot undertaking for the future campaign.

Malaria in the Sudan

5. Background information on this programme and a statement concerning the incidence of malaria and efforts on the part of the Government of Sudan to control the disease were presented to the Board in September 1955 (E/ICEF/L.806). Malaria is one of the most prevalent diseases in the country. As a result of the extensive irrigation programme by which the Government hopes to expand its agricultural economy, the malaria vector may be expected to increase and the Government has therefore given high priority

within its limited means to all measures for malaria control. Comprehensive control measures, including residual spraying with insecticides have been implemented over the past six to seven years, to protect a population of about 3 million.

6. In 1955 it was realized that if malaria transmission was to be effectively stopped further measures, including a stricter scientific control of the work, would have to be taken. The control work undertaken up to then, particularly in the Gezira irrigated area, had met with apparent success, but planning for eventual eradication of malaria was complicated by various factors requiring detailed examination. It was possible, for example, that the location of the Sudan in relation to other countries on the African continent, and the prevalence of the typically African vector species, A. gambiae, would necessitate a somewhat different approach than that which is now employed for eradication of malaria in other countries to the north and east of the Sudan.

7. On this basis it was decided in 1955 to establish the present pilot project, and at the end of that year a WHO consultant malariologist visited the Sudan to make specific recommendations on the strategy to be followed and the details of the plan of operations for this project. The Fung district of the Blue Nile Province was accordingly selected for the location of the pilot scheme, conditions here being representative of those which are likely to be encountered throughout the country.

8. The present plan of operations is for the three years 1957-1959, during which total coverage is to be provided to protect the following population in the Blue Nile Province (excluding the Gezira irrigated area where control is the responsibility of the Gezira Board):

	Initial pilot area a/	First extension area b/	Total
In 1957: (completed)	225,000	--	225,000
In 1958: (present recommendation)	225,000	250,000	475,000
In 1959:	To be determined in accordance with results of operations in 1957 and 1958. c/		

a/ The initial pilot area comprises Sennar and Northern Fung District in the Blue Nile Province, and includes some 650 villages along the Blue Nile and Dinder rivers, extending westward from the Blue Nile to an uninhabited desert zone between the two Niles.

b/ The first extension area is an extension southwards up the Blue Nile, Dinder and Rahed rivers towards the frontier between Sudan and Ethiopia, and includes 7-800 villages.

c/ The second extension area would probably include the districts of Dueim and Kosti along both banks of the White Nile south of the Gezira area, extending west to Kordofan Province. It is currently estimated that about half a million population are affected in this area.

The first year's operation

9. The pilot eradication project was established toward the end of 1956, on arrival of the WHO malariologist, with headquarters in Sennar town. A WHO entomologist and a sanitarian later joined the project. The Government has, in accordance with the agreed plan, provided a national matching team consisting of a malariologist, an entomologist and four public health officers to function as sanitarians, and in addition technical, administrative

and other staff as required. Operational direction of the project was assumed by the WHO malariologist, pending the completion of training of the national matching member. During the period December 1956 to June 1957 inclusive, the following principal activities were undertaken within the initial pilot area:

a) Spleen and parasite surveys: Spleen surveys, undertaken in 38 villages where 7,120 children were examined, showed the overall average rate of enlarged spleens to be approximately 13 per cent, with a highest rate for a locality recorded at 53 per cent. It was also observed that the endemicity tends to increase in villages away from the Blue Nile banks, and becomes especially high in the eastern part of the area. The conclusion drawn is that communities along the Blue Nile were comparatively accessible to those Government teams that had carried out spraying work in the district in the past, but that there total coverage had not been achieved. Parasite surveys were also made, during which blood slides from 1,310 children and 177 infants were examined, showing an overall parasite rate of over 11 per cent, rising in certain villages to 30 per cent.

b) Sanitary survey: An extensive sanitary survey of 600 villages was undertaken prior to the beginning of spraying. Entomological surveys were later made in which five species of anopheles were identified, with A. gambiae predominating.

c) Training: With the comparatively limited time available before the start of spraying, early attention was given to the training of the project's national staff in all categories. A comprehensive programme of training was carried out with due regard to limitations in the qualifications of available laboratory technicians. In addition to the theoretical and practical instruction provided for the national staff directly concerned with this year's work, four additional Government public health officers were trained in preparation for future expansion of this project.

d) Spraying operations, 1957: Residual spraying with dieldrin was effected during fifty days in May and June 1957 throughout the initial pilot area. Complete coverage was undertaken, with the exception of a check area consisting of a group of villages left uncontrolled for later epidemiological and entomological investigations. Altogether 43,000 huts (tukuls) and 129,000 other rooms and structures were sprayed in the 620 villages included in the operation. The population thus protected totalled 225,000.

10. A full appraisal of the spraying programme this year will only be available when post-operational surveys have been completed at the end of 1957. However, various conclusions can be drawn at this stage on the basis of which protective measures can be planned for the following year. The estimate of requirements for 1958 which appears below (paras. 12, 17 and 18) is based on this advance planning. Meanwhile during the second half of the current year and at the end of the rainy season, the project staff will start survey work in the first extension area and will initiate the training of additional staff for the 1958 programme.

Proposed plan of operations for 1958

11. Extent of the programme: The objective of the 1958 operation is to effect a second application of blanket residual spraying throughout the area protected in 1957 and to extend total coverage to the first extension area to protect a total of approximately 475,000 persons living in predominantly rural areas, including settled inhabitants in villages, seasonal migrants and nomads. Malariometric surveys and entomological investigations will be continued to evaluate results and to modify the strategy as required to meet the eventual objective of eradication. Attention will be given to special problems related to the movements of nomads and migrating pilgrims travelling across the area.

12. Estimation of requirements for 1958: The choice of dieldrin as the insecticide to be used for residual spraying in the area being covered in the first two years is based on the observed long transmission season in the Sudan, coupled with the fact that during this season larger parts of these areas are not accessible due to rains. During the rainy season which lasts generally from July to October, roads are closed by Government order so that practically all motor transport ceases. For this reason it has become necessary to make use of an insecticide with a longer residual effect. There is reason to believe however that these conditions may not prevail everywhere and especially in the extension area for the third year. In order to determine whether it may be possible to use a less costly insecticide in areas which are relatively more accessible the year around, limited tests will be carried out in 1958 on residual spraying with DDT and BHC. Small quantities of these insecticides are requested for testing; 9,000 persons will be protected in the test areas.

13. The spraying operations in 1957 have provided data to show that the surface to be sprayed per person protected averages 30 square metres. This includes the typical huts (tukuls) in villages and houses in towns and larger communities. It has been necessary to include in the spraying programme other structures than those used as living quarters, such as accessory huts for kitchens, stores and stables, since these have all been found to be mosquito resting places. The proposed spraying plan for 1958 is provisionally based on a single annual spraying of 0.5 gramme of technical dieldrin per square metre.

14. The operation in 1958 will include an area which has somewhat similar conditions to those existing in African tropical forests where the transmission season may extend to almost the entire year around. According to reports from West Africa, it is apparent that under given conditions residual spraying alone may not be effective in checking malaria transmission, particularly because the prevailing vector species, A. gambiae, is known also to rest outdoors in the forest. Therefore it is proposed to supplement residual spraying with the provision of prophylactic drugs, e.g. Daraprim, for the protection of groups of

population (totalling several thousands) in areas where such treatment is indicated.

Organization of personnel

15. The pilot eradication project is under the supervision of the Director General of Public Health, Ministry of Health, who also directs the malaria control work being continued by the Government in other provinces. In due course, when firmer criteria for a country-wide programme of malaria eradication have been set forth, a permanent anti-malaria service will be established within the Ministry of Health. In 1957 the Government set up a Malaria Co-ordinating Committee to faciliate more direct and continuous co-ordination between the pilot project and malaria control elsewhere in the country, including the Gezira irrigated area.

16. The spraying operation in 1958 will involve the employment of an average of 152 spraying men during the 60 effective days of operation. This is based on the findings from the first year of operation, when the average surface sprayed by a worker amounted to approximately 1,550 square metres daily. These workers will be organized in 38 squads, each with a foreman, four pump- carrying workers and a mixer. Trained sanitary overseers, the number of which will be increased from eight to seventeen by the outset of 1958, will supervise two to three squads each, forming a working crew. Operational control of the spraying work is carried out, under the direction of the international staff and matching members, by six public health officers (sanitarians), four of whom took part in the 1957 programme.

Transport requirements

17. In order to faciliate transportation, the spraying force will be organized in three operational units, each to be provided with two vehicles for super-vision, a small truck and two to three five-ton trucks for the conveyance of labourers and supplies. Trucks are available from the Government, but with the new deployment of the five utility vehicles used in the 1957 programme, the increased workload necessitates the provision of trucks, a utility vehicle and

a station wagon to provide field transportation for the international and national senior technicians.

18. A serious problem has also been encountered with respect to the lack of adequate water supplies in a great many villages where available wells often provide insufficient quantities to meet the requirements for spraying. Water will therefore have to be transported in drums over considerable distances, and while it is hoped that this can be arranged for the most part by use of existing transport, three trailers have been requested to give extra loading space for this purpose. A further review of transport and maintenance will be undertaken when the UNICEF Area Transport Officer visits the project at the beginning of 1958.

19. The survey work in 1958 will involve the establishment of field units, based on existing dispensaries in the project area and staffed by a laboratory technician and a sanitary aid. Training of such staff, including seven laboratory technicians, is being continued in 1958 by the international staff. Additional laboratory equipment is requested for these field stations.

UNICEF commitments

20. UNICEF would provide for the 1958 programme the following supplies and equipment:

	US$	US$
a) Insecticides (paras.12 and 13)		30,129
Dieldrin, 50% wettable, 33,000 lbs.	29,700	
DDT, 75% wettable, 1,100 lbs.	253	
BHC, 6.5% gamma isomer, 1,100 lbs.	176	
b) Anti-malaria drugs (para.14)		2,500
Daraprim tablets, 25 mgm. 240,000		
c) Transport (paras.17 and 18)		14,095
Trucks, 3	7,500	
Station wagon, 4-wheel drive, 1	2,100	
Utility vehicle, 4-wheel drive, 1	1,850	
Spare parts for these vehicles	1,145	
Trailers, 3	1,500	
d) Sprayers with sets of spare parts and nozzles		1,756
to supplement stock of existing pumps, 125		
e) Laboratory and other equipment (para.19)		1,975
Microscopes, chemicals, glassware and other equipment for field stations and survey teams		
f) Contingencies		1,545
Total supplies and equipment		52,000
g) Freight		5,000
Total recommended allocation		57,000

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WHO approval and participation

21. This project has the technical approval of WHO. A WHO consultant malariologist visited the Sudan last December and January, and the regional malaria adviser has since been to the field twice to advise on the implementation of the project. A three-man WHO team is stationed in the country on a three-year assignment financed with Technical Assistance funds. The WHO budget for this purpose for 1958 is $23,263. A national malariologist will study abroad on a twelve-months WHO fellowship during the next year.

Government commitments and matching

22. The Government has provided all local supplies and services required to implement this project, including premises and other facilities for the project headquarters at Sennar, as well as eight trucks. In 1958, further accommodation will be made available for field stations throughout the areas under protection. The national permanent staff and temporary workers will be increased in accordance with the requirements of the expanded operations next year. The direct annual cost of this project to the Government, over and above the cost of normal malaria control carried out in other provinces, will increase from LE 25,000 (US$71,750) in 1957 to LE 35,000 (US$100,450) which is the matching cost for 1958 for the allocation now recommended. In addition, approximately LE 7,000 (US$20,090) will be drawn from the regular malaria control budget, to cover the cost of personnel regularly employed in the larger control operations who are to be transferred to the pilot project for work in 1958.